FACTORS AFFECTING HEALTHCARE SUPPLY CHAIN PERFORMANCE IN TANZANIA: A CASE OF MEDICAL STORES DEPARTMENT HEADQUARTERS

Geofrey Philemon MWAKASALA
Mzumbe University Dar es Salaam Campus, Tanzania

Edward MAKOYE
Mzumbe University Dar es Salaam Campus, Tanzania

Abstract:

This study examined factors affecting healthcare supply chain performance in Tanzania. Specifically, the study examined the effect of information technology and inventory control practices on healthcare supply chain performance in Tanzania. The study was conducted in Dar es Salaam region and involved Medical Stores Department (MSD) Headquarters. The study used mixed research approach and a cross-sectional design. Out of 209 populations, 137 respondents were selected as sample size randomly. In data collection, questionnaires and interview were used as tools for collection of data. The study used descriptive and inferential (linear regression) analysis. Findings established that, information technology has positive and statistically significant influence on healthcare supply chain performance. Also, inventory control practices have positive and significant effect on healthcare supply chain performance. The study recommends that, the healthcare sector together with Medical Stores Department (MSD) in Tanzania should consider increasing their investment in information technology infrastructure. This could involve upgrading existing systems, adopting new technologies, and ensuring that IT resources are adequately allocated to support healthcare supply chain operations. Also, healthcare sector and MSD need to ensure seamless integration of different IT systems within and between healthcare organizations. Moreover, MSD should put more emphasis on improving their inventory management systems to ensure that inventory is properly managed and tracked.

1. Introduction

The healthcare supply chain being responsible for the distribution of vital medical resources from manufacturers to patients faces numerous global challenges. These include but not limited to imbalances between demand and supply, especially during healthcare crises like pandemics, which results to shortages. Also, inadequate coordination among stakeholders in healthcare supply chain causes its inefficiencies as reported by Spieske, Gebhardt, Kopyto and Birkel (2022).

Other challenges of facing healthcare supply chain are complex and fragmented structures resulting to difficulties in managing inventory. It is also associated with challenges of maintaining quality control on medical supplies to prevent substandard or counterfeit products, disruptions due to unanticipated events that obstruct critical supplies and inventory management struggles due to inaccurate projections (NAOT, 2015 and Lakshmy, 2021). Duong, Moles, Chaar, and Chen (2019) spotted that the challenges of technological gaps and lack of integration, logistical hurdles in transporting sensitive medical items, financial constraints affecting cost-effective quality, healthcare inequalities impact negatively on access and distribution of medical items. WHO (2017), holds that challenges in healthcare delivery includes shortage of skilled personnel for efficient management, and growing concerns about sustainability and the need to reduce waste. Also, Deloitte, (2019) provided that, stock out rate lies at an average of 24% for vital items and out-dated goods has increased by 37% over the past one year. In addition, the dormant, outdated and slow-moving items raised by 136% for same period which are valued about over 11.7 billion expired in MSD warehouses (Deloitte, 2019).

Inadequate stock management practices contribute to healthcare supply chain problems (NAOT, 2015). Manual record-keeping, lack of real-time data and poor forecasting methods can result in overstocking or under stocking of essential healthcare commodities (NAOT, 2015). This disturbs healthcare service delivery, leading to shortages of critical medicines and medical supplies. Furthermore, the limited financial resources and inconsistent funding for healthcare services impact the supply chain. For instance, Deloitte, (2019) reported that, while demand for medicine has been growing at an average of 46.7% for the past 4 years, funding for medicine and medicine supplies has been declining at an average of 74.5% over the past 4 years.

Globally, healthcare supply chain is an issue of public attention due to its great effect on delivery of healthcare services in a more effective and efficient way. It has become an increasingly important factor in order to reduce poor utilization of resources thereby improving healthcare qualities (Zhang, et al. 2022).

Several reviews based on Tanzania healthcare supply chain have been conducted recently for instance, Ruhago, et al. (2022); Githendu, et al. (2020); Massawe (2019); Fredrick (2018) reported significant gains in improving the performance of the healthcare supply chain. However, the availability and accessibility of vital medical and equipment has continued to remain uneven, with availability of essential medicines in the public sector health supply chain in Tanzania is 56% (Githendu, et al. 2020). Therefore, this study examined the key factors affecting the healthcare supply chain performance in Tanzania.

This study categorically aimed at examining the effect of information technology and the influence of inventory control practices on supply chain performance (SCP) of healthcare in Tanzania in order to identify and address challenges as well as exploiting the opportunities that are likely to impact the availability, accessibility and quality healthcare resources. By examining the effect of information technology and the influence of inventory control practices on SCP of healthcare in Tanzania, strategies can be developed to improve information technology and enhance inventory control practices thereby improving overall healthcare SCP. This study intends offer valuable insights for policymakers, healthcare administrators, and stakeholders to make informed decisions and implement interventions that can strengthen the supply chain and ultimately improve healthcare services delivery in Tanzania.

2. Literature Review
2.1 Theoretical Literature Review
Resource Dependency Theory

The theory, which was created in the 1970s by Jeffrey Pfeffer and Gerald Salancik, explains how organizations interact with their surroundings to obtain the resources necessary for them to run efficiently (Werner, 2008). The Resource-Based Theory concentrates on how an organization's performance and competitive advantage are influenced by its special resources and capabilities. Theory associated with several key concepts namely: resource scarcity, interdependence, power asymmetry, resource munificence, resource control and environmental uncertainty.

The theory provides further that, an organization's competitive advantage originates from its valuable, rare, inimitable, non-substitutable resources and the unique way they are developed through core capabilities. Thus, an organization with unique and non-imitable resources is likely to outperform other firms in the industry.

According to Håkansson and Ford (2002), the theory explains how businesses and other organizations depend on one another's resources such as access to raw materials, goods, services, financing, expertise, and transportation and logistics infrastructure in order to survive and thrive. Therefore, it is considered that resource dependency links buyers and suppliers together in a network, and that these ties are defined by the correlation of new resources and the interchange of current resources (Håkansson & Ford, 2002).

In this context, technological infrastructure and network availability are a crucial aspect. The theory would suggest that the availability of technological infrastructure can positively impact supply chain performance (Raj, Mukherjee, De Sousa & Srivastava 2022).

In addition, efficient inventory management practices can be seen as a valuable capability which is likely to impact positively the healthcare supply chain. Effective inventory control contributes to minimizing costs, reducing waste, and ensuring timely availability of medical supplies. The theory would suggest that organizations capable of managing their inventory effectively are more likely to maintain a competitive edge in their supply chain operations.

2.2 Empirical Literature Review

Hashmi, Noor and Yusnita, (2020) used a quantitative approach and a sample size of 200 from a target population 2899 was selected. The finding provide that supply chain management practices did exert a significant positive effect on integrated systems, as well as proportionate to each other this implies that improving supply chain management practices will enhance healthcare performance. Also, structural equation modeling revealed that IS exerted a statistically significant positive effect on healthcare performance: improvements to integrated systems will improve healthcare performance.

Odero (2016) found relationships amongst supply chain components and hospitals' operational efficiency. The investigation used 11 government hospitals. Both primary and secondary data were employed in the investigation. The results indicated that respondents gave the degree of technology, inventory control, and legislation a mean rating of 3.45 and 3.45, respectively. A substantial positive association (r = 0.869) between financial perspective, learning and creativity was found in the correlation result. The study came to the conclusion that the supply chain in government hospitals was moderately impacted by a number of elements, including government rules, inventory management, distribution routes, staff competency, technological level, and procurement procedures.

Fredrick (2018) examined the aspects influencing performance of pharmaceutical supply chain at Medical Store Department (MSD) in Dar es Salaam Tanzania. The study used exploratory research design. From population of 220 employees a sample of 65 was randomly selected. Questionnaire was the means of collecting data. Findings established that information sharing; employees' competence, and infrastructures and inventory control had significant influence on the performance of pharmaceutical supply chain. Based on the empirical reviews, two (2) hypotheses were developed as shown below: -

H01: Information technology has significant positive influences on supply chain performance for healthcare in Tanzania.

H02: Inventory control has significant positive influences on supply chain performance for healthcare in Tanzania.

3. Methodology

The study used cross-sectional research design to allow a researcher to capture a snapshot of the healthcare supply chain performance and the key factors influencing it at a specific point in time. Also, the design was employed for being more efficient and cost-effective compared to longitudinal designs. The study location, Medical Stores Department Headquarters – Dar es Salaam, was selected for its relevance to the study for being the main player responsible for managing, procurement and distribution of medical supplies which provides comprehensive analysis of the healthcare supply chain in Tanzania. The study population comprised 209 participants, with a sample size of 137 determined using Yamane (1967) formula, ensuring a 95% confidence level and a 5% margin of error. The sampling techniques included both purposive and simple random sampling, allowing for a representative sample of the relevant departments and key informants.

Data collection involved both primary and secondary data, utilizing questionnaires and interviews to collect first-hand information, supplemented by a review of existing documents (documentary reviews) with the need to discover and familiarize the researcher on data/information known by the organization of study which in turn was of great value to discover information which was not known. The reliability and validity of the data were ensured through test and retest as well as pilot study, and consistent testing of the research instruments. Data analysis was conducted using quantitative and qualitative methods, including content analysis, descriptive and inferential statistics, with a focus on multiple and linear regression analysis to understand the influence of information technology and inventory control practices on healthcare supply chain performance in Tanzania.

4. Findings And Analysis

4.1 Descriptive Statistics

4.1.1 Descriptive Statistics of Information Technology

The results indicate 68.5% (37.4% strongly agree and 31.1% agreed) of the respondents were on agreement side that the technology used in healthcare supply chain in Tanzania is inadequate, whereas 13.9% were undecided (neutral), and 17.4% (14.8% disagreed, and 2.6% strongly disagreed) were on disagreement side. This suggests that majority of respondents believe that the technology used in the healthcare supply chain in Tanzania is insufficient. The mean value of 2.1 which is below average indicates most of respondents were on agreement side on the statement that

level of technology used in healthcare supply chain in Tanzania is insufficient. The impression of insufficiency suggests that Tanzania's healthcare supply chain is experiencing operational difficulties as a result of inadequate technology. This could result in problems with the supply chain management procedure, like delays, inefficiencies, or mistakes. Furthermore, insufficient technology within the healthcare supply chain may have a domino impact on the healthcare delivery system as a whole. Effective patient care depends on the timely and accurate provision of medical resources, and any flaws in the supply chain may have an influence on the quality of care.

Likewise, results show the total agreement on the ICT positively impacting the healthcare supply chain lands at 71.3% (33.0% and 38.3% strongly agree and agree respectively) that Information and Communication Technology has a significant positive impact on healthcare supply chain performance (see Table 1). A 9.6% of respondents expressed a neutral stance, indicating that they neither agree nor disagree with the statement about the impact of ICT on healthcare supply chain performance. A notable but smaller percentage about 6.1% of respondents disagree that ICT significantly affects healthcare supply chain performance.

This suggests some divergence in opinions. Also, mean value of 2.21 exposed most respondents were on agreement on the Information and communication technology greatly affects the healthcare supply chain performance. The overall outcome on the ways ICT is impacting healthcare supply chain is positively improving it.

In Tanzania, Medical Stores Department (MSD) has implemented the EPICOR-10 inventory control system to manage pharmaceutical supplies. The EPICOR-10 system has improved pharmaceutical inventory management by providing automated, integrated platform to track stock levels, generate orders, and manage the supply chain. EPICOR-10 provides real-time data on stock levels and expiry dates, enabling automated order generation based on consumption data, improving inventory accuracy and reducing stockouts thereby enhancing effective and efficient healthcare supply chain.

Table 1 exposed that players in the healthcare supply chain in Tanzania adopts ICT due to its usefulness in improving supply chain performance. A majority of the respondents 67.8% (23.5% strongly agree and 44.3% agree) provided that ICT has been useful in supply chain performance. Also, a minority (13.9%) are neutral, indicating that they do not strongly disagree with the statement. A very small percentage (18.2%) disagreed with the statement.

Results as presented from table 1 indicates that 33.9% and 38.3% strongly agree and agree respectively and suggesting that they believe ICT plays a crucial role in facilitating timely information sharing between different stages of the healthcare supply chain. This indicates a widespread acknowledgment of the positive impact of technology on improving supply chain performance in the healthcare sector. A smaller (7.0%) portion of respondents remains neutral, indicating that some individuals may not have a strong opinion or may require more information to form a conclusive viewpoint regarding the role of ICT in healthcare supply chain performance. A minority (23.8%) of respondents disagrees with the statement. Generally, the majority's positive stand suggests a consensus understanding on the significant role of ICT in improving information sharing and, consequently, supply chain performance in the healthcare sector.

Table 1 likewise designates that, a substantial majority 71.3% (28.7% strongly agree and 42.6% agree) of respondents holds a positive view, indicating that the use of ICT results to effective and efficiency record tracking system which is of great importance on performance of healthcare supply chain. This implies a widespread recognition that leveraging technology can contribute to making an efficient and effective healthcare supply chain. A minority (16.5%) of respondents disagrees with the statement.

Table 1: Descriptive Statistics of Information Technology

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree	Mean
The level of technology used in healthcare supply chain in Tanzania is inadequate	43(37.4%)	36(31.1%)	16(13.9%)	17(14.8%)	3(2.6%)	2.13
Information and communication technology greatly affects the healthcare supply chain	38(33.0%)	44(38.3%)	11(9.6%)	15(13.0%)	7(6.1%)	2.21

performance						
Players in healthcare supply chain have adopted the use of ICT due its usefulness in supply chain performance	27(23.5%)	51(44.3%)	16(13.9%)	15(13.0%)	6(5.2%)	2.32
ICT ensures timely information sharing between different stages of supply chain which in turn affects positively the healthcare supply chain performance	39(33.9%)	44(38.3%)	8(7.0%)	16(19.5%)	5(4.3%)	2.19
The use of ICT in healthcare supply chain results to timely fulfillment of customer requirements	35(30.4%)	45(39.1%)	11(9.6%)	17(14.8%)	7(6.1%)	2.27
The use of ICT results to effective and efficiency record tracking system which is of great importance on performance of healthcare supply chain	33(28.7%)	49(42.6%)	14(12.2%)	14(12.2%)	5(4.3%)	2.20

4.1.2 Descriptive Statistics of Inventory Control

This section presents results of the descriptive statistics related to inventory policies and control within the context of healthcare supply chains. The majority of respondents strongly agreed and agreed to the statement by 47.0% and 24.3% respectively. The mean value of 2.04 indicates an agreement on the inventory policy has promoted good storage of healthcare supplies as indicated in Table 2. In summary, the results reveal that a significant proportion of respondents hold positive stands of the inventory policy's influence on the storage of healthcare supplies across healthcare supply chain actors, with a moderate overall level of agreement.

Second statement results show that a significant proportion agreed or strongly agreed (66.0% combined) that inventory control policy has influenced the performance of the healthcare supply chain. Inventory control policy is assisting on making supplies available hence increase efficiency and effectiveness of the healthcare supply chain. Also, mean value of 2.20 suggests a moderate to high level of agreement on the inventory control policy has influenced the performance of the healthcare supply chain.

In addition, Table 2 established that, a substantial number of respondents agreed or strongly agreed (65.3% combined) that inventory control has resulted in economies of scale, leading to a less costly healthcare supply chain. Moreover, mean value of 2.26 indicates a relatively high level of agreement. Likewise, results from Table 2 shows that most respondents agreed and strongly agree by 36.5% and 27.0% respectively inventory control at MSD aided in improving the delivery time of healthcare services. Also, mean value of 2.19 suggests a moderate to high level of agreement.

In addition, table 2 shows that a significant proportion of respondents agreed (33.9%) and strongly agreed (32.9%) on inventory control has resulted in increased sales as there have been no missed sales. The mean value of 2.22 indicates a high level of agreement on inventory control has resulted in increased sales. In this context, a mean value of 2.22 suggests that, on average, respondents lean towards agreement with the statement that inventory control has resulted in increased healthcare supply chain performance. These results carry implications for services offered by the organizations that employ inventory control practices have best outcome on healthcare supply chain. The high

level of agreement among respondents indicates association among effective inventory management and improved healthcare performance.

In addition, results indicate that a significant number of respondents agreed (36.5%) and strongly agreed (34.8%) on the inventory control practices being meant to ensure order accuracy along the healthcare supply chain. The mean value of 2.16 suggests that most of respondents of the healthcare organizations participated in study were on the agreement side that inventory control practices across healthcare supply chain actors is meant to ensure order accuracy in the healthcare supply chain. The result concludes that there is a significant degree of consensus among respondents concerning the function of inventory management procedures in guaranteeing order accuracy in the healthcare supply chain. This result implies that respondents had a common understanding of how important inventory management is to preserving accuracy and dependability in order fulfillment in the healthcare industry.

Table 2: Descriptive Statistics of Inventory Control Practices

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree	Mean
Inventory policy has promoted good storage of healthcare supplies.	54(47.0%)	28(24.3%)	14(12.2%)	12(10.4%)	7(6.1%)	2.04
Inventory control policy has influenced the performance of healthcare supply chain	38(33.0%)	38(33.0%)	23(20.0%)	10(8.7%)	6(5.2%)	2.20
Inventory control has resulted to economies of scale which results to less costly healthcare supply chain	34(29.6%)	41(35.7%)	21(18.3%)	13(11.3%)	6(5.2%)	2.26
Inventory control at MSD aided to improve the delivery time of healthcare services	42(36.5%)	31(27.0%)	24(20.9%)	14(12.2%)	4(3.5%)	2.19
Inventory control has resulted to increased sales	37(32.9%)	39(33.9%)	23(20.0%)	9(7.8%)	7(6.1%)	2.22
Inventory control has reduced unnecessary delays in providing customer services there by improving service levels	31(27.0%)	44(38.3%)	21(18.3%)	9(7.8%)	10(8.7%)	2.33
Inventory control practices is meant to order accuracy in the healthcare supply chain	40(34.8%)	42(36.5%)	17(14.8%)	7(6.1%)	9(7.8%)	2.16

4.1.3 Descriptive Statistics of Supply Chain Performance

Table 3 provides descriptive statistics regarding the respondents' views of supply chain performance in the context of healthcare in Tanzania. Results of first statement indicate that 38.3% and 36.5% strongly agreed and agree respectively that healthcare services delivered in Tanzania are timely accessed. The mean value of 2.18 indicates a moderate to high level of agreement, suggesting that respondents generally consider healthcare services in Tanzania to be timely accessed. Likewise, results of second statement indicates that 35.7% and 38.3% of respondents strongly agree and agree respectively that healthcare services deliver in Tanzania are characterized by high order accuracy. The

mean value of 2.34 indicates a relatively high level of agreement, suggesting that respondents generally consider that healthcare services in Tanzania exhibit high order accuracy.

Results of the last statement show that, 34.8% and 39.1% of respondents strongly agree and agree respectively that health-care services delivery in Tanzania is cost-effective. The mean value of 2.36 indicates a relatively high level of agreement, suggesting that respondents generally consider healthcare services delivery in Tanzania to be cost-effective. In summary, the descriptive statistics in Table 3 reveal a positive perception among respondents regarding supply chain performance in healthcare in Tanzania. The majority of respondents believe that healthcare services are timely accessed, characterized by high order accuracy, and cost-effective. The mean values for all three statements are above 2.0, indicating an overall agreement with positive attributes related to supply chain performance in the healthcare sector in Tanzania.

Table 3: Descriptive Statistics of Supply Chain Performance

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree	Mean
The healthcare services delivered in Tanzania are timely accessed	44(38.3%)	42(36.5%)	3(2.6%)	16(13.9%)	10(8.7%)	2.18
The healthcare services delivered in Tanzania are characterized by high order accuracy	41(35.7%)	44(38.3%)	1(0.9%)	8(7.0%)	21(18.3%)	2.34
Healthcare services delivery is cost effective	40(34.8%)	45(39.1%)	1(0.9%)	6(5.2%)	23(20.0%)	2.36

4.2 Factor Analysis

The researcher used factor analysis technique through Principal Component Analysis (PCA) as extraction technique and Varimax as rotation technique to test the sampling acceptability and suitability of data for further analysis. The results indicate that KMO and Bartlett's Teston was 0.958 and p-value was 0.000 which is acceptable and appropriate for the study as recommended by Pallant (2005) as shown in Table 4.

Table 4: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.958
Bartlett's Test of Sphericity	Approx. Chi-Square	4167.586
	df	496
	Sig.	.000

4.3 Inferential Statistics

This section presents results of linear regression model that examine the effect of information technology and inventory control practices on supply chain performance of healthcare in Tanzania. The dependent variable of supply chain performance regressed against two independent variables of information technology and inventory control practices. The inferential statistics are made up of the model assumptions like normality test and multicollinearity. All these are presented here down then will be followed by main results.

4.3.1 Multicollinearity

Table 5 presents the Variance Inflation Factor (VIF) and Tolerance for every independent variable in the model. The degree to which a variable may be anticipated by the other independent variables in the model is known as its tolerance. A variable that has a low tolerance value is significantly associated with the other independent variables and might be a factor in multicollinearity. The degree of multicollinearity can be determined using VIF, which is the reciprocal of the tolerance value. In general, multicollinearity is indicated by a VIF value of less than 5 or greater than 10, which denotes strong multicollinearity. Since none of the independent variables in this instance had VIF values greater than 5, multicollinearity is not present. Overall, the results show that the independent variables in the model do not significantly multicollinear.

Table 5: Multicollinearity

Variable	Tolerance	VIF
Information Technology	.209	4.786
Inventory Control Practices	.243	4.108

4.3.2. Heteroscedasticity

Heteroscedasticity identified using scatter plot. If the scatter plot displays a pattern, for instance a curve, it designates violation of the assumptions of homoscedasticity. The study results show asymmetrical structure, therefore there is no problem of heteroscedasticity and variance of residual is constant for all observation.
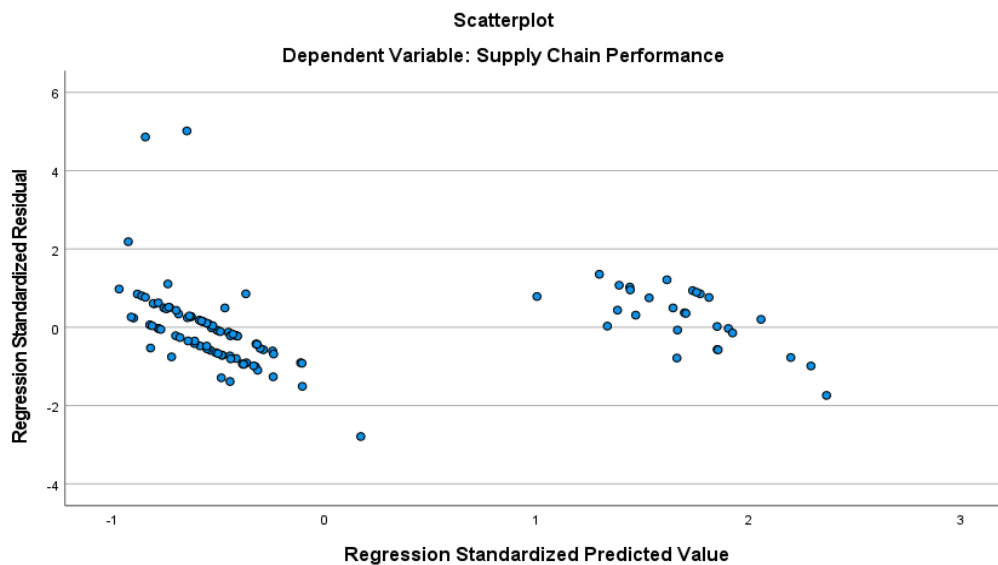

Figure 1: Scatter Plot

4.3.3 ANOVA Table

Results from Table 6 shows F-statistic of 197.405, with probability value of 0.000 which is less than 0.05. This implies that there is at least one among the independent variables within the model statistically significant influence on the dependent variable. This means that, at least one of two independent variables of information technology and inventory control practices statistically significant influence SCP of healthcare in Tanzania hence giving the required impacts on healthcare supply chain since the overall regression model is statistically significant.

Table 6: ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	97.585	3	32.528	197.405	.000[b]
	Residual	18.291	111	.165		
	Total	115.875	114			

a. Dependent Variable: Supply Chain Performance

b. Predictors: (Constant), Inventory Control Practices and Information Technology

4.3.4 Residuals Normality

This subsection shows result of normality test. The histogram's results are shown in Figure 2, where the residuals formed a symmetric bell-shaped curve around zero. The residual is therefore regularly distributed. Similarly, conclusions taken from Figure 4.3 emphasize that the observed residuals would be shown to closely coincide with a straight line in an ideal normal p-p plot, showing that the residuals follow a normal distribution. This alignment supports the theory that the residuals' normality assumptions are maintained in the context of the regression model.
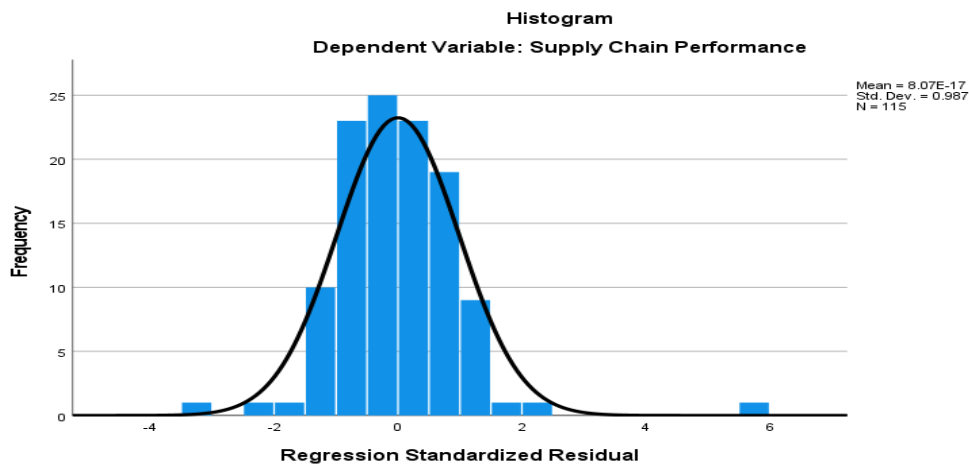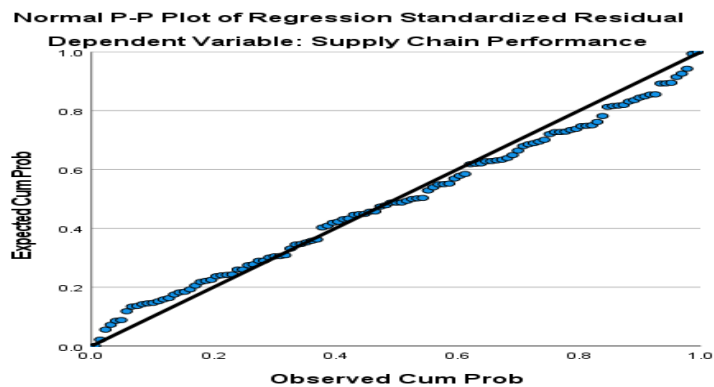

Figure 2: Histogram

Figure 3: Normal P-P Plot

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4.3.5 Test for Normality
The results of two normality tests, Kolmogorov-Smirnova and Shapiro-Wilk, are presented in Table 7. The p-value for the Shapiro-Wilk test is 0.057, and the probability value for the Kolmogorov-Smirnova test is 0.089 in this instance. A probability value of less than 0.05 typically denotes a non-normal distribution of the residual. The p-values in this instance, however, are higher than 0.05, meaning that at the 0.05 level of significance, we are unable to reject the null hypothesis of normality. As a result, the study determines that the regression model's standardized residuals have a normal distribution.

Table 7: Test for Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Standardized Residual	.134	141	.089	.909	141	0.057

a. Dependent Variable: Healthcare Supply Chain Performance

4.4.1 Information Technology and Healthcare Supply Chain Performance
The first objective was to investigate how information technology is affecting Tanzanian healthcare supply chains performance. The impact of information technology on the supply chain performance of healthcare was found to be positive and significant at 1%. A change in information technology is associated with a 0.398 increase in the supply chain performance in the delivery of healthcare services, ceteris paribus as shown in Table 8. The findings are showing the ways information technology increases supply chain efficiency in Tanzania's healthcare. The results align with formulated hypothesis and conclude information technology related with increased supply chain performance of healthcare services delivery in Tanzania.
The afore-mentioned result is supported by interview question responded as follows;
"In Tanzania, information technology is revolutionizing the performance of the healthcare supply chain by enhancing real-time insight into patient data and streamlining the movement of medical supplies, the electronic health record system helps healthcare providers make more informed decisions and eventually increases the effectiveness of providing healthcare services. For example, precise tracking of medications and medical supplies is ensured by employing sophisticated inventory management systems. This lowers waste and lessens the possibility of shortages, which greatly improves the cost-effectiveness of providing healthcare services" (Head of Procurement Department).

"In the current digital era, information technology is essential to streamlining Tanzania's healthcare services supply chain. Predictive analytics, for example, makes it possible to foresee demand, which facilitates proactive planning and guarantees that necessary medical supplies are always on hand when needed. All of these benefits have a significant impact on the dependability and responsiveness of healthcare service. Similarly, information technology spurs innovation in Tanzania's healthcare supply chain management. Utilizing technology to facilitate safe and transparent transactions guarantees the supply chain's integrity. In addition to increasing stakeholder trust, this improves pharmaceutical traceability, lowering the possibility of fake medications and guaranteeing patient safety." (Head of ICT Department)

4.4.2 Inventory Control Practices and Healthcare Supply Chain Performance
Regression analysis reveals that inventory control procedures have a positive and substantial impact at 1% (p_value = 0.001). Increasing inventory management procedures by one unit is linked to a 0.300 increase in healthcare supply chain performance, all other things being equal. This implies that higher inventory control practices encourage increasing supply chain performance of healthcare in Tanzania. The results align with formulated hypothesis and conclude inventory control practices related with increased supply chain performance of healthcare in Tanzania.

Finding also consistence with interview as indicated by different participants as follows:

"The foundation of our healthcare supply chain is inventory control. Inventory control practice maximizes resource utilization, cutting waste, and promoting a smooth flow of medical supplies, it changes the performance landscape. A well-designed inventory management plan has the potential to improve Tanzania's whole healthcare system and guarantee more sustainable and responsive service delivery to the public". (Head of Logistics Department)

"Inventory control has a significant impact on Tanzania's healthcare supply chain. For instance, via inventory control we can improve service delivery and cost-effectiveness by maintaining precise medical stock levels and effective distribution to hospitals, healthcare and dispensary. This promotes and expand access to healthcare services throughout the area." It also prevents stock outs, and contributes to the overall effectiveness of healthcare services delivery, especially in resource-constrained environments. Thus, effective inventory control is synonymous with reliability in healthcare services. It minimizes the risk of shortages, empowers healthcare providers to focus on patient care (Head of Procurement Department)

4.5 Hypothesis Test
The results from regression analysis based on specific objectives show that, the study failed to reject alternative hypothesis that there is significant relationship between information technology, inventory control practices and supply chain performance of healthcare in Tanzania. Table 4.9 shows summary of hypothesis test.

Table 9: Hypothesis test

Hypothesis	Relationship	Sig .value	Decision
There is significant relationship between information technology and supply chain performance of healthcare services delivery in Tanzania	Positive	0.00	Fail to reject
There is significant relationship between inventory control practices and supply chain performance of healthcare services delivery in Tanzania	Positive	0.00	Fail to reject

5. Discussions
5.1 ICT and Healthcare Supply Chain Performance
Findings on the impact of information technology on the supply chain efficiency of the provision of healthcare services were found to be positive and statistically significant at 1%. When all other parameters are held constant, there is a 0.398 correlation between an increase in information technology and an improvement in the supply chain performance of healthcare in Tanzania. The findings support the hypothesis and indicate that information technology improves the efficiency of the healthcare supply chain.
Findings are consistent with Hashmi, A. R. et al, (2020) who look into the relationship between supply chain management practices and public healthcare performance in Punjab. Findings of structural equation modeling indicated that information system exerted a statistically significant and positive effect on supply chain performance of healthcare services delivery. Thus, improvements to integrated systems will improve healthcare performance.
Similarly, the findings are consistent with Mathur, et al. (2018) on the study on relationships between supply chain practices, organizational performance (OP), and the efficacy of supply chain performance (SCP) in the healthcare industries. The findings indicated that information communication technology has an impact on the effective supply chain performance in the Indian healthcare sectors.
Furthermore, the study is also consistent with Apwoka (2018) on variables affecting the effectiveness of the procurement process in public hospitals at Kenyatta National Hospital. The research revealed a significant correlation between information and communication technology and the effectiveness of the procurement process.
The findings also support the resource dependency theory, which demonstrates how businesses and other organizations depend on one another's resources that is, on access to infrastructures like information technology in order to survive and prosper (Håkansson & Ford, 2002). Because suppliers and purchasers are connected in a network due to their reliance on resources, and because of the development of information technology, these

connections or interactions are marked by the sharing of current resources and the correlation of new resources (Håkansson & Ford, 2002).

5.2 Inventory Control Practices and Healthcare Supply Chain Performance
Regression analysis results indicate that inventory control procedures have a positive and substantial impact at 1%. When all other parameters remain unchanged, an increase of one unit in inventory control practices is linked to a 0.300 improvement in supply chain performance. This means that, when all other variables are held constant, inventory control procedures are linked to a 30.0% improvement in the supply chain performance of healthcare in Tanzania. This implies that higher inventory control practices encourage increasing supply chain performance of healthcare in Tanzania. The results align with formulated hypothesis and conclude inventory control practices related with increased supply chain performance of healthcare in Tanzania.

Precise inventory management helps companies to avoid overstocking, which reduces the risk of holding obsolete or unsellable products. In addition, customer satisfaction is directly influenced by the availability and timely delivery of products. Efficient inventory control ensures that products are available when customers need them, reducing instances of stockouts and backorders. Also, streamlined processes result from effective inventory control, making the supply chain more efficient. With accurate inventory data, businesses improve demand forecasting, leading to more efficient production schedules and reduced lead times. Adopting lean inventory practices, such as just-in-time (JIT) inventory management, minimizes waste and ensures that resources are used efficiently.

Findings align with Odero, (2016) who investigated the influence of supply chain on performance of Kenya public hospitals. The study concluded that inventory management and distribution channels have significant and positive influence on supply chain for government hospitals. Also, Asamoah et al, (2023) on the influence of supply chain visibility on supply chain performance in Ghana health service. Their regression analyses exposed that supply chain visibility and inventory management are associated with an increasing supply chain performance.

Moreover, results align with theory, since inventory control practices can be seen as a valuable capability which is likely to impact positively the healthcare supply chain by addressing problems like stockouts, errors, and inefficiencies (Rosen et al., 2018).

6. Conclusion And Recommendations
6.1 Conclusion
Based on the first objective's results, it can be concluded that, an increase in information technology is correlated with a 0.398 improvement in Tanzania's healthcare supply chain performance. The findings support the hypothesis and draw the conclusion that information technology improves the efficiency of the healthcare services supply chain. Moreover, the study concludes that higher inventory control practices improve healthcare supply chain performance in Tanzania. The results align with formulated hypothesis and conclude inventory control practices related with increase supply chain performance of healthcare in Tanzania.

6.2 Recommendations
Based on the result of first objective, the study recommends that, healthcare sectors together with medical store department (MSD) in Tanzania should consider increasing their investment in information technology infrastructure. This could involve upgrading existing systems, adopting new technologies, and ensuring that IT resources are adequately allocated to support supply chain operations.

Also, there is the need for continuous training programs for healthcare staff, procurement staffs to enhance their IT skills. Moreover, healthcare sectors and medical store department (MSD) need to ensure seamless integration of different IT systems within healthcare organizations. This integration can facilitate better communication, data sharing, and coordination among various departments involved in the supply chain, ultimately improving overall performance.

The last objective study's findings led to a number of recommendations that may be implemented to enhance Tanzania's healthcare services' supply chain performance. In order to reduce the stockpiling of vast quantities of slow-moving inventory, which eventually results in expired health commodities, the MSD should first employ interventions like the "just in time" inventory model which might be enhanced by raising the order fill rate, would also lower the expenses associated with maintaining inventory, including the holding charge for highly expired

commodities. In addition, it is imperative for the government to prioritize enhancing their inventory management systems to guarantee appropriate inventory management and tracking.

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