



Supply Chain Information Storage and Perceived Service Delivery within Government Health Centres in Kampala Metropolitan Area

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Abstract: This paper explores the relationship between supply chain information storage and perceived service delivery within Government Health Centres in Kampala Metropolitan Area. The study was conducted using a mixed philosophical approach of positivism and interpretivism. Using a cross-sectional research design, data was collected from a sample of 96 health centres in KMA. Data was then analyzed using means, Pearson Correlation Coefficient (PCC) and SEM modeling. Findings indicated a high extent of supply chain information storage (average mean = 4.13 and SD of 0.22) and service delivery (average mean of 4.44 and SD of 0.25) within HCs. These were correlated and it was revealed that supply chain information storage fairly relates with service delivery ($R = 0.737$, $p\text{-value} = .001$) at predictive influence of ($\beta = .818$, $p\text{-value} = .009$), which resulted into the rejection of H_0 . The researchers therefore conclude that, supply chain information storage positively and significantly relates with service delivery within Government Health Centres in Kampala Metropolitan Area..

Keywords: Supply Chain Information Storage, Quality Management, Cost Management, Time management, Service Delivery.

1. INTRODUCTION

Global supply chains have been a key driver in accelerating production and service delivery management (Chuan & Hong, 2015). They have not only been sheer contributors of cost, efficiency and quality management, but have also enhanced collaborations and innovations among organizations (Musau 2021). In order for this to effectively happen, the need to ensure effective supply chain information storage becomes inevitable due its role in enabling responsive and accurate decision making processes possible (Alunguru, et. al., 2017). Furthermore, the growth and development of information technology, information storage can be done in multitudes, in differing forms, at various levels, and in interrelated fashions. These information systems provide us with the ability to quantify information gain or loss using dynamic methods, which are important in improving organizational performance. If translated, one can say, organizations that are destined to succeed must invest in information managed storage systems and computer infrastructure, and fully have them integrated in their supply chain operations or network.

The level at which information processing, storage and flow happens in an organization's supply chain network heavily depends on the nature and robustness of the ICT systems and networks integrated by that organization (Bessick, 2016). The more robust an ICT system is, the more efficient and productive the supply chain network is expected to be (Sheldon, 2021) which is why companies have lately been encouraged to invest extensively in ICT in order to remain competitive.

In Uganda, though technology adoption is on the increase, the use of manual information storage systems dominates among most organizations (Alunguru, et. al., 2017). We believe that it is just a matter of time that this will also come to pass given the rate at which information systems are growing within the country. Government ought to continue providing support to this cause in form of offering tax subsidies to technological equipment and tools (Athman, 2012). There is need to also provide technological liberalism without shutting down social platforms. This will boast acceleration and ICT adoption within the country. Whenever there is effective information liberalism within the country, people tend to be more receptive to ICT adoption and usage which in turn enhances organizations

management. The flow and storage of information enhances clearer understanding of the objectives and aspirations of the organization thus goal congruence and teamwork (Chopra & Meindl, 2013). This also stimulates the processing, analysis and sharing of information within organizations (Gnanasundaram & Shrivastava, 2012). With computer power and infrastructure data storages and management is more efficient and accurate compared to it being collected without such information infrastructure (Bessick, 2016). In the health sector where the numbers of service beneficiaries are high, the need for such information infrastructures is highly necessary for data analysis, storage and retrieval to ensure effective service delivery management (Yip & Hafez, 2015).

1.1. Problem Statement

Government of Uganda has tried investing in modern healthcare data managed systems; however, quite many health centres have continued to experience poor service delivery (Mpaata et al., 2017; Nabukeera, 2016). There is poor quality of medical stock (OAG Report, 2021), accumulation of unnecessary stock in Government health centres (OAG Report, 2011); costly practices such as Pilferage of drugs during distribution, high stocks levels of medicines in some cases (USAID, 2016); and untimely delivery of services in health centres with a lead time of 61.2 days at unavailable rate of medicines of 32-50% among public health units (Okello, et al., 2015). The explanation for this poor service delivery remains less examined. Contemporary theories and literature have mainly concentrated on the consequences of poor service delivery, overlooking the precursors for service delivery (Brugger, 2018). It is against this background that the study intends to examine why in spite of government efforts to boost information management within health facilities, service delivery has remained a challenge within health centres in Uganda.

1.2. Purpose of the Study

To examine the relationship between supply chain information storage and service delivery within Government health centres in Kampala Metropolitan Area. Specifically, the study aimed at: (1) assessing the relationship between supply chain information storage and quality service delivery management; (2) examining the relationship between supply chain information storage and cost management in service delivery; and lastly, (3) evaluating the relationship between supply chain information storage and timely service delivery management within public health centres in Kampala Metropolitan Area

2. REVIEW OF RELATED LITERATURE

2.1. Supply Chain Information Storage and Service Delivery

Supply chain information storage (SCIS) refers to all activities an organization puts forth to archive and provide safe custody to information or data to be used in the supply chain. Information storage also known as record keeping should be seen as a corporate area of endeavor involving the administration of all business information throughout their life cycle. According to Roper & Millar (1999) supply chain information storage activities such as allocation, maintenance and careful conservation of all documents or records under custody promote effective service delivery. Service delivery is the act of providing social needs to customers or nationals of a given country. It is a mechanism used by an organization to meet the needs and aspirations of the people it is meant to serve (MLG, 2013). In health centres, information storage systems are needed to ensure records about organizational operations, say; procurement, stock, patients and so on are kept well.

Without the supply chain information storage function, it is nearly impossible for HCs to actualize efficiency in their operations due to its critical importance in availing data needed for decision making (UHSC Report, 2020). Whenever information is not properly stored, the chances of having reliable information becomes minimal (Alunguru, et. al., 2017). This is why HCs in Uganda ought to ensure that information resources, processed and those retrieved through feedback are properly kept to support future decisions. Though, the use of modern systems is still low within the country, the need to begin integrating computerized systems is very necessary (Athman, 2012). This is the only way the country can guarantee effective service delivery among HCs. According to Takeshita, et. al. (2022) the nature and sophistication of consumer needs require companies to be receptive to information technology, innovations and research if they are to remain competitive in the current global space. Using IT aided storage systems does not only speed up data processing and retrieval, but also enables bulk storage

within limited space (Bessick, 2016). This can save money and resource hence enhancing organizations competitiveness. Studies like Chuan & Hong (2015) and Chopra & Meindl (2013) also underscore the benefits of computerized data storage systems among organizations. Though, some notable limitations cannot go unmentioned, such as; data loss due to malware and equipment acquisition costs. To salvage this, government of Uganda, recently, pledged to support ICT systems with the country by subsidizing and offering tax waives to IT machines in a bid to accelerate information technology adoption. This will boast service delivery among different sectors.

H₀₁: There is no significant relationship between supply chain information storage and perceived service delivery within public health centres in Kampala Metropolitan Area

2.2. Supply Chain Information Storage and Quality Management

According to Asamoah, et. al. (2020) whenever an organization has good information storage systems in its supply chain network, quality management is guaranteed. This is because data quality used in decision making regarding standards and customer service is heavily dependent on the quality of information storage systems of an organization (Sheldon, 2021). The accuracy, completeness, consistency, reliability and validity of information is determined by how that information is protected during its custody (Musau 2021). Well-kept information is normally reliability for decision making. In order for organizations to actualize quality management, the need to enhance their supply chain information storage systems becomes inevitable. This implies that, for health centres to achieve quality service delivery it important to set practices that help ensure that data integrity is maintained since all decision processes are dependent on it (Somasundaram & Shrivastava, 2009). Furthermore, the quest to deliver quality services requires organizations to continually update their information resources in order to meet up with customers' demands and expectations. Healthcare improvement requires a deliberate focus on having a robust up-to-date information databank about the changing needs of patients and other stakeholders (Alunguru, et. al., 2017). This will enable health centres to promptly serve their customers, be responsible of delivering quality services and adherence to standards of safer healthcare management. It is easy to refer to already the available information resources within an organizations supply chain when making critical decisions (Chopra & Meindl, 2013). This enhance quality in services within health facilities.

H₀₂: There is no significant relationship between supply chain information storage and quality service delivery management within public health centres in Kampala Metropolitan Area

2.3. Supply Chain Information Storage and Cost Management

Information storage is a key determinant of costs within the supply chain process of any given organizations (Alunguru, et. al., 2017). This is because managers can easily refer or compare to cost data in order to be in position to control costs areas of the organization (Okiria, et. (2016). Organizations that have poor information storage systems tend to suffer from high operational costs due to lack of proper tracking and monitoring abilities (Gnanasundaram & Shrivastava, 2012). Cost management helps improve patient outcomes, which is an aspiration for any medical manager. By reducing unnecessary costs, medical facilities can allocate resources towards improving patient experience, acquiring advanced equipment, and increasing staffing and so on (USAID, 2016). Healthcare organizations that carefully and strategically reduce spending can avoid negative impact on their ability to deliver an excellent patient experience (Mpaata et al., 2017).

Furthermore, it is quite hard for health facilities to ensure profitability without analyzing cost data, service line profit and loss accounting for their operations on a daily basis. This data has to be archived and analyzed continuously to avoid loss (UHSC Report, 2020). Similarly, in order to achieve sustainability, efficiency and affordable healthcare services within health centres, it is important for healthcare managers to maintain daily cost data about their operations, analyze it periodically for effective decision making (Nabukeera, 2016). Scholars like, Asamoah, et al. (2020) and Takeshita, et al. (2022) have practically indicated that, it's impossible to manage organizational costs without keeping a record on the operational costs of the organization. This makes information storage a central issue for any organization that would wish to control or manager its cost for effective service delivery.

H₀₃: There is no significant relationship between supply chain information storage and cost management in service delivery within public health centres in Kampala Metropolitan Area

2.4. Supply Chain Information Storage and Time Management

Managing time is a key performance metric in healthcare service delivery. Information storage in health facilities supply chain network plays a critical role in the actualization of these metrics. Data helps managers to determine their efficiencies through comparing time performances and finding ways on how to improve it (Sheldon, 2021). Without information resources or data, it is a bit challenging for healthcare managers to measure their performance and get them improved (Somasundaram & Shrivastava, 2009). When time management practices are improved within health centres, it is easy to realize efficient delivery of care, maintain patient safety, and prevent burnout among healthcare professionals. According to Olena (2023) time management techniques are vital for any healthcare business to keep running and delivering high-quality patient care, including minimizing wait times and dealing with emergencies without losing sight of other patients. In order for an organization to have an impactful service delivery drive, the need to enhance time management practices, such as; reporting time, meeting deadlines and ensuring that lead-times are fulfilled by the organization (Musau 2021). Additionally, organizations can only talk about customer professionals service by providing prompt, efficient, and high-quality support to its customers (Alunguru, et. al., 2017). It is on these grounds, that we can say, there is efficiency or time management in service delivery.

H₀₄: There is no significant relationship between supply chain information storage and timely service delivery management within public health centres in Kampala Metropolitan Area

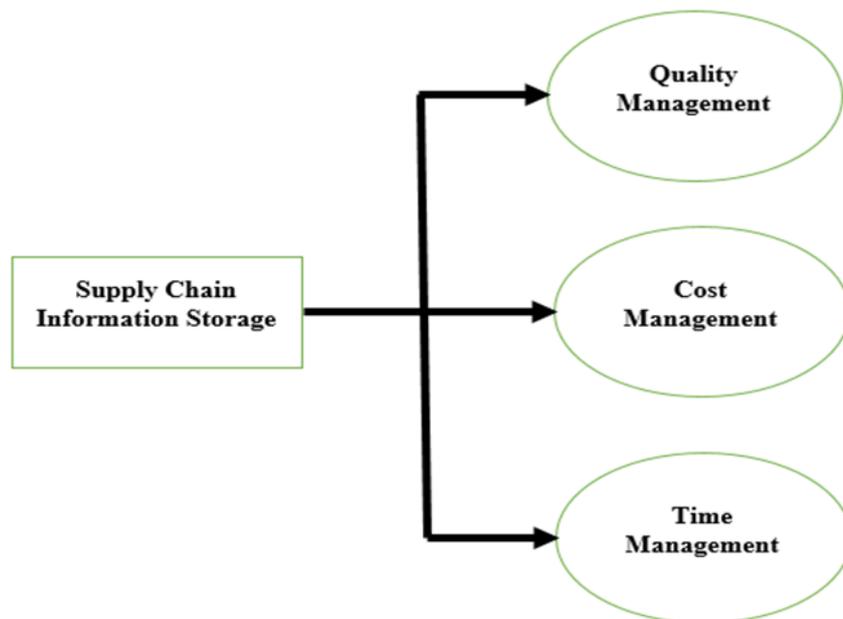


Figure 2.1. Shows the Theorized Model

The model is based on a One-to-Many approach. As postulated, it is supply chain information storage that influences service delivery in form of; quality management, cost management and time management.

3. RESEARCH METHODOLOGY

3.1. Research Philosophy and Approach

The study employed a positivistic and interpretivism research philosophy in order to capture balanced insights. A positive study is that which recognizes only what can be scientifically verified or which is capable of logical or mathematical proof, and therefore refusing to consider metaphysics and theism, which are very general and abstract (Greener & Martelli, 2015). While, an interpretivism philosophy was used to address qualitative methods of the study, such as; the use of interviews and observation in data collection and analysis. In this approach, the researchers focused on individuals' beliefs, motivations, and reasoning to gain understanding of social interactions or phenomena. Interpretivists assume that access to reality happens through social constructions, such as; language, consciousness, shared meanings, and instruments (Kothari & Garg, 2019).

3.2. Study Population, Sampling and Data Collection Methods

The unit of analysis of the study were Government health centre in Kampala Metropolitan Area whose total population is 149. Of these, 11 were health centre IVs, 56 were health centre IIIs and 82 were health centre IIs (National Health Facility Master List, 2018). Using the Krejcie and Morgan (1970) sampling method, the sample size for 149 health centres was 108 which the researchers concentrated on for data collection. Quantitatively, the researchers issued eight (8) questionnaires in each health centres and then aggregated the opinion using the SPSS program to form a single opinion for each health centre. This implies that, for the 108 sampled health centres, 864 questionnaires were issued. Only 96 health centres however managed to return all questionnaires sufficiently filled, representing 89% response rate. The purpose of aggregating the responses was mainly because the Unit of Analysis for the study was the health centre. Simple random and purposive techniques were used to select participant who were considered to fill the questionnaire. This offered everybody in the health centre(s) an opportunity to participate in the study as well as gather enriched information.

3.3. Data Quality Control

3.3.1. Validity of Quantitative Data

To ensure validity, the researchers consulted experts, lecturers and colleagues in line with his academic field to review and offer opinion of the content and relevancy of questions. Secondly, each and every objective of the study was considered while drafting the research instruments. Using SPSS, the content validity index (CVI) was computed among the study variables, and was above 0.70 as indicated in table 3.1 below. According to Amin (2005) for the content validity index to be adequate it should at least be 0.70.

Table 3.1. Shows the Content Validity of Constructs as Extracted from the SPSS program

Variables	N	Sig. Value	Total Scores (r)	PV-Value (df ²)	Decision (Total Scores > PV-Value)
SC Information Storage	96	.000	.810**	.2006	CVI is Valid
Service Delivery	96	.000	.933**	.2006	CVI is Valid

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

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

Table 3.1 above, N is the total number of units examined. This was subjected to a degree of freedom (df) (96 – 2 = 94), since it was a two tailed analysis at a significance level of 0.05. The Pearson's Correlation Coefficient Critical Values was computed and was 0.2006. According to Greener & Martelli (2015) when the r-value is greater than the critical value, then the item tested is valid. The researchers therefore conclude that, all the two variables were valid and depicted facts on ground.

The researchers proceeded to determine the convergent validity of the constructs. According to Kothari & Garg (2019) convergent validity is a measure of how closely a test is related with other tests meant to measure the same or similar construct(s). Convergent validity is a subset of construct validity which generally measures how well a test measures the concept it is designed to evaluate (Lukito & Ikhsan, 2020).

Table 3.2. Shows the Convergent Validity of Constructs as Extracted from the SPSS

Constructs	FL	No. of Counts	FL ²	Error (e) = (1-FL ²)	CR	AVE	Decision (AVE≥0.5)
SC Information Storage	.743	2	.553	.447	.694	.532	Valid
Service Delivery	.714		.510	.490			
TOTAL	1.457		1.063	.937			

Narration: SCIS: Supply Chain Information Storage, SD: Service Delivery, FL: Factor Loading, CR: Composite Reliability, AVE: Average Variance Extracted

Table 3.2 above, shows that the convergent validity of supply chain information storage and service delivery meet the minimum threshold of 0.5 AVE. Convergent validity is adequate if the AVE of a latent variable is ≥ 0.5 (Lukito & Ikhsan, 2020). The higher the AVE from the cutoff point of 0.5, the more reliable the constructs. A lesser AVE from 0.5 indicates that the measurement items of your

questionnaire explain more errors than the variance in the constructs (Greener & Martelli, 2015). Furthermore, the researchers measured for Composite reliability [CR], which is sometimes known as construct reliability. CR tests for internal consistency in scale items, much like the Cronbach's alpha (Kothari & Garg, 2019). It is recommended that the reliability of a construct be at least 0.60 to be acceptable (Amin, 2005). A high CR is a very good indication that all your items constantly measure the same construct. From table 4.4, CR of supply chain informations storage and service delivery is above .60, which is acceptable.

3.3.2. Reliability of Quantitative Data

To ensure reliability, the researchers accurately coded, made clear instructions and conducted a pilot study on the tools. The pilot study was conducted among ten health centres constituting about ten percent of the sample size. This is in line with Amin (2005) who asserts that a pilot study should be at least ten percent of the units of inquiry to be sampled. These respondents were given questionnaires to fill and in about four days the questionnaires were collected and analyzed for reliability. The same test was given to the same sample after a period of one week in order to determine the reliability coefficient test of the responses between the two tests (Kothari & Garg, 2019). The study tested for reliability coefficient basing on Cronbach's Alpha method, which was 0.867 (see table 3.3). All the values for reliability coefficients must be equal or greater than 0.7 to be considered adequate (Amin, 2005).

Table 3.3. Shows the Item Statistics for Cronbach's Alpha as Extracted from SPSS

Analyzed Variable	Mean	Std. Deviation	N	Cronbach's Alpha
SC Information Storage	4.13	.114	96	.867
Service Delivery	4.40	.136	96	

Source. Primary Data (2023) analyzed using SPSS Program

3.4. Test for Linearity

Test for Linearity was done to determine whether there is a linear relationship between supply chain information storage and service delivery. The Linearity test measures whether there is a straight-line relationship between the IVs and the DV (Garson, 2012). It shows whether the predictor variables in the regression have a straight-line relationship with the outcome variable. If the test produces a significant value smaller than 0.05, then there is a linear relationship among the study variables (Greener & Martelli, 2015). Outliers from the straight-line show deviation from linearity which should be ignored because they imply nonlinear relationship between the IV and DV (Amin, 2005).

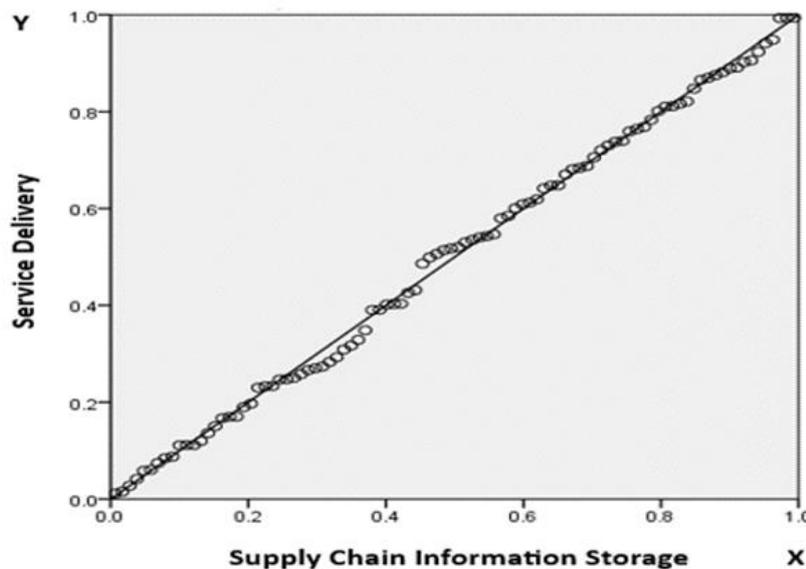


Figure 3.1. Shows the Best Fit Regression line

Figure 3.1 above, shows a strong positive relationship between supply chain information storage and service delivery. The closer the points to the line of best fit, the stronger the correlation among the variables (Garson, 2012). We can now say, the more investments made in supply chain information

storage, the higher the chances of positive performance in service delivery among health centres in Kampala Metropolitan Area.

3.5. Data Reduction

3.5.1. Exploratory Factor Analysis [EFA]

In order to extract factors with the highest impact levels from the dataset, the researchers had to performed an EFA test as indicated below:

• **Supply Chain Information Storage**

An EFA on supply chain information storage indicated a Kaisor-Meyer-Olkin (KMO) value of .754 and Bartlett’s test of sphericity .000. According to Çokluk et al. (2010), if the KMO is equal or greater than .60 with a Bartlett’s test $p \leq .05$, then the sample size is adequate. The retained factor loadings from the Rotated Component Matrix were as follows; SCIS12 (53.8%), SCIS10 (61.2%), SCIS16 (73.3%), SCIS5 (69.1%), SCIS8 (52.5%), SCIS4 (64.6%), SCIS11 (80.6%) SCIS15 (61.0%), SCIS9 (69.7%) and SCIS3 (79.1%)

• **Service Delivery**

EFA for service delivery showed a Kaisor-Meyer-Olkin (KMO) value of .893 and Bartlett’s test of sphericity .000, which was adequate. Three factors (cost management, time management and quality management) were extracted with the following variances; 18.245% of the variance in the first factor, followed by 16.586% variance in the second factor, and lastly, 10.377% in the third factor. Cumulatively, all the three factors accounted for 45.208% variance on service delivery. This was accounted for by the following Rotated Component Matrix; the first factor [Cost Management] accounted for by CM12 (67.1%), QM11 (66.4%), QM8 (64.5%), QM16 (62.8%), CM8 (62.6%), CM3 (62.1%), TD8 (61.7%), CM15 (61.6%), TD4 (59.1%), QM3 (54.0%), the second factor [Time Management] accounted for by CM7 (71.1%), CM11 (69.1%), CM2 (68.4%), TD7 (67.7%), TD3 (66.1%), QM10 (63.6%), QM7 (60.9%), CM14 (60.2%), and lastly, the third factor [Quality Management] accounted for by QM13 (76.5%), QM5 (74.3%), QM15 (72.0%), CM5 (71.8%)

From the EFA extracts, the researchers proceeded to conduct Confirmatory Factory Analysis (CFA) models as indicated in the next section

3.5.2. Confirmatory Factor Analysis [CFA]

CFA was carried out to either confirm or reject the researcher’s pre-conceived theory on the items that measure the study variables (Hair et al., 2006). In other words, for the researchers to continue to carry out statistical tests with precision, they needed to confirm that the items used to measure the constructs of study, were actually the real ones. Secondly, to conduct structural equation models [SEM] in order to establish the predictive influence of variables and be in position to test for the research hypotheses.

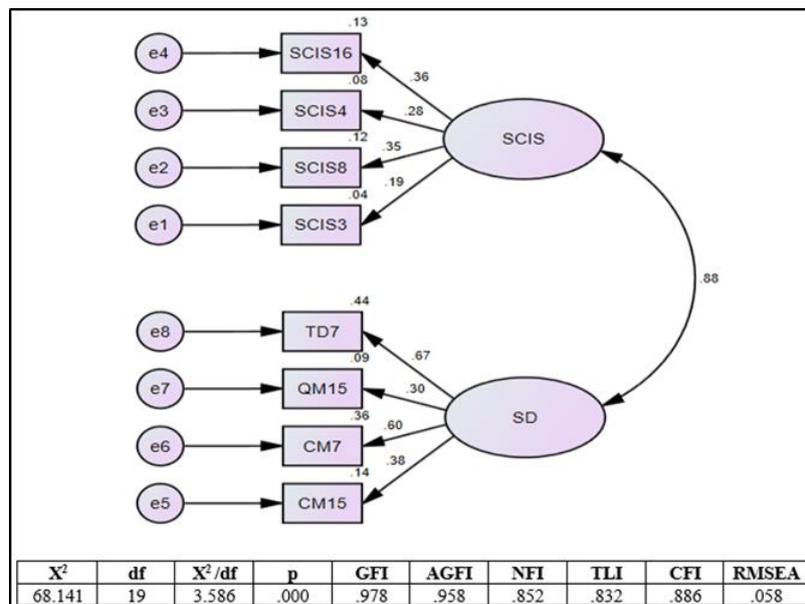


Fig. 3.2. Shows the CFA for Supply Chain Information Storage and Service Delivery

Figure 3.2 above, shows CFA for supply chain information storage and service delivery. The model indicates $X^2/df = 3.586$ which is significant a p-value = .000 indicating model fitness. Other fit indices which corroborate this finding; GFI =.978, AGFI =.958, NFI of .852, CFI=.886, TLI =.832 and RMSEA =.058.

Table 3.4. Shows the Regression Weights for Supply Chain Information Storage and Service Delivery

			Estimate Regression Weights	S.E.	C.R.	P	Standardized Regression Weights
SCIS3	<---	SCIS	1				.189
SCIS8	<---	SCIS	1.742	.502	3.472	***	.347
SCIS4	<---	SCIS	1.397	.419	3.337	***	.278
SCIS16	<---	SCIS	1.763	.501	3.518	***	.360
CM15	<---	SD	1				.376
CM7	<---	SD	1.514	.216	7.003	***	.603
QM15	<---	SD	0.797	.147	5.409	***	.299
TD7	<---	SD	1.712	.242	7.083	***	.667

Narration: SCIP: SCIS: Supply Chain Information Storage, QM: Quality Management, CM: Cost Management; TD: Timely Delivery Management

Table 3.4 above, shows that, the R^2 corresponding to each of the 08 observed item explains a low portion of variance in each of the variables (between 18.9% and 66.7%). The R^2 statistics are as follows; SCIS3 (18.9%), SCIS8 (34.7%), SCIS4 (27.8%), SCIS16 (36.0%), CM15 (37.6%), CM7 (60.3%), QM15 (29.9%) and TD7 (66.7%)

3.6. Data Analysis

Data was analyzed using the Statistical Package for Social Scientist (SPSS) version 20 program. Descriptive statistics were analyzed using means and standard deviations (SDs), while inferential statistics were analyzed using correlation and SEM models to draw conclusions about research hypotheses. Hypotheses were tested using correlation and SEM analyses. To interpret the level of means for descriptive data, the researchers used the following ranges: if a mean fell between 4.30 and 5.00, it was interpreted as very high; if it was between 3.50 and 4.20, it was interpreted as high; between 2.70 and 3.40, it was interpreted as moderate; between 1.90 and 2.60, it was interpreted as low; and lastly, a mean that was between 1.10 and 1.80, was interpreted as very low.

The researchers believe, this scale and associated interpretations gives more meaning towards understanding the study phenomena. Furthermore, to interpret correlation results, the following scale was used: a coefficient which was between .000 and .199, was interpreted as very week; that between .200 and .399, was interpreted as week; between .400 and .599, was moderate; .600 and .799, was considered to be strong; and lastly, between .800 and 1.000, was very strong. Additionally, the researchers used the table below to interpret fit indices for CFA and SEM models.

Table 3.5. Shows the Fit Indices for the Interpretation of CFA and SEM Models

Variable	X^2/df	P	GFI	AGFI	NFI	TLI	CFI	RMSEA
Cutoff point	≤ 5	≥ 0.05	≥ 0.90	≥ 0.85	≥ 0.90	≥ 0.90	≥ 0.90	≤ 0.08

Narration:

X^2/df : Chi-Square/ Degree of Freedom

P: Probability

GFI: Goodness-of- fit index

AGFI: Adjusted Goodness-of- fit index

NFI: Normed Fit Index

TLI: Tucker-Lewis's Index

CFI: Comparative Fit Index

RMSEA: Root Mean Square Error of Approximation

4. RESEARCH FINDINGS

4.1. Descriptive Statistics

For purposes of making a summary of the observed data, the researchers established means and standard deviations to describe the extent and level of variables as expressed by the respondents. Table 4.1 below shows the summary of means and standard deviations describing the variables of the study

Table 4.1. *Descriptive Statistics*

Variables Measured	Mean	SD	Interpretation
Supply Chain Information Storage	4.13	0.22	High
Quality Management	4.38	0.24	Very High
Cost Management	4.41	0.25	Very High
Time Management	4.41	0.25	Very High
Service Delivery	4.44	0.25	Very High

Source: Field Data 2023

4.1.1. Supply Chain Information Storage

Findings showed a high extent of supply chain information storage in health centers with an average mean of 4.13 and SD of 0.22. This was attributed to high responses on the following issues; having information storage standards and procedures (mean = 4.24), using only qualified personnel to be in charge of managing information (mean = 4.22), storing information in coded format for easy allocated and retrieval (mean = 4.16), securing information using anti-viruses (mean = 4.13), using physical methods to store information (mean = 4.13), controlling access to information resources (mean = 4.13), training data managers about information security and management (mean = 4.13), auditing information kept to maintain its integrity (mean = 4.13), having no cyber-attacks or intrusions on health centre database (mean = 4.12), backing-up stored information to mitigate against it loss (mean = 4.11), rarely losing information from archives (mean = 4.10), using information resource to control stock and manage expiries (mean = 4.10), keeping hard copy information in form of files (mean = 4.09), information stored being properly management (mean = 4.09), having databases of information about health centre activities and patients (mean = 4.06), and lastly, using electronic information systems such as computes to store data (mean = 4.06).

Qualitative Responses on Supply Chain Information Storage Also Seemed to Be In Support of Questionnaire Survey Data and Physical Observations As Indicated Below:

‘We record every case that comes to this health centre’, a Record Officers at Ntenjeru-Kisoga Town Council Kojja GHC IV noted. ‘We even use computers to back-up this information’, he further indicates. This was a common sentiment across most of the health centres. Government provides computers which helps health centres store data in large quantities (Sheldon, 2021). The presence and use of computers in offices was observed at a very high rate. This confirmed the opinion fronted by most health workers who were interviewed.

According to Interview III in Kisenyi Health Centre IV, ‘the use of computers was not so much sometime back, health centres would record information using patient forms or books; however, as time evolved computer were incorporated everywhere. The use of computers has improved speed and accuracy in data capture and storage. ‘Patients no longer queue for a very long time, the way they used to’, he further noted. ‘These computers at time are donated by well-wishers, such as NGO’s’, Quality Assurance Officers at Ssabagabo Makindye GHC IV indicates. The use of computers has greatly supported work in health centres especially in areas of data management and storage. Similar, sentiments were noted in other health centres across the metropolitan region.

These finding emphasizes the need for government to continue supporting the integration of information systems and ICT generally in the management of healthcare data. Though, in this study, research observations confirmed high presence of desktop computers in most administrative offices, this has to cascade down to all area of medical operations, such as; stores, accounts, doctors’ rooms and integrated with administrative authority for real-time information capture and sharing. The provision of ICT infrastructure and gargets for data storage in crucial in supporting worker to smoothly interact with data for effective decision making and service delivery. This argument is supported by scholars like Bessick

(2016), Yip & Hafez (2015) and Sheldon (2021) who argue that, data storage within organization(s) improves internal controls such as accounting, tracking operations activities, which eventually enhances service delivery.

4.1.2. Service Delivery

This was the dependent variables of the study. It constituted the following constructs; (1) quality management in service delivery, (2) cost management in service delivery, and (3) time management in service delivery.

Quality Management in Service Delivery

Findings revealed a very high level of quality management in service delivery within health centres at an average mean of 4.38 and SD of 0.24. This was as a result of very high responses on the following issues; having a good drug storage system (mean = 4.51), drugs store being properly equipped with machines (mean = 4.48), conducting occasional inspection and stocktaking activities on drugs (mean = 4.47), ensuring that fragile drugs such as vaccines are kept in cold rooms or fridges (mean = 4.47), people managing drugs being highly qualified (mean = 4.45), having a quality management team at the health centre (mean = 4.44), NMS supplying exactly what is ordered for (mean = 4.4), strictly adhering to ISO, NDA and UNBS standards of quality (mean = 4.36), rarely experiencing drug contamination (mean = 4.35), receiving quality management briefing and training organized by the health centre management (mean = 4.34), keeping information on the quality of drugs (mean = 4.33), receiving positive complements from patients (mean = 4.32), patients being happy with the quality of services offered by the health centre (mean = 4.31), constantly monitoring delicate or fragile drugs (mean = 4.31), having internal quality control systems and standards (mean = 4.30), rarely experiencing drug expiries (mean = 4.29), and lastly, ensuring high standard of service delivery (mean = 4.27).

Quantitative Responses Equally Confirm that Quality Management in Service Delivery is A Priority Among Health Centres As Expressed Below:

‘We manage quality through regular inspection and stocktaking’, an Interviewee at Kyampisi Sub-county GHC III, Mukono District noted. Our supervisors always put has on pressure to monitor stock conditions to avoid expiries, she noted further. Similar sentiments were also observed in health centres like; Mpunge GHC III, Mukono District, Namayumba Town Council GHC IV, Wakiso District, and others. In some HC IV, they were indications of quality management departments heavily involved in ensuring standards. For instance, according to the Store Officer, Wakiso Town Council Wakiso GHC IV, the health centre regularly conducts quality management meeting to remind staff about quality and standards issues. Occasionally, also trainings are conducted to skill workers with quality management techniques and ensure efficiency in their operations.

The Picture on Quality Management Within Ghc Seemed Desirable Qualitatively and Quantitatively When Respondents Were Asked As Seen From Above. However, Some Opinion From Patients Presented A Different View As Expressed Below:

‘Yes, we receive drugs for free in most cases, but this is only for basic medicines like Panado and fragile. Drugs for serious sicknesses are never there, so we are normally forced to buy such medines from clinics’, a Patient at Muduma GHC III, Mpigi District, noted. Secondly, it is good for health workers to follow-up with their Patients, ‘this has never been done on me, not even once’, he further indicated. Though, such statements seemed specific to a few health facilities, managers of health centres need to always make a keen examination of their customer, find out whether they are happy or not in order to provide ways of better service delivery management.

Cost Management in Service Delivery

This was the second construct under service delivery management which was the dependent variable of the study.

Results showed a high level of cost management in service delivery in health centres with an average mean of 4.41 and SD of 0.25. This was due to high responses on the following issues; rarely experiencing internal loss due to expiries (mean = 4.52), health centre rarely experiencing excess stocking of item (mean = 4.5), health centres offering cheaper services than others medical facilities (mean = 4.47), having internal cost controls at the health centre (mean = 4.42), health centres always

budgeting for their activities (mean = 4.41), keeping cost records by health centre (mean = 4.41), rarely having stock shortages as a health centre (mean = 4.41), employees being highly efficient and competent (mean = 4.4), health centres rarely experiencing theft of medicines (mean = 4.39), having no serious cases of stock getting spoiled or contaminated in stores (mean = 4.38), ensuring efficient stock handling systems in the health centre (mean = 4.38), health centres having internal systems that are efficient (mean = 4.37), frontline workers normally being supervised to ensure efficiency (mean = 4.37), having proper inventory control systems (mean = 4.35), and lastly, offering affordable services to patients (mean = 4.3)

Qualitative Results Were Also in Support of the High Quantitative Responses on Cost Management Within Health Centres, As Expressed Below:

‘We normally stock-take in order to have updated information about our stock. This helps us avoid overstocking and having stock associated costs like expiries’, an Interviewee, Ntenjeru-Kisoga Town Council GHC IV, Mukono District. Stock accounting, tracking and verification was highly noticeable among health centre IVs and IIIs as stock control measures. According to Interviewee 2, Kisenyi GHC IV, Kampala Capital City, ‘when drugs arrive they are immediately recorded and allocated to the necessary shelves within the store. Order picking is normally based on the principles of first expiry-first out (FEFO) to avoid unnecessary expiries and loss’. Most of the health centres IVs and IIIs had such stock control measures in place. The application of FEFO techniques in inventory control and management is a commendable measure in controlling stock expiries for any warehouse (Sohrabi et al., 2021)

Whereas, efforts have been by most health centres to curb down inventory associated costs as indicated qualitative and quantitatively more has to be done to further increase the percentage of control measures and totally minimize stock loss. Some challenges highlighted in the management of medical inventories by health centre include:

‘Sometimes the drugs brought to us by NMS are of short expiry and yet we may not have peoples to consume them immediately’, Interviewee 1 at Mpigi Town Council GHC IV, Mpigi District. This is what brings about expiries in most cases within health facilities, he further noted. In some cases, ‘drugs supplied by NMS are not the ones we requisition for, which leaves us with no room apart from keeping stock that we do not need at that time’ an Interviewee, Namayumba GHC IV. In fact, this is one of the key causes of stock expiries in our health centre, since such drugs end up over staying in stores without anyone asking for them, he further indicates. NMS needs to strictly analyze requisitions from health centres to ensure accurate deliveries of medical demands. This will greatly minimize the problem of unnecessary stocking in health centres hence reducing expiries.

Time Management in Service Delivery

This was the third construct under service delivery management the dependent variable of the study.

Findings indicated a very high level of time management in service delivery within health centres with an average mean of 4.41 and SD of 0.25. This was attributed to very high responses on the issues of; NMS always keeping time in the delivery of medical supplies (mean = 4.55), health centres conducting staff training to enhance efficiency (mean = 4.53), ensuring time management while providing services (mean = 4.49), having drugs in store to ensure timely deliveries (mean = 4.40), customers being happy with the speed of service delivery (mean = 4.39), availability of logistics systems to ensure time delivery management (mean = 4.39), managing emergency cases efficiently by health centres (mean = 4.36), health centres having standby strategies to ensure timely delivery (mean = 4.36), briefing employees about timely delivery management (mean = 4.35), and lastly, frontline workers being sensitive with time management (mean = 4.31)

Interview Responses also Attested to the High Quantitative Responses on the Issue of Time Management Among Health Centres, As Expressed Below:

Most interactions indicated that time management was a priority, for instance, according to Interviewee 1, Buwambo GHC IV, Wakiso District, ‘we rarely receive complaints from patients about inefficient medical staff. We supervise our team and encourage them to always report on time’. Similar sentiments were indicated at Ssabagabo Makindye Municipal Council Ndejeje GHC IV Wakiso District, where the Interviewee noted that ‘nobody can leave work before their duty-time has elapsed’. He emphatically

said, this would be unacceptable. By observation, time management was moderate among health centres. Though, managerial opinion indicated it to be above average in most areas, the researcher’s observations suggest the need for more efforts to raise the score in reflection of the following comments: ‘In most cases, medical peoples are there, but the problem at times they come late, and you maybe in pain. You have to wait until they come’, a Patient in Ntenjeru-Kisoga Town Council Kojja health centres GHC IV, Mukono District indicated. At times, ‘the health centre takes long to give medicines, which forces some patients to go and buy them from outside’, a Patient at Kisenyi GHC IV, Kampala Capital City noted.

4.2. Correlation Analysis

The researchers performed correlation analysis between variables to determine the relationship and relative strengths of association among variables. Results are presented in table 4.2 below.

Table 4.2. Shows Correlation Analysis between SCIS and Service Delivery

Variables Correlated	1	2	3	4	5
Supply chain information Storage SCIS[1]	1				
Quality Management [2]	.685**	1			
Cost Management [3]	.685**	.802**	1		
Time Management [4]	.669**	.748**	.776**	1	
Service Delivery [5]	.737**	.920**	.932**	.914**	1

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

Source: Field Data 2023

Table 4.2, shows that, there is a positive and significant relationship between supply chain information storage and service delivery of ($r = .737$, p -value = .001). This resulted into the rejection of H_01 , which stated that, ‘there is no significant relationship between supply chain information storage and perceived service delivery’. Since, .737 is relatively closer to +1 as a measurement criterion, we can say that, supply chain information storage strongly relates with service delivery. Results also indicated that, supply chain information storage positively and significantly relates with quality management ($r = .685$, p -value = .001), which resulted into the rejection of the H_02 . Furthermore, it is postulated that, there is a positive and significant relationship between supply chain information storage and cost management within health centres ($r = .685$, p -value = .001), leading to the rejection of H_03 . Lastly, finding show that, supply chain information storage positively and significantly relates with timely service delivery ($r = .669$, p -value = .001), which also resulted into the rejection of H_04 . The researchers therefore conclude that, SCIS positively and significantly relates with service delivery, and its related constructs of quality, cost and time management.

The Research Proceeded to Conduct A Structural Equation Models (Sem) For Scis and the Constructs of Sd As Indicated Below

4.3. Structural Equation Models

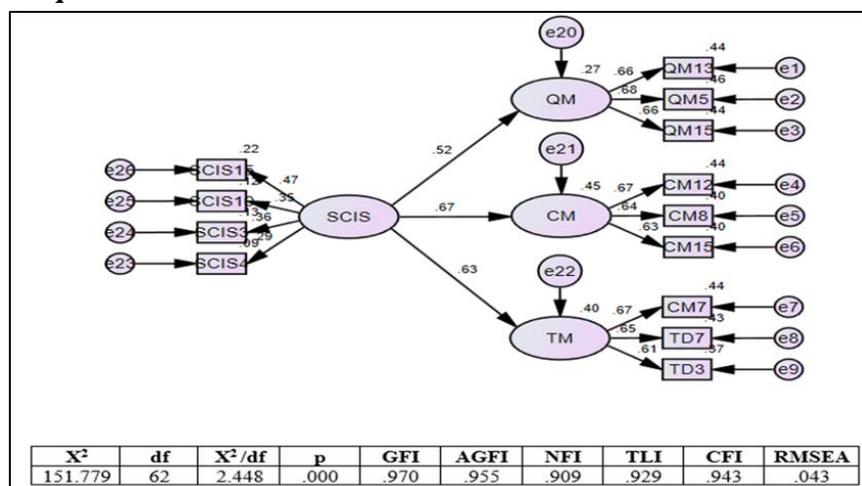


Figure 4.1. Structural Equation Model [SEM] for SCIS and the Constructs of SD

These were performed to examine the prediction power and contributions of supply chain information storage on service delivery, and extent to which quality, cost and timely delivery management is influenced by supply chain information storage. The results are presented in figure 4.1 below.

Table 4.3. Paths analysis results [SEM] for SCIS and the Constructs of SD

			Estimate Regression Weights	S.E.	C.R.	P	Standardized Regression Weights	SMC
QM	<---	SCIS	1.254	.228	5.508	***	.521	.271
CM	<---	SCIS	1.608	.289	5.572	***	.672	.451
TM	<---	SCIS	1.476	.263	5.611	***	.635	.403

Narration. SCIS: Supply Chain Information Storage, SD: Service Delivery, QM: Quality Management, CM: Cost management, TM: Time Management

Source. Field Data (2023) Computed Using AMOS Program

From table 4.3 above, supply chain information storage positively and significantly predicted quality management in service delivery at ($\beta = .521$ and $p\text{-value} = .000$), resulting into the rejection of **H₀₂**. Furthermore, findings revealed that supply chain information storage positively and significantly predicted cost management at ($\beta = .672$ and $p\text{-value} = .000$), which resulted into the rejection of **H₀₃**. Lastly, it showed that, supply chain information storage positively and significantly predict time management at ($\beta = .635$ and $p\text{-value} = .000$), resulting into the rejection of **H₀₄**. The researchers therefore conclude that, supply chain information storage positively and significantly predict service delivery with its associated constructs of quality management, cost and timely delivery. Cost management appeared to be influenced highest at (SMC =.451), followed by time management at (SMC =.403), and lastly Quality management at (SMS = .271).

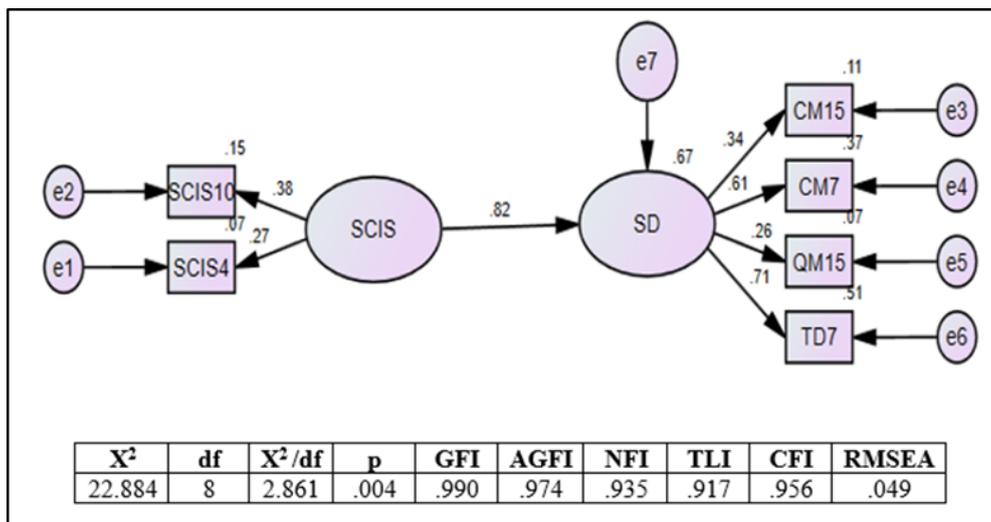


Figure 4.2. Structural Equation Model [SEM] for SCIS and SD

From figure 4.2 above, fit indices of SCIS predicting SD were reliable at an NFI of .935 indicating a good convergent validity. The X²/df of 2.861 significant at a p-value of .004 was within acceptable margins of model fitness. Other fit indices which collaborated these findings include; GFI = .990, AGFI = .974, TLI = .917, CFI = .956 and RMSEA = .049

Table 4.4. Paths analysis results [SEM] for SCIS and SD

			Estimate Regression Weights	S.E.	C.R.	P	Standardized Regression Weights	SMC
SD	<---	SCIS	1.110	.424	2.621	.009	.818	.670

Narration. SCIS: Supply Chain Information Storage, SD: Service Delivery

Source. Field Data (2023) Computed Using AMOS Program

Table 4.4 above, shows that, supply chain information storage positively and significantly predicts service delivery at ($\beta = .818$, $p\text{-value} = .009$). This resulted into the rejection of **H₀₄**, which stated that

‘there is no significant relationship between supply chain information storage and service delivery’. The statistic postulate that, 82% of the variance in service delivery within HCs is influenced by supply chain information storage. Model 4.2 equally confirms that, when the constructs of service delivery are combined or treated as a one block, the predictive influence of SCIS is far much higher than considering them individually. This is evidence a boost in the SMC of model 4.2 as compared to model or figure 4.1.

5. DISCUSSION OF RESEARCH FINDINGS

5.1. Supply Chain Information Storage and Quality Management in Service Delivery

Results revealed a high extent of SCIS within health centres in KMA. When this was correlated with QM, it showed that, SCIS highly relates with QM. Findings further indicated that, for healthcare managers to ensure that their facilities meet ISO and UNBS standards of quality, information kept should be audited to maintain its integrity. This was line with Takeshita, et al., (2022) who asserted that information auditing within organizations should not be looked at as a subsidiary issue, but rather a necessity accountability and transparency. It is hard to actualize stakeholders trust and confidence as an organization without emphasizing standard practices (MLG, 2013). Similarly, it is difficult to control information loss, without strengthening your internal data management systems and standards as a HC. Okiria, et., (2016) asserts that, organizations that foster the integrity of their information guarantee reliability in decision making a key factor in quality management. Poor information storage lead to information distortion which compromises decision making and quality management drives within organizations. In order to avoid such, organizations need to ensure effective supply chain storage systems are maintained, coupled with periodically audits to ensure information integrity (OAG, 2021). Lastly, the study revealed that, HCs that have standards of employment such as engaging qualified personnel to manage key operations, have higher chances of customer satisfaction than those which never capitalize on staff technical abilities. This was in agreement with Brugger (2018) who investigated about ‘How to Handle Demand Fulfillment in an Uncertain Environment’ and found a high correlation between using high qualified personal in information systems areas and performance management. Similar findings were also propounded by Musau (2021) and Bessick (2016) in their researchers.

5.2. Supply Chain Information Storage and Cost Management in Service Delivery

Findings showed a positive and significant relationship between SCIS and cost management in service delivery within health centres in KMA. The relationship was very high with a moderate predictive power. Furthermore, it is indicated that, proper information storage improves drug management and monitoring within HCs. This was also highlighted by Sheldon (2021) in his article of data storage management advantages and challenges where he avers the critical of information storage in boasting decision making and performances within organizations. Cost practices also have a big connection with how information is managed and stored within organizations. The study revealed that, HCs with information back-up systems, access controls and data updating were at an upper hand in managing operational costs related to inventory, procurement and distribution of medical items. Additionally, HCs that invested in modern IT had better efficiencies and customer satisfaction than those with limited information systems. This is true with Gnanasundaram & Shrivastava (2012) who attaches high performance with IT vested organizations.

The rate of information loss is also limited with organizations that have invested good IT facilities, he further asserts. Safe record keeping in health centres was very dependent on limiting access controls to physical data more than using IT systems. This needs to change it HCs in KMA are to compete regionally or at global scale. The more advanced information storage systems are, the more reliable its information output would be in aiding decision making regarding cost management in HCs. As argued by Takeshita, et al. (2022) it is practically impossible for an organization to exponentially cut-down costs without advancing its supply chain information storage systems. Cost comparisons can only be made with existing data. And no cost improvements can be realized with comparing with previous data. This makes information storage a critical component in managing organizational costs area.

5.3. Supply Chain Information Storage and Timely Service Delivery Management

Results indicated a positive and significant relationship between SCIS and TM within HCs. The relationship was strong with a moderate predictive influence. According to Okiria, et. (2016)

information storage can influence timeliness by availing data which can be used for comparing previous time performance with current ones in order to find ways of improving it. Findings revealed that, lack of proper information storage within HCs causes inefficiency in service delivery. For instance, it was very difficult to ensure effective and sustained time management without capturing efficiency records, customer feedback and lead-times within HCs. It is this information captured on a daily basis that can enable managers determine ways of realizing efficiency. Similarly, the use of technological systems in information storage boasts efficiency in service delivery. This is because IT enhances information storage, retrieval speed as well as decision making (Olena, 2023). The study indicated that, HCs that had some sort of advanced systems, received much appreciation from patients compared to without. Timeliness in serving customers greatly depends on the speed of information processing within an organization (Sheldon, 2021). Organizations that are slow in processing and retrieving information tend to be inefficient. This is why it is encouraged that HCs, that would wish to remain competitive adjust technologically as per the changes in the environment. Globally, the healthcare industry has elevated technologically to meet the changing cases and demand of patients. Service speed has a big dependence on technological integration of the organizations (Bessick, 2016). Healthcare managers have to put this mind if they are to improve efficiency and timeliness in their service offerings.

6. CONCLUSIONS AND RECOMMENDATIONS OF THE STUDY

From the study findings, the researchers conclude that, supply chain information storage positively and significantly relate with service delivery within government health centres in KMA. This resulted into the rejection of H_01 , which statement that, 'there is no significant relationship between supply chain information storage and perceived service delivery within government health centres'. The researchers further note that, there is a positive and significant relationship between supply chain information storage and the constructs of service delivery, such as quality, cost and time management, which led to the rejection of H_02 , H_03 and H_04 . In light of this, the study recommends that, healthcare managers invest more in supply chain information storage if they are to actualize quality management, cost effectiveness and timely delivery of medical services to their clients.

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