Supply Chain Information Systems and Service Delivery of the Public Health Care Sector in the County Governments of Western Region, Kenya

Mogere Kelvin Machuki[1]
Evans S. Kwendo[2]
Nurwin Fozia[3]

[1]kmachuki@mmust.ac.ke (+254 701561854)
[2]ekwendo@mmust.ac.ke (+254 721855663)
[3]nfozia@kafu.ac.ke (+254 780770777)

[1]https://orcid.org/0000-0002-5257-8387
[2]https://orcid.org/0009-0007-2631-0102
[3]https://orcid.org/0000-0001-9012-5701

[1,2] Masinde Muliro University of science and Technology
[3]Kaimosi Friends University

ABSTRACT

The healthcare sector has undergone significant changes within the past decades, and amidst these changes, attaining efficient and effective healthcare service delivery has remained a distant prospect. This study, therefore, sought to find out the effect of supply chain information systems on service delivery in the public health care sector in the county governments of the western region. The study was anchored on the theory of human service delivery and health network metrics. The study adopted a positivist research philosophy and a descriptive survey research design, and the target population was 284 respondents from the four level 5 county hospitals in the western region. Questionnaires and interview schedules were used for data collection and analyzed using descriptive and inferential statistics. The data was presented using tables. 258 respondents participated in the study, and preliminary data checking, screening, and cleaning were done. Validity and reliability statistics were done, and they indicated that the research instruments were adequate for their purpose. Regression analysis shows that supply chain information systems had a significant effect on service delivery in the public health care sector in the county governments of Western Region, Kenya ($t = 6.442$, $p<0.050$). The supply chain information system accounted for 14.0% of the changes in service delivery. The study recommended that in the selection of a hospital information system, it should be cost-effective, integrative, high-performance, reliable, responsive, fast, and sustainable. Beyond the infrastructure for information systems, they should invest time and resources in the training of their staff members.

Keywords: Chain Information Systems, County Governments, Public Health Care Sector, Service Delivery Supply

I. INTRODUCTION

Supply chain management is a crucial sector that facilitates smooth industry operations. Essentially, supply chain management entails the processes involved in the transformation of raw materials into finished goods that are of value to the customer (Stadtler, 2014). Initially, it was regarded as a mere clerical function within the broader organization. However, the function holds strategic importance as the business environment features an increasing number of competitors, both locally and internationally, forcing organizations to design ways of improving their internal processes to remain ahead of their competitors. Today, the supply chain function's relevance is not only restricted to industries and manufacturers of goods but also to the service sector, which also relies more on their supply chains as a source of competitiveness.

The health-care sector is one industry whereby researchers and professionals have begun to pay attention to the supply chain as a strategic area for cost efficiencies and quality improvements (Kwon et al., 2016). The healthcare sector has undergone significant changes within the past decade. Most recently, the COVID-19 pandemic has accelerated healthcare industry change, causing increased shortages and lowered speeds of delivery of medical supplies and equipment as organizations and governments struggle to curb the spread of the virus (World Health Organization, 2017). In Busia and Bungoma counties, lack of resources to train the hospital management committees on effective supply chain strategies and shortage of drugs, staff, and limited bed capacities, respectively, are some of the reported challenges (Okedi & Adungo, 2021; Matheshe & Inimah, 2017).

Masaba et al. (2020) are in agreement with these studies, citing a lack of sufficient human, physical, and financial resources in the country's health care sector as hampering effective supply chain information systems. The pandemic has placed new pressures on healthcare delivery systems, most of them attributed to supply chain disruptions, inadequate healthcare staff, information technology infrastructure, and other related global inequities (Deloitte, 2021).

The healthcare supply chain entails the manufacturing of health resources such as equipment and drugs and distributing them to healthcare providers and patients in a timely manner. The availability of medical equipment and drugs is correlated with effective healthcare service delivery (Zamzam et al., 2021). In general, healthcare organizations face the unavailability of medical equipment due to delays in delivery, supply chain risks, unaffordability due to financial constraints, poor information systems, and a lack of responsiveness. Besides availability, adequate equipment and drugs also enhance timely and cost-effective healthcare service delivery (Ogundele & Olafimihan, 2009).

In health service delivery, supply chain information systems have become increasingly important and have enhanced health care performance. The World Health Organization opines that with supply chain information systems, there is better information sharing between the health facilities and the suppliers, easy access to information, promotion of patient-centered healthcare, and improved quality of care. However, in pursuit of efficient health services through information systems, their implementation remains a difficult prospect.

Despite significant efforts from the county governments to improve the state of public health in Kenya, the country's health sector is still marred with key challenges such as a lack of sufficient human, physical, and financial resources that hamper effective supply chain information systems (Masaba et al., 2020). The devolution of the health sector in Kenya has brought unique challenges. One of the common challenges within hospitals is delayed deliveries of medical equipment that inhibit effective service delivery amongst the population (The Global Fund, 2021). A social audit conducted by Transparency International (2020) reports that Vihiga County Hospital is faced with inadequate funds, thereby creating instances of low medical supplies and negating the quality of infrastructure (physical and technological) and services at the facility.

Studies have been done on supply chain information systems and service delivery by organizations in Europe, Finland, Malaysia, Nigeria, South Africa, Tunisia, Kenya, e.t.c. The findings of these studies cannot be generalized to the Kenyan context owing to the different governance systems and different external environmental forces. This study therefore sought to fill this gap by examining the effect of supply chain information systems on service delivery in the public health care sector in the county governments of the Western Region, Kenya.

1.1 Research objectives

To ascertain the influence of the supply chain information system on service delivery in the public health care sector in the county governments of the Western Region, Kenya

II. LITERATURE REVIEW

2.1 Theoretical Literature

2.1.1 Health Network Metrics

The health network metrics are a framework that was launched by the World Health Organization in 2005. With the goal of improving public health in low and middle-income countries, the HNM was initiated with the objective of improving the healthcare information systems capabilities within countries (World Health Organization, 2015). The tool consists of two main aspects. The first is the normative portion, which contains elements that are centered on the standards and components of a health information system. Some of the examples include health indicators, data sources, management, and the dissemination and use of the data. The second is the implementation portion, which consists of the roadmap for executing the standards and components developed. It includes elements such as principles, processes, and tools used to reach the HNM goals. The HNM framework is based on the assumption that the two portions work interdependently to attain the goal of improved healthcare quality, accessibility, and availability at national and regional levels.

The HNM framework is useful for this research as it informs the variables of supply chain information systems, especially in the healthcare sector, which is the main context of the study. Studies demonstrate that information systems are an enabler for supply chain integration (Barakat et al., 2020; Kollberg & Dreyer, 2014). Through IT, supply chains can enhance their marketing capability, reduce costs, improve their business processes, build virtual work teams, and compete on greater scales (Gunasekaran & Ngai, 2004). In the healthcare context, information systems can enhance service delivery by enhancing access, quality, and affordability of services. The HNM framework is therefore a useful tool for understanding how supply chains can leverage information system tools and procedures to enhance service delivery.

2.1.2 Theory of Human Service Delivery Systems

The theory of human service delivery was first postulated by Richard Sauber in 1976. It theorizes that human beings are a resource within systems for service delivery. In a study that was conducted in the insurance context, Senge (1978) argued that it was difficult to develop metrics that could be used to measure intangible aspects of the industry, such as the quality and delivery of services. In later years, more scholars began to apply the model to other service-based industries. Theorists have begun to work to develop a system that can be used to build a system that ensures optimized service delivery for customers. The theorists suggested that every organization should develop internal metrics that they use to measure the quality of human services (Pue, 1996). They should also be able to have aspirational guidelines that direct the human resources within the organization on how to meet their shared vision and goals.

The health sector is primarily a service-centered industry. Even though hospitals also provide goods such as medicine and equipment, their core business is made up of people—medical professionals who work within the healthcare system to deliver services to patients. This research focuses on the public health sector, where the key indicator for measuring performance is service delivery. The theory of human service delivery can be used to inform this research by shedding light on the challenges that hospitals face in measuring the quality of their services and suggesting indicators that they can use to objectively draw conclusions about the quality of their service delivery.

2.2 Conceptual Review of Variables

2.2.1 Information Systems (IS)

In the digital age, information systems continue to take center stage in discussions across various fields, supply chain included. From an information technology perspective, information systems include technological components that are used for collecting, storing, processing, and distributing information (McNurlin & Sprague, 2005). Information systems can therefore be regarded as a part of information technology. In the supply chain, organizations rely on three main types of IS: infrastructural, strategic, and operational IS (Modgil & Sharma, 2017). Infrastructural IS refers to the technologies that are used in communication between actors in the supply chain. Information systems play an important role in the sharing of information. With increased competition and demanding customers, companies are seeking opportunities to stay ahead of their rivals while at the same time attending to unique customer needs. Information systems can be used by players along the supply chain to share information in real time, thus building stronger relationships with external stakeholders (Al-Odeh, 2016). Infrastructural IS also ensures that there is coordination among workers within the various departments of an organization.

Strategic IS is used for the process of long-term planning and policy formulation. These tasks are handled by the top management and seek to establish the company's strategy for staying competitive and reducing long-term costs (Modgil & Sharma, 2017). Additionally, strategic IS enhances a firm's ability to develop capabilities that influence supply chain operations. Operational IS addresses the day-to-day activities within the firm. Related to the supply chain, IS can be used to attain operational goals such as managing inventory, fulfilling orders, replenishing orders, managing relationships, increasing volume of production, and minimizing defects (Modgil & Sharma, 2017). Even though the three components of the supply chain serve different purposes, they are connected at the various stages of the supply chain. Collaboratively, they are important for attaining economies of scale and enhancing flexibility and speed of response to customer needs.

A significant indicator of supply chain information systems is information sharing. Information sharing refers to the ability to exchange data among organizations, people, and groups. The modern supply chain spans across geographical locations and time; therefore, it is important that the players adopt information sharing to secure cooperation for the purpose of effective operations (Lotfi et al., 2013). The advent of information technology and systems has enhanced the process of information sharing. Pandey et al. (2010) explain that some of the information that may be shared includes sales and demand forecasts, the state of inventory, production plans and scheduling, purchasing plans, order tracking, and product development plans. Information sharing supports the development of partnerships between supply chain actors, making it a significant determinant of supply chain collaboration.

Additionally, scholars emphasize the importance of supply chain network designs for organizational performance. Rooted in network theory, supply chain network designs entail the formation of linkages between suppliers as well as other actors on the supply chain, such as customers and buyers (Hearnshaw & Wilson, 2013). Initially, supply chain networks were assumed to be linear; however, increasingly, the demands of today's business environment require that the linkages be non-linear and more complex (Mari et al., 2015). Like the typology of a computer network, supply chain network designs are made up of nodes, links, and flows. The nodes represent the business units within a supply chain, while links are the mediums that connect the business units. Information systems support the coordination and sustainability of the networks as they allow for the sharing of information between the various nodes in the supply chain network.

2.2.2 Service Delivery

Service delivery is a concept that is used in the context of public administration to describe the degree to which it is able to fulfill its duties. There are various indicators that are used to demonstrate the level of service delivery provided to citizens. One of the measures of service delivery is efficiency, which focuses on the economic use of resources (Shepherd & Günter, 2010). Following the generic structure of a supply chain, measuring service delivery would then evaluate the efficiency of different activities along the value chain, such as supplier, inbound, manufacturing, outbound, marketing, distribution, and customer activities. In the field of healthcare, efficiency is demonstrated by comparing the inputs of the system, such as cost and labor, against the outputs, such as health outcomes and physical visits (Mathur et al., 2018).

Public organizations rely on various ways of measuring service delivery. Some of these measures include flexibility, quality, price, technology, innovativeness, and cost, among others. Shepherd and Gunter (2010) recommend that organizations distinguish between cost and non-cost aspects of supply chain service delivery since it is inadequate to solely rely on cost measures. These types of measures fall into either of two categories: quantitative or qualitative supply chain performance measurement. Additionally, measuring service delivery should be a continuous process that is embedded within an organization's operations.

Another measure of service delivery is speed. Speed addresses the time that it takes for citizens to receive services from providers. Speed is especially important in healthcare. The ability to get healthcare services quickly following an injury or sickness often has an impact on the likelihood and speed of recovery (Yang et al., 2015). It could be the speed of a physician's response, the delivery of drugs, or the necessary equipment required to provide healthcare. The supply chain is an important determinant of the speed of service delivery in the healthcare context. A proper supply chain is one that is able to monitor and manage the flow of drugs and healthcare services from manufacturers to hospitals and patients, ensuring that they receive the medical supplies at the right time and place (Mathur et al., 2018).

Accessibility is yet another measure of service delivery, especially in the health sector. Even though developed nations have established systems to increase the accessibility of healthcare services, developing nations still struggle with providing their citizens with accessible healthcare. According to the Agency for Healthcare Research and Quality in 2018, there are four main components of healthcare service accessibility: availability of a workforce, timeliness, availability of required services, and adequate coverage that gives patients access to the healthcare system. Accessibility is a key challenge for the Kenyan healthcare system, as evidenced by disparities between urban and rural contexts as well as people from different social classes (Otieno et al., 2020). The introduction of the devolved system held the promise of increasing accessibility to healthcare services by transferring power and resources closer to the people.

Like the case for other areas of public service, quality is a significant indicator of the level of service delivery that citizens receive. Quality of service refers to the difference between the expectations of customers and what is delivered to them (Shahin & Samea, 2010). In the public sector, quality of service can be attained by identifying standards of performance and comparing actual performance to identify any issues in the operational processes that impede high-quality service delivery. Most measures of quality originated in the good sector; however, some of them are inapplicable to the services sector since the latter is a different context with intangible aspects that are difficult to measure objectively (Mugambi & Kiruthu, 2015). A framework for measuring the quality-of-service delivery, which entails assessing the quality of the physical aspects of their operations, such as workers and facilities, how reliable the services are, how responsive they are to customer needs, the empathy that the workers show to customers, and assurance, was established (Parasuraman, Zeithaml, & Berry, 1985). These dimensions of quality are also well applicable to the health care sector.

2.3 Empirical Review of variables

2.3.1 Supply Chain Information Systems and Service Delivery

A study by Buxmann et al. (2004) investigates the influence of information systems on organizational performance. They focus on supply chain management software as a technological system that can be adapted within organizations. The study is conducted in the European automobile industry by using existing data from online and offline channels regarding 25 car manufacturers in Europe. The results indicated a significant positive relationship between the use of supply chain software and firm performance through inventory optimization and the prevention of shortfalls. A more recent study by Kähkönen et al. (2014) investigates the use of supply chain information systems within Finnish companies. The authors focus on the use of electronic business solutions in 570 companies in Finland. The researchers report similar findings with Buxmann et al. (2004) that information systems - in their case, the use of e-business platforms - have a significant influence on supply chain performance.

Differing findings are, however, reported by Shatat and Udin (2012), who focused on the manufacturing industry in Malaysia and investigated how productive information technology is for the performance of firms. They relied on

data that had been collected through questionnaires from IT executives across the industry about their use of information technology tools such as IT services, IT capabilities, Advanced Pacification and Scheduling (APS), Supply Chain Management Systems, Manufacturing Execution Systems (MES), and Enterprise Resources Planning (ERP) and its effect on supply chain performance. The study findings reported an insignificant relationship between some aspects of an ERP system and supply chain performance, such as workflow management.

In Africa, the adoption of information systems in the supply chain has been much slower. However, there are key companies that serve as industry and regional leaders in the adoption of information systems in the supply chain. A study by Egharevba et al. (2019) focuses on the Nigerian health sector and the use of information systems to enhance the logistical processes of distributing medicines and related health data. The researchers focus on an application called "the Ease App," which uses technological solutions to allow the collection and distribution of real-time data that can be used for health statistical data storage and analysis. The study sought to investigate the influence of the Ease App on decision-making processes in Africa. The app was measured across various indicators, and the findings revealed that it has a significant relationship with performance, thus concluding that the application was highly reliable as a solution for coordination and decision-making along the healthcare supply chain.

Another study in Africa that sought to enhance understanding about the deployment of information technology tools on the supply chain is one by Selomo and Govender (2016). The study focused on a different context, South Africa, and seeks to investigate the application of supply chain information systems in the public sector and how they impact performance. The researchers collected data from four government departments in the Limpopo area. The findings of the study reveal that information systems have a significant influence on supply chain performance.

A study by Mzoughi et al. (2008) had the objective of establishing the effect of ERP systems on the performance of Tunisian companies and reported contradicting findings. In the study, performance was measured through the company's ability to gain a competitive advantage. The researchers used questionnaires that were administered to 216 managers within Tunisian companies. The study findings revealed that even though ERP adoption has a positive relationship with a company's ability to gain a competitive advantage, the relationship between the two variables remains insignificant.

In Kenya, information systems have been adopted across various industries with the goal of enhancing the supply chain and overall organizational performance. A study by Mundia et al. (2015) investigates the use of information systems in the retail sector. Focusing on the context of nine supermarkets in Nakuru Town, the authors administer questionnaires to employees working within the procurement and information technology departments. The study findings revealed a positive relationship between information systems and the performance of supermarkets within Nakuru town. Further, the researchers reported that the effect of information systems on performance is statistically significant.

Similar findings are reported in a study that was conducted by Magutu, Aduda, and Nyaoga (2015), which was conducted in manufacturing firms in Kenya. Specifically, the study objective of the researchers is to investigate the influence of the use of technology on supply chain performance in 138 large manufacturing firms. Questionnaires were administered to respondents, who included employees within the 138 companies. Through Spearman's correlation, the researchers found that information technology had a statistically significant role in mediating the relationship between supply chain strategies and organizational performance. The study recommended that managers integrate technologies into their functional processes so as to improve their performance.

With regards to supply chain information systems, studies have been done and show a positive and significant contribution of supply chain information systems to performance (Kähkönen et al., 2014; Buxmann et al., 2004; Selomo & Govender, 2016; Mundia et al., 2015; Magutu et al., 2015). However, still in the area of supply chain information systems, various researchers have reported negative and insignificant contributions of supply chain information systems to performance (Shatat & Udin, 2012; Mzoughi et al., 2008). The contradictory results present a gap, which this study intends to fill by looking at the influence of supply chain information systems on service delivery in the public health care sector in Kenya.

III. RESEARCH METHODOLOGY

The study adopted the positivism research philosophy and descriptive survey research design. The study was carried out in the western region of Kenya. The study focused on county referral hospitals within the four counties. The target population for this study was employees with clinical roles within the four level five county hospitals: Vihiga County Referral Hospital, Busia County Referral Hospital, Kakamega County Referral Hospital, and Bungoma County Referral Hospital. For each of the strata of the study, the researchers used simple random sampling to select 284

respondents from a target population of 984. The study relied on the formula proposed by Yamane (1973) for calculating sample size since it provided an easy formula for calculating sample size. The formula is depicted below:

$$n = \frac{N}{1 + 0.05^2\ (N)}$$

Where : n= is the required sample size
N = number of people in the target population
e = allowable error term
When the values were substituted in the formula, the sample population was selected as below:

$$n = \frac{984}{1+0.05^2(984)} = 284$$

The solution translated to 284 respondents. Therefore, the sample population was as follows: -

Table 1
Sample Size

Strata	**Bungoma**	**Vihiga**	**Kakamega**	**Busia**	**Total**
Doctors	11	12	15	9	47
Clinical Officers	11	10	10	9	40
Nurses	54	28	78	37	197
Total	**76**	**50**	**103**	**55**	**284**

The main source of primary data for this research was questionnaires and an interview schedule developed by the researcher. The study measured the validity of the research instrument for its content and construct validity. The study used factor analysis to test for construct validity, which demonstrated if the items selected adequately reflected the constructs or phenomena of the study. Cronbach's alpha was used to test the reliability of the research instrument, and all the coefficients of the variables were above 0.7, meaning they were good. The data was then coded and analyzed, and the results presented in the form of charts, graphs, and tables were done per the objective of the study. The study conducted a simple regression analysis, and the model is as below:

$Y = \alpha + \beta X + \varepsilon$

Where:

Y = Health Service delivery
α = constant
β = Slopes of regression for the independent variables
X= Supply Chain Responsiveness

IV. FINDINGS & DISCUSSIONS

4.1 Response rate

This study attained a 90.8% response rate which can be deemed as very good. The high response rate was attributed to the data collection procedures.

Table 2
Response Rate

	Frequency	Percent
Returned	258	90.8
Not Returned	26	9.2
Total	284	100.0

The table 3 below shows results for Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity. According to Hair et al. (2006), KMO measures sampling adequacy and checks the appropriateness of the use of factor analysis. A range of 0.5–1.0 indicates the appropriateness of factor analysis. The above results indicated a KMO value of 0.663, which was greater than 0.5. This showed that factor analysis was appropriate for this study. The Bartlett test of sphericity provided a significance value of 0.000, which was less than 0.05 at the 5% significance level, indicating a correlation between the variables.

Table 3

KMO and Bartletts Test for Supply Chain Information Systems

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.663
Bartlett's Test of Sphericity	Approx. Chi-Square	768.299
	Df	21
	Sig.	.000

For this study, statements with a factor loading greater than 0.4 were deemed appropriate. From the findings of the table 4 below, none of the variables had a factor loading less than 0.4, which meant that all of them were considered for analysis. According to Tabachnick and Fidell (2007), factor loadings greater than 0.4 were to be retained for further statistical analysis; hence, no statement was dropped.

Table 4

Rotated Component Matrix

Rotated Component Matrix[a]			
	Component		
	1	2	3
Our hospital embraces ICT when sourcing for resource inputs	**.784**	-.067	.379
ICT has enabled our hospitals to replenish inventory on time	.300	.034	**.833**
ICT has made it easy to follow up inventory on transit	**.899**	.261	-.045
ICT has facilitated quick delivery of medical supplies and equipment to the hospitals	**.834**	.178	.064
ICT has enhanced increased information sharing between the patients and the hospitals	-.076	.363	**.819**
ICT has enabled the hospital to deliver good service to the patients	.082	**.848**	.354
Electronic Data Interchange (EDI) has enhanced easy communication between our facility and the suppliers	.229	**.885**	.027
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 5 iterations.			

Table 5 below shows results for Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity. KMO measures sampling adequacy and checks the appropriateness of the use of factor analysis (Hair et al., 2006). A range of 0.5–1.0 indicates the appropriateness of factor analysis. The above results indicated a KMO value of 0.657, which was greater than 0.5. This showed that factor analysis was appropriate for this study. The Bartlett test of sphericity provided a significance value of 0.000, which was less than 0.05 at the 5% significance level, indicating a correlation between the variables.

Table 5

KMO and Bartletts test for Service Delivery

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.657**
Bartlett's Test of Sphericity	Approx. Chi-Square	**353.618**
	Df	**6**
	Sig.	**.000**

For this study, statements with a factor loading greater than 0.4 were deemed appropriate. From the findings of the table 6 below, none of the variables had a factor loading less than 0.4, which meant that all of them were considered for analysis. According to Tabachnick and Fidell (2007), factor loadings greater than 0.4 were to be retained for further statistical analysis; hence, no statement was dropped.

Table 6

Component Matrix

Component Matrix[a]	
	Component
	1
Our hospital provides treatment, diagnostic tests and other services in an acceptable time period	**.872**
Our hospital has up to date and well maintained equipment	**.799**
Our hospital has effective and efficient health care service delivery	**.796**
Our hospital provides speedy delivery of medical supplies to patients	**.639**
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

4.2 Descriptive statistics

4.2.1 Descriptive Statistics for Supply Chain Information System

The study relied on a Likert scale whereby 1 represented strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. The table below represents a summary of the responses from the participants for each questionnaire item.

Table 7

Supply Chain Information System

Statement	N	Mean	Std. Dev.	CV (%)
Our hospitals embraces ICT when sourcing for resource inputs	258	2.95	1.226	41.6
ICT has enabled our hospital to replenish inventory on time	258	2.90	1.171	40.4
ICT has made it easy to follow up inventory in transit	258	3.08	1.079	35.0
ICT has facilitated quick delivery of medical supplies and equipment to the hospitals	258	3.26	.945	29.0
ICT has enhanced increased information sharing between the patients and the hospitals	258	3.62	1.230	34.0
ICT has enabled the hospital to deliver good service to the patients	258	3.40	1.183	34.8
Electronic Data Interchange (EDI) has enhanced easy communication between our facility and suppliers	258	3.29	1.089	33.1
Valid N (listwise)	258			

The majority of the respondents were neutral about whether the hospitals embrace ICT when sourcing for resource inputs, as evidenced by the mean of 2.95 and a standard deviation of 1.226. On the subject of whether ICT had enabled their hospitals to replenish inventory on time, most of the respondents were also neutral, with a mean of 2.90 and a standard deviation of 1.171. The respondents also provided their opinions on whether ICT has made it easier for their facilities to follow up on inventory in transit, and the majority of them were neutral, as portrayed by the 3.08 mean and a standard deviation of 1.0179. The questionnaire also sought the opinion of the respondents about whether ICT has facilitated quick delivery of medical supplies and equipment to hospitals. Most of the respondents were neutral, with a mean of 3.26 and a standard deviation of 0.945.

The respondents were also questioned about the role of ICT in information sharing systems between patients and hospitals. On whether ICT has enhanced increased information sharing between the patients and the hospitals, the majority agreed, as evidenced by the 3.62 mean and a standard deviation of 1.230. The next item sought the opinions of respondents on whether ICT has enabled the hospital to deliver good service to patients. Most of them remained neutral, with the responses having a mean of 3.40 and a standard deviation of 1.183. On the last item under supply chain information systems, the respondents provided their opinions about whether electronic data interchange (EDI) has enhanced easy communication between the facility and suppliers. Most of the respondents were neutral, as depicted by the mean score of 3.29 and a standard deviation of 1.089.

4.2.2 Descriptive Statistics for Service Delivery

The study relied on a Likert scale whereby 1 represented strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. Table 8 below represents a summary of the responses from the participants for each questionnaire item.

Table 8

Descriptive Statistics for Service Delivery

Statement	N	Mean	Std. Dev.	CV (%)
Our hospital provides treatment, diagnostic tests, and other services in an acceptable time period	258	3.38	1.230	36.4
Our hospital has up to date and well-maintained equipment	258	3.17	1.109	35.0
Our hospital has effective and efficient healthcare services delivery	258	3.15	1.067	33.9
Our hospital provides speedy delivery of medical supplies to patients	258	3.28	1.134	34.6
Valid N (listwise)	258			

The respondents were neutral about whether their hospital provides treatment, diagnostic tests, and other services in an acceptable time period. The mean was 3.38 and the standard deviation was 1.230. On the question of whether their hospital had up-to-date and well-maintained equipment, most of the respondents were neutral, as evidenced by the mean of 3.17 and the standard deviation of 1.109. The respondents also provided their opinions about whether their hospital had effective and efficient healthcare service delivery. Most of them were neutral, with a mean of 3.15 and a standard deviation of 1.067. On whether their hospital provided speedy delivery of medical supplies to patients, most of the respondents were also neutral, as evidenced by the mean of 3.28 and a standard deviation of 1.134.

4.3 Regression Analysis

Further, the study conducted regression analysis on the data by using linear regression models between the different independent variables and the dependent variable of the study. Regression analysis was done to predict the effect of each of the independent variables of the study on the outcome variable (service delivery). This analysis was important in determining how well supply chain information systems could predict service delivery of health facilities in Western Kenya.

The findings of the study displayed in Table 9 demonstrate that the value of R-square is 0. 140. This value implies that, 14.0% of variation of service delivery was explained by supply chain information systems.

Table 9

Model Summary

Model Summary									
					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.374[a]	.140	.136	.82207	.140	41.502	1	256	.000
a. Predictors: (Constant), InforSys									

Table 10 below highlights the Analysis of Variance (ANOVA) results at the 0.05 level of significance. The findings demonstrate that in the model, the independent variable of study, the supply chain information system, was important in predicting service delivery, as indicated by an F value of 41.502 and a significance value of.000, a value that is less than the 0.05 significance level. Moreover, the importance of this model is emphasized by the eta squared value of 14.0%.

Table 10

Analysis of Variance

ANOVA						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	**28.047**	**1**	**28.047**	**41.502**	**.000[b]**
	Residual	**173.004**	**256**	**.676**		
	Total	**201.051**	**257**			
a. Dependent Variable: SeDel						
b. Predictors: (Constant), InforSys						

From Table 11 above, the study findings reveal that supply chain information systems had a significant influence on service delivery (significance value = 0.000). These findings imply that increasing supply chain information systems by a single unit or level causes a 0.441 increase in service delivery; all other factors are held constant. Hence, at a 0.05 level of significance, the null hypothesis of the study is rejected. Supply chain information systems positively influence service delivery.

Table 11

Regression Coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.825	.226		8.072	.000
	InforSys	.441	.069	.374	6.442	.000
a. Dependent Variable: SeDel						

The findings that supply chain information systems positively influenced service delivery as presented in Table 11 are supported by studies conducted by Qrunfleh and Tarafdar (2014), Bayraktar et al. (2009), Kakhki and Gargeya (2019), and Asmussen and Møller (2020). Qrunfleh and Tarafdar (2014) report that supply chain information systems have a positive impact on the performance of the supply chain and the subsequent performance of the entire firm. They argue that the most essential supply chain information systems are those that are tailored towards enhancing efficiency and flexibility. Bayraktar et al. (2009) corroborate the above findings by reporting that supply chain information systems have a positive influence on the operational performance of firms in the manufacturing sector. However, they emphasize that the relationship between the two variables is reliant on the presence of supply chain information systems enabling factors and the absence of limiting factors. Likewise, Kakhki and Gargeya (2019) reported that supply chain information systems have a sportive impact on service delivery; however, they raise the importance of addressing the issues of data security, privacy, ownership, governance, and trust along the supply chain. Asmussen & Møller (2020) also affirm the positive impact of supply chain information systems on the performance of firms, especially focusing on the roles played by analytics and ERP systems.

V. CONCLUSIONS & RECOMMENDTIONS

5.1 Conclusions

In conclusion, this research underscores the significant impact of supply chain information systems on service delivery in the Kenyan public health sector (r = 0.374), highlighting its practical importance. Despite being relatively new and underexplored, these systems explain 14.0% of service delivery variations, establishing them as crucial predictors of service quality. Additionally, difficulties like a lack of trained professionals and limited financial resources hinder supply chain information systems. Recognizing their role as a key practice for enhancing service delivery, further exploration and investment in these systems are essential for improving healthcare outcomes in Kenya.

5.2 Recommendations

Hospitals in Western Kenya should prioritize investing in supply chain information systems, encompassing hardware and software, to enhance supply chain efficiency. Selection criteria should consider cost-effectiveness, integration, reliability, and sustainability. Training healthcare staff is crucial for effective system utilization. Integration of these systems with overall hospital strategies is vital, as is fostering supply chain resilience and responsiveness to address unforeseen challenges and maintain service quality.

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