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Supply Chain Information Management and Service Delivery in Public Health Sector Organizations: A Case Study on National Medical Stores of Uganda

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Abstract—**This paper describes the relationship between supply chain information management and service delivery efficiency in public health sector organizations. The three specific objectives of this paper are to: examine the relationship between supply chain information processing and service delivery; assess the relationship between supply chain information storage and service delivery; and lastly, to evaluate the relationship between supply chain information flow and service delivery. The researcher employed a positivist approach using a descriptive, case study and correlational designs. Using a researcher's made five point Likert scale questionnaire, data was collected from a sample of 148 respondents. Of these, 56 respondents were from the National Medical Stores (NMS), while 92 were from supplementary sources (Mulago Hospital and Kisenyi Health Centre IV). Data was analyzed using means, and the Pearson Linear Correlation Coefficient. Findings revealed that, supply chain information management was at an average mean of 3.97, interpreted as high, while service delivery management was at an average mean of 2.94, interpreted as moderate. Correlation results on the other hand, indicated a positive and significant relationship between supply chain information management and service delivery of r-value 76% and Sig. value of 0.002. In light of this, the researcher therefore concludes that, supply chain information management positively contributes to service delivery, and that the findings of this paper can act as a cornerstone for managers to comprehend the importance of information management within the supply chain process, and in particular, appreciate the value of data collection, information storage and sharing within the supply chain network, if service delivery decisions are to be maximised.**

Keywords— *Supply chain information management, Supply chain information processing, Supply chain information flow, Supply chain information storage, Service delivery.*

1.   Introduction

Currently, public entities are required to ensure that their performance objectives are met through being efficient and effective in their operations and in order to meet their 21st century global objectives; such as poverty alleviation, eradication of tropical diseases, and ensuring accountability [35]. This has forced many of them to change their operating systems from manual or traditional, to information driven, in order to become efficient and effective, and therefore meet their performance objectives [14], [47]. The transition of many public health sector organizations has seen them realize agility and flexibility in fulfilling stakeholders changing requirements. However, this does not mean that all public health sector organizations have recorded success stories, for instance, even after NMS changed her work operations from the traditional push systems to an information pull or order based systems, the entity continued to record service performance challenges such as excessive inventory, stock shortages, drugs expiries, and wrong deliveries [4], [25]. World over though, information driven systems such as, Electronic Data Interchange (EDI), Enterprise Resource Planning (ERP), Distribution Requirement Planning (DRP), Material Requirement Planning (MRP), Collaborative Planning, Forecasting, and Replenishment (CPFR) have been known for enabling companies like Wal-Mart, Practer and Gamble attain tremendous service performance in the areas of quality management, customers responsiveness, and cost reduction [12], [34], [52].

In both developed and developing countries, the management of supply chains determines how services will be delivered. Effective supply chain management leads to effective service delivery. For supply chain to be effective there must be smooth flow of information within the supply chain itself. [46] argued that managing the flows of information is the most critical of the activities that any supply

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chain function can do to realize effective performance. This is because the flow or movement of drugs and other related medical supplies is usually triggered by an associated information movement. Effective management of the drug supply chain, therefore, is premised on the effective management of the related information flows. This explains why NMS transitioned from the limited information flow push system to the broad band information flow system known as the pull or order based system. Disease management within the Uganda has improved, for instance, by considering only the average number of malaria cases for the districts surveyed, the delivered average quantity is adequate according to the Health Management Information System Reports as cited in [32].

In countries like UK, USA, and Japan, companies and government entities have increasingly desired to obtain competitive advantage by employing more advanced sourcing approaches, innovation and research in areas of business, science and information technology. [15] argues that, the quest for new and better ways to compete has triggered the growth of information technology and systems all-over the world, thus receiving increasing attention. One area, in which globalization practices have been anchored, is the integration of supply chain through promotion of information flow within the supply chain network [52]. Service performances of companies like Wal-Mart, Procter and Gamble have been dependant on information systems within their supply chains. The move from traditional to hi-tech global sourcing approaches, such as using internet platforms, and technologies like EDI, ERP and CPFR have seen many companies and government bodies integrating and improving their supply chain coordination among trading partners, which has enhanced materials, information, and product flow across the global environment [12, [34].

In most African countries, health sector service delivery has been challenged simply because organizations have not yet developed their sourcing and supply chain practices or strategies to enable them exploit their potential with regard to quality management, cost management and time management in service delivery [41]. Shifting from a narrow cost reduction emphasis to a more integrated and coordinated supply chain level requires a lot with regard to investing in information management systems that eventually would revamp supply chain practices in Africa. The reality however is that, most companies and government entities in Africa for instance, currently lack the understanding, capability and/or willingness to operate at such demanding levels. According to the [31], this has caused serious consequences with regard to the level of service delivery in those countries in form of the quality of services offered, rate of responsiveness in service

delivery and the level of operational efficiency, among others.

In East Africa, health sector service delivery management is still faced with numerous challenges, most of which, attributed to poor supply chain information management systems. In Kenya, for instance, the country faces great challenges in data collection, analysis, evaluation and interpretation of health indicators to guide evidence based policy making. This is because of lack of low institutional capacity, lack of clear functional linkages between the different components of the health system, inadequate funding, among others [13]. In Rwanda, however, government initiated TRACnet systems to help manage health data, the system is largely paper based and has significant limitations, ranging from being slow in passing data/information from one program area to another or passing it from one system to another, which results in limited data entries, duplication, loss of critical information, higher costs, and missing opportunities for timely intervention and prevention, [11]. In Tanzania, a health information system was initiated to help supply each level of the health sector with the necessary information in a timely and accurate manner. However, the system was limited by members of health Ministry being frustrated by the difficult process of implementation. For instance, data collection and reports to senior management were accorded little attention yet it was a key factor in improving the effectiveness of health care within the country, [41]. Similarly, in Uganda, the sector faces numerous information related challenges, which include but not limited to, lack of sufficient funds to invest in information technologies, insufficient technical capacity and poor institutional collaboration, which renders service delivery a challenge. To be specific, poor information and supply chain coordination among partner institutions like the Ministry of Health, NMS and health centres has continued to affect procurement, storage and distribution of drugs within the country, [4].

1.1   Theoretical Framework

The study employed the information theory for data management developed by [42]. The theory states that, with the explosion of computer power and computing infrastructure, data generates can be done in multitudes, differing formats, at different scales, and in inter-related areas. This also provides us with the tools to quantify information gain or loss using dynamic systems in order to improve our ability of designing good representations, storage mechanisms, and analysis tools for data dissemination. The theory looks at how information is generated, and can be analyzed accurately, the cost-benefit analysis of information, and so on. For

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instance, if we store more information, we get better answers to queries, but we pay the price in terms of increased storage. Conversely, reducing the amount of information that we store improves performance at the cost of decreased accuracy for query results.

In respect to this study, the information theory for data management is postulated to be used as a cornerstone in improving the data collection process, analysis, and dissemination among supply chain members. The theory also provides clarity on the associated costs and benefits of information management and in helping solve complex questions using dynamics systems which are computer-aided approaches for analyzing and solving complex problems, such as determining uncertainties and consumer behaviour within the supply chain network, and is to provide feedback to understand the dynamic behaviour of complex systems. These dynamics were developed from the work of J.W. Forrester, which helped in understanding and forecasting behaviour of the situations, establishing a structural framework for decision making, challenging industrial assumptions, shortening delivery times, improving customer service quality, and discovering new strategies. System dynamics have been applied to logistics and supply systems as indicated in studies like, [21], [34], [45].

1.2   Problem Statement

The [36] mandates the Uganda National Medical Stores (NMS) to procure and ensure the effective supply of drugs within the country. Given this mandate, NMS devises approaches in which it can best realize this objective; among other approaches is the combined supply chain system of push and pull of drugs by Hospitals and health centres. This system operates under information management through demand tracking and forecasting [50]. However, despite this, recent reports including but not limited to [3], [4], [10] [38] and [49] among others, have indicated continued inefficiencies in the supply chain process of drugs within the country. These inefficiencies are manifested in form of, delays in the delivery of drugs, expiry of drugs in stores, and shortages of basic items and drugs', which have culminated into loss of lives and resources, poor functioning of Hospitals and health centres, among others. It is against this background therefore, that the study sought to examine, why in spite of all initiatives by NMS, service delivery has remained a serious challenge.

1.3   Purpose of the Study

To examine the relationship between supply chain information management and service delivery in public health sector organizations using NMS as a case study.

1.4   Objectives

i)   To examine the relationship between supply chain information processing and service delivery by NMS.
ii) To assess the relationship between supply chain information storage and service delivery by NMS.
iii) To evaluate the relationship between supply chain information flow and service delivery by NMS.

1.5   Research Hypothesis

i)   There is a significant relationship between supply chain information management and service delivery by NMS.
ii) There is a significant relationship between supply chain information processing and service delivery by NMS.
iii) There is a significant relationship between supply chain information storage and service delivery by NMS.
iv) There is a significant relationship between the extent of supply chain information flow and the level of service delivery by NMS.

2   Review of Related Literature

2.1   Supply Chain Information Management and Service Delivery

[33] contends that supply chain involves all activities associated with the flow and transformation of goods from the raw materials stage (extraction), through to end users, as well as the associated information flows. It is a network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in form of products and services in the hands of the ultimate customer or consumer [27], while information management relates to treating information as an asset or valuation resource of enhancing an organisation's competitiveness and responsiveness. It results from effectively identifying, collecting, and analysing information and then directing it to the points of decision making and customer service, [22], [24]. In light of this, supply chain information management therefore relates to the processing, analysis, storage, and dissemination of information resources to facilitate effective decision making within an organisational supply chain process. It involves the use of technological programmes, solutions or systems to facilitate these kinds of activities, [2], [15], [26]. On the other hand, service delivery is the provision of services to the intended clients or recipients. In the public sector, provision

of services can be in form of; road construction, education, health, and security among others. The effective provision of services (quality, cost, and timelines in delivery) is a constitution mandate of government to its citizens, [7]. As an economic function, government taxes its citizens in order to facilitate public finance activities, such as, provision of health services, education, security, and public infrastructures like roads among others. Service delivery in the public sector should be guided by the principle of 'service to the people,' which means that the system of service delivery should be reoriented towards the customer's favour, [10].

In light of this, supply chain information management is therefore a key component in achieving effective service delivery management. [8], [26], and [48] points out that, managing information within the supply chain improves logistic performance in form of increased visibility of logistical operations and downstream activities. This reduces uncertain within the supply chain process normally caused by demand shocks or the bullwhip effect. According to [23], [29], and [51] when information is integrated in the supply chain process of an organization, efficiency is enhanced leading to quality and timely service delivery management. However, the integration process of such information based systems is very expensive and requires a lot of staff sensitization and training in areas of IT and software management [6], [18], [39], [53].

At NMS, supply chain information management practices involve the use of a computerized information managed system known as Navision, [9]. This system is fully information based and is used to analyse and ensure effective procurement, storage, and physical distribution management of medicines and medical supplies within the supply chain process of NMS, which has consequently improved data management leading to effective service delivery, [37]. Similarly, studies like [25], [50] maintain that, with the establishment of an information based pull system at NMS, the rate of complains from NMS recipients (Hospitals and health centres) has reduced over years, which is an indication of effective service delivery management. Given these benefits though, most organizations face complex and risky decision analysis in selecting appropriate information solutions for use in their operations because of the few empirically derived models which can suitably analyze the effects of supply chain information management on service delivery, (Reddy & Reddy, 2001 as cited by [29]).

2.1.1   Supply Chain Information Processing and Service Delivery

Supply chain information processing relates to the collection, analysis, interpretation, and dissemination of data or information within an organization to enhance supply chain operations. NMS being a pure supply chain management organization that is mandated to procure and ensure the effective supply of drugs within the country, [36]. For it to fulfil this mandate, it has to regularly collect downstream data or information from Hospitals and health centres, analyze this data, and disseminate it to the necessary parties (such as Ministry of Health, and the National Drug Authority) for planning purposes [37]. By doing so, the decision management process is enhanced thus effective supply chain management and service delivery. [5], [19] assets that, technologies like electronic data interchange, material requirement planning, and order management systems are increasingly being used by most organizations to enhance their service operations in the areas of data collection, analysis and dissemination. Order management systems, for example, are used to link inventories and prevailing demand levels, which helps minimise problems of stock outs and expiries thus effective service delivery, [34].

Data processing practices at NMS have mainly focussed on how reliable and accurate data will be collected from hospitals and health centres in order to maximize efficiency in the supply chain process of drugs within the country. Using an order based or pull system of supply chain management, demand is used to determine what will be supplied in hospitals and health units across the country. NMS receives daily requisitions, records them, and determines when, and how to ensure that demand is fulfilled [50]. The order based approach also mitigated the problem of demand swings that NMS used to face by increasing visibility and demand forecasting hence effective service delivery management. Hospitals and health centres can now make requisitions through e-mails, faxing and toll free lines, which has increased the capacity of NMS to collect data and facilitate effective decision making and service delivery management.

2.1.2   Supply Chain Information Storage and Service Delivery

Supply chain information storage relates to all mechanisms an organization puts in place to provide safe custody of information or data that is received and not yet used in the supply chain. Information storage also relates to record management and/ or archiving organizational documents. Its involves the creation, receipt, maintenance, use and disposition of records, including the processes for capturing and maintaining evidence of information about business activities and transactions in form of records or documents, (ISO 15489: 2001 Standard as cited by

[44]). This indicates that information storage is a crucial component of the supply chain process that promotes accountability, effective monitoring and control of organization operations for effective service delivery management [1], [30]. In the same way, supply chain information storage is an area of corporate endeavour which involves the administration of all business information within the supply chain. It involves establishing control measure to safeguard information resources. The measures may include; controlling access, training of staff, and employing security systems against malicious codes and social engineering. Information storage within the supply chain can broadly be categorized into two main perspectives namely; manual and computerized information storage systems. The manual information storage systems involve keeping data or information in paper form or hard copy, whereas the computerized storage systems are those involving keeping data or information in soft copies usually with aid of computer technologies. [40] points out that computerised information systems are cost effective and time saving especially in processing than the paper based systems or manual systems of information storage.

The rate of computer usage in Uganda is still low standing at 11%, (Kohut et al. 2007 as cited by [16]). This implies that, majority of organizations are papers based or have little investments in information systems given the enormous benefits that accrue as a result of using such computerised systems. The [43] asserts that computerized storage systems help store huge volumes of data, save operational cost, and enhance efficiency within an organisation. Though such systems have some pitfalls, including the fact that, they are expensive to install, difficult to master by employees and are sometimes threatened by malicious codes or social engineering [6], [18] and [19]. Managers should not use that as an excuse since their benefits toward service delivery management outweigh their pitfalls.

2.1.3 Supply Chain Information Flow and Service Delivery

Supply chain information flow involves the dissemination, distribution or sharing information resources among supply chain partners for effective decision making. It is the extent to which critical and proprietary information is communicated to one's supply chain partner, [52]. For information flow to be effective it must consider the following questions: what to share, whom to share with, how to share, and when to share. If these are addressed supply chain optimization will be realized in the lines of quality, cost, and time management. At NMS, supply chain information flow practices can be categorized into two main perspectives namely;

intra-organizational information flow and the inter-organizational information flow. The intra-organization information flow relating to sharing information resources among internal organizational departments, normally using technologies like ERP, MRP and DRP, whereas inter-organizational information flow involving the flow of information resources among external partners, such as Ministry of Health, Donor agencies, Hospitals like Mulago, health centres and others. This kind of information flow uses technologies like the internet, CPFR and EDI to transmit data among each other, [15] and [26] thus effective service delivery management.

Although, the [4] indicates some levels of inefficiencies in information sharing between NMS and its partners, the [37], maintains that NMS has weeded this problem through automation and that there is enhanced collaboration between NMS and its business partners. Such collaborations not only enhance efficiency but also increase organisational cohesiveness and visibility with the supply chain process thus effective service delivery management, [29], [46], [51].

3 Research Methodology

3.1 Research Approach and Designs

A quantitative paradigm was employed for the study using a descriptive, case study and correlational research design. This was aimed at providing a detailed analysis and contextual description of study phenomenons. Correlation methods were used in data analysis to describe the relationship between the two main variables (supply chain information management and service delivery) and their associated constructs.

3.2 Data Collection

Data was collected from a population of 180 respondents. These were mainly tactical and senior management employees. Using the Krejcie and Morgan (1970) sample size determination formula, a total sample size of 148 respondents was considered for the study. Senior managers were sampled using purposive techniques while tactical managers were sampled using simple random techniques. A researcher's made five point Likert scale questionnaire was then used to collect data from the targeted sampled groups as indicated in table A.

Table A: Population, Sample Size and Sampling Techniques

Category of Respondents	Population	Sample Size	Sampling Techniques

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Administrators	7	7	Purposive Sampling
Procurement, & Logistics Officers	12	11	Simple Random Sampling
Marketing & Sales	5	5	Simple Random Sampling
Finance & Accounting	4	3	Simple Random Sampling
Management Information Systems	4	4	Simple Random Sampling
Operations	28	26	Simple Random Sampling
Total for NMS	**60**	**56**	
Supplementary Sources (Mulago Hospital & Kisenyi Health Centre IV	**120**	**92**	Simple Random & Convenient Sampling
Overall Total	**180**	**148**	

Source: *Primary Data Sampled using the Krejcie & Morgan Sampling Technique (1970).*

3.3   Data Analysis

Data was analyzed using the Statistical Package for Social Scientists. Specifically, the researchers used means and standard deviations to measure the level of supply chain information management and service delivery by NMS, while the Persons Linear Correlation Coefficient was used to measure relationships that existed among the two study variables and their constructs. Numerical values and response modes were used to interpret the means as indicated in table B:

Table B: Numerical values and response modes used to interpret the means

Mean Range	Response Mode	Interpretation
4.30 – 5.00	Strongly Agree	Very High
3.50 – 4.20	Agree	High
2.70 – 3.40	Not Sure	Undecided
1.90 – 2.60	Disagree	Low
1.10 – 1.80	Strongly Disagree	Very Low

Source: *Mabonga (2012).*

4   Findings

4.1   Supply   Chain   Information Management

Supply chain information management as the independent variable of the study was dimensioned by three major components namely; supply chain information processing, supply chain information storage and supply chain information flow as follows:

4.1.1   Supply   Chain   Information Processing

The results indicated, a high extent of supply chain information processing at NMS with an average mean of 4.36. This was attributed to a high response on the issues of; effective information processing generally promoting quality, cost minimization, and timely delivery within the entire supply chain process (mean = 4.62), followed by the disseminated of information among the various respective user departments/ or members of the supply chain (mean = 4.57), then information on drug supply is collected directly from regional hospitals and health centre IVs by National Medical Stores officials come third (mean = 4.55), effective information processing (collection, analysis & dissemination) promotes timely delivery of drugs in health units/ hospitals by enabling SC members plan effectively and be in position to meet deadlines (mean = 4.55), Effective information processing (collection, analysis and dissemination) promotes quality management in the delivery of drugs by availing factual information on the needs of peoples to NMS (mean = 4.54), Information/ data received on drug requirement/ requests from health centres/ regional hospitals is verified when deliveries are made (mean = 4.52), effective information processing (collection, analysis and dissemination) promotes cost minimization by enabling NMS identify cost effective suppliers and distribution channels within the SC (mean = 4.45), Information on drug requirement/ status should always be supplied by health centres/ hospitals, instead of NMS collecting it from them(mean = 4.45), Information/ data is tabulated/ analyzed with the aid of computer programmes/ systems in order to come up with accurate interpretation(mean = 4.43), health centres/ and regional hospital officials communicate drugs requirements/ requests on time to National Medical Stores (mean = 4.43), the users (regional hospitals and health centres IV officials) are the ones who request/ demand for drugs in case a need a rises (mean = 4.43), information quality communicated by health centres/ regional hospitals is usually accurate and reliable (4.36), information/ data is recorded with the aid of electronic gadgets like computers, and lastly, information/ data is collected using electronic systems like Bar coding and Electronic point of sales/delivery (mean = 2.73).

4.1.2   Supply Chain Information Storage

The study also showed a high extent of supply chain information storage at NMS with an average mean of 4.06. This was due to high response rates on the issues of; effective information storage generally promoting quality, cost minimization and timely delivery within the supply chain process (mean = 4.62), computer storage systems

promoting accuracy, efficiency and economy in space than manual systems/ paper form recording systems (mean = 4.64), effective information storage promoting quality management by maintaining records on the status of drugs such as expiry dates, special care to given on particular drugs and others (mean = 4.62), effective information storage promoting cost minimization by maintaining records, which in turn help maximize service delivery efficiency, and effectiveness through improved visibility (mean = 4.61), effective information storage promoting time management by maintain records on delivery deadlines of drugs, thus effective supply chain management process (mean = 4.59), paper recording/ manual recording is normally used to supplement, and backup soft copies/ information in case it is lost from the computers (mean = 4.52), access to stored information is usually restricted from organizational staff for purpose of security and alterations/ tempering (mean = 4.34), firewalls, anti-viruses, and social engineering/ training staff are some of the ways in which the entity protects its information resources (mean = 4.32), information resources stored are usually classified according to the timelines of drug expiration, regions in which they are collected (mean = 4.11), information collected/ received by the entity is stored in soft copies with the aid of computers, instead of being recorded manually/ in paper form (mean = 3.86), computer storage systems are safer in terms of data storage than the manual recording systems (mean = 3.02), and lastly, the entity is challenged with cyber space risks such as viruses, worms, and Trajan horses by its computerized storage systems (mean = 1.43).

4.1.3   Supply Chain Information Flow

Similarly, a high extent of supply chain information flow at NMS was indicated with average mean of 3.91. This was attributed to high responses on the issues of; effective information flow among the various organization's departments and other external entities generally promoting quality, cost minimization and time delivery within the supply chain process (mean = 4.70), effective information flows among the various organization's departments and other external entities, such as the suppliers, promoting time management in the delivery of drugs by increasing accuracy, innovation and vigilance (mean = 4.59), all staff members within the supply chain process are trained on how to handle information and ensure it is used optimally (mean = 4.55), absence of effective information flow from the users (health centres/ regional hospitals) affecting the quality, cost and time of drug delivery (mean = 4.55), effective information flows among the various organization's departments and other external entities such as the suppliers promotes cost

minimization in the supply chain process of drugs by increasing accuracy, innovation and vigilance (mean = 4.55), effective information flows among the various organization's departments and other external entities such as the suppliers promoting quality management in the supply chain process of drugs by increasing accuracy, innovation and vigilance (mean = 4.36), absence of effective information flow between NMS and its suppliers negatively affecting quality management, cost, and the delivery time (mean = 4.34), information flow among the different organization's departments and other external entities is a common practice (mean = 4.16), information flow among the various organization's departments and others entities is done electronically using computer to computer systems like electronic data interchange/ and the internet (mean = 2.70), information flowing within the cyber space is protected from crackers using private key encryption systems of authentication/ verification (mean = 2.68), and lastly, information flowing within the cyber space is normally threatened by illegal intruders/ crackers within the supply chain process (mean = 1.91).

4.2   Service Delivery Management

Service delivery was the dependent variable of the study and it was dimensioned by three major components namely; quality service delivery management, cost management in service delivery and time management in service delivery as follows:

4.2.1   Quality   Service   Delivery Management

Findings indicated that the level of quality service delivery management by the National Medical Stores is high (average mean = 3.81). This was due to high responses on the issues of; information quality on the requirement of drugs sent to NMS by hospitals and health centres (mean = 4.70), followed by the standard of drugs delivered by NMS to health centres and hospitals within the country (mean = 4.61), drugs that require refrigeration are always accompanied by the refrigeration facilities provided by National Medical Stores (mean = 4.57), you are occasionally advised how to handle particular drugs, which are considered delicate and need special consideration(mean = 4.48), delicate/ fragile drugs are usually delivered when they are still intact and not contaminated or spoiled (mean = 4.34), quality standards like the ISO and UBOS are usually observed by National medical stores (mean = 4.27), inspections/ verifications of the quality & accuracy of drugs are jointly done both by NMS and health centres/ hospital officials upon delivery (mean = 3.50), drug specifications as ordered by regional hospitals/ health centres is usually observed and

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fulfilled by National medical stores (mean = 2.00) and lastly, NMS makes consultations from regional hospitals/ health centres on the exact descriptions and quality of drugs before delivery (mean = 1.84)

4.2.2 Cost Management in Service Delivery

Results showed a high level of cost management in service delivery by NMS (average mean = 3.65). This was attributed to a high response rate on the issues of; drugs delivered by National medical stores usually are cheaper than other suppliers in the market (mean = 4.54), followed by fact that National Medical Stores usually does not attach any costs to the drugs delivered (4.54), drugs delivered by National medical store are easily accessible and affordable to every patient (mean = 3.98), National Medical Stores role in the economy of Uganda is key in controlling the cost of drugs in the country (mean = 3.46), and lastly, centralizing drug procurement and supply chain system the way it is in Uganda under NMS generally improves supply chain efficiency and cost management (mean = 1.75).

4.2.3 Time Management in Service Delivery

Finding indicated a very low level of timely service delivery management by NMS (average mean = 1.36). This was due to very low response rates on the issues of; centralizing drug procurement and supply chain system the way it is in Uganda under NMS generally improving time management in delivery and effectiveness (mean = 1.46), followed by a very low rate on issue of medical emergencies and whether the National medical stores strives hard to respond to the needs of people on time (mean = 1.34), and lastly, drugs are usually delivered on time by National Medical Stores to health centers/ regional Hospitals (mean = 1.29)

4.3 Correctional Analysis

This section measures the relationship between the four major hypotheses of the study, as indicated in table C.

Table C: Correlation Analysis of Supply Chain Information Mgt and Service Delivery

Variables Correlated	r-value	Sig.	Interpretation	Decision on H_1
Supply chain information management & level of service delivery	.764	.002	Significant Relationship	Adopted
Supply chain information processing & Service delivery	.518	.024	Significant Relationship	Adopted
Supply chain information storage & Service delivery	.326	.038	Significant Relationship	Adopted
Supply chain information flow & Service delivery	.621	.013	Significant Relationship	Adopted

Source: *Primary Data*

5 Discussions

5.1 Supply Chain Information Management and Service Delivery

This section addresses the main objective of the study, which intended to examine the relationship between supply chain information management and service delivery. In doing so, the researcher ascertain that, the level of supply chain information management at NMS was high, with an overall mean of 3.97, while the level of service delivery management was indicated to be moderate, at an overall mean of 2.94. When these findings were correlated a positive and significant relationship between supply chain information management and service delivery was showed (r-value of 76% and Sig. Value of 0.002). This concurred with [17] who analyzed the impact of information on supply chain performance, and obtained a positive link between information management and decision performance within a supply chain network. It is on this basis therefore, that the researcher concludes on the hypothesis to be relational, and that, supply chain information management highly contributes to service delivery, Managers therefore ought to accord considerable attention and resources in information systems, if maximum service performance is to be realized in the areas of quality, cost and timely service delivery management, [15], [51].

5.1.1 Supply Chain Information Processing and Service Delivery

A positive and significant relationship between supply chain information processing and service delivery was also indicated with an r-value of 52% and level of Significance 0.024. This is in agreement with [42] who propounded the theory of information data management. Srivastava's conclusions were that information processing positively influence service performance among organization, and that, when managers invest in data processing collection mechanism decisions making within an organization will be enhanced, which in turn improves service performance in areas of quality, cost and time management.

Although a moderate relationship is indicated between supply chain information processing and service delivery, [4] maintain that there are some levels of inefficiencies in information processing at NMS which has led to drugs expiring, shortages, and excessive inventories hence affecting service delivery management.

5.1.2 Supply Chain Information Storage and Service Delivery

A high level of supply chain information storage at NMS was indicated, with an average mean of 4.06. When it was correlated with service delivery a positive and significant relationship between the two variables was realised (r-value 33%, and Sig. value of 0.038). The conclusions made were that supply chain information storage contributes positively to service delivery management, but with a relatively low margin. Despite this marginal contribution managers should not underestimate the influence of information storage within the supply chain in promoting accountability, and enhancing monitoring and evaluation of organisational operations, which are critical in achieving effective service delivery management [1], [30].

5.1.3 Supply Chain Information Flow and Service Delivery

A high level of supply chain information flow was also indicated at an average mean of 3.91. When this was correlated with service delivery, a positive and significant relationship between the two variables was realised (r-value 62%, and sig. value of 0.013). This is in line with [17] who analyzed the impact of information sharing on supply chain performance, and obtained a positive link between information management communication and decision support within a supply chain network. It is on this basis that the researcher concluded that, supply chain information flow highly contributes to service delivery management, and that, managers ought to continue investing in information systems and related technologies if there to maximise communication within their supply chain networks hence effective service delivery management, [15], [35].

6 Conclusions

From the finding, the researcher concluded on the hypothesis as follows: (1) there is a positive and significant relationship between the extent of supply chain information processing and the level of service delivery, (2) a positive and significant relationship between the extent of supply chain information storage and the level of service delivery was indicated, similar (3) there is a positive and significant relationship between the extent of supply chain information flow and the

level of service delivery management. That notwithstanding, the extent of supply chain information management and the level of service delivery in general indicated a positive and significant relationship, resulting into acceptance of the alternative hypothesis. The researcher therefore concludes that, supply chain information management contributes positively on service delivery among public health sector organizations. In light of these conclusions, this paper serves as a platform for supply chain managers to comprehend the importance of information management within the supply chain process. Secondly, it will contribute to the existing board of knowledge on as far as supply chain information management is concerned.

7 Recommendations

The researcher puts forward the following recommendations, basing on the study findings; (1) National Medical Stores should create an environment that encourages health centres and hospitals to easily make requisitions whenever there is a need within a health Unit/ hospitals across the Country. This will allow easy capture of data/ request, thus promoting affective planning for delivery management; (2) Hospital and health centre personnel should be trained and enlightened on the procurement process and in particular how to assess their needs and make rightful specification. This will reduce the problem of errors associated with making requisitions by health units/ and hospitals; (3) there is need for more supply chain professionals within NMS to help manage procurement and the distribution process of drugs within the Country. This is because the entity handles large scale operations of supply chain, yet the prevailing numbers seem not to be sufficient; (4) the National Medical Stores should invest in ICT in order to enhance data collection, analysis, storage and dissemination. The rate at which data is collected using modern gargets is low, and yet studies have shown that such tools capture vast datum, and are accurate compared to the manual systems, largely being used by the entity currently; (5) occasionally, NMS should meet with health centre/ hospital officials to plan for drug deliveries within the Country, and in order to coordinate information regarding drug stocks within health units/ hospitals, which will eventually eliminate the problem of poor response to medical emergencies like Ebola, Cholera, and Marburg, when they strike the country; and lastly (6), government should continuously support NMS by adequately funding it. This will enable NMS to maintain an adequate stock level and avoid problems of drug shortages within the country, and in order to efficiently manage its internal operations like facilitation of field staff, acquisition

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of modern data management gargets, and others, thus enabling effective supply chain management of drugs within the Country.

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