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Optimization of Supply Chains and Service Delivery in Selected Ugandan Charitable Organizations

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Abstract

Aim: This study aims to determine how supply chain optimization affects service delivery in a few Ugandan charitable organizations.

Methods: The study employed a descriptive design and a census survey sample approach because it was just 28 people in the population being studied. A self-administered questionnaire containing both open-ended and closed-ended questions was used to collect the data. All quantitative variables were estimated using descriptive statistics, such as percentages, means, standard deviations, and frequencies. The data was collected, analyzed using multiple regressions, and then displayed as tables and graphs.

Results: The study's conclusions showed that supply chain optimization has a significant impact on how well certain Ugandan humanitarian organizations deliver their services. The majority of supply chain optimization's components, including transportation and distribution, depend on technology to operate at their best, according to the study.

Conclusion: Service delivery was found to have a favorable and statistically significant link with inventory management, strategic sourcing, and technology.

Recommendation: The study recommend humanitarian organizations integrate supply chain operations utilizing technology to increase efficiency and accountability and to develop the skills of their human resources to meet the difficulties of the contemporary supply chain.

Keywords: *Supply chain optimization, service delivery, humanitarian organizations*

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1.0 INTRODUCTION

1.1 Background of the Study

An estimated 134 million people require humanitarian assistance worldwide (GHO, 2018). Around 1 billion individuals worldwide lack basic identity (World Bank, 2018), a significant portion of them are residents of sub-Saharan Africa, further complicating the problem. The ability of this people to participate in social, economic, and political life is severely hampered by a lack of identity. According to the 2018 World Disaster Report, humanitarian aid should be provided to everybody without distinction; but, in order to identify and reach them, a person must first be 'visible'. According to the 2018 Global Risk Report from the World Economic Forum, geopolitical and environmental risks skyrocketed between 2017 and 2018.This is expected to be replicated in the coming years. Based on the UN-led Humanitarian Response Plans (2017), Syria, DRC, South Sudan, Afghanistan and Ukraine were among the hardest hit countries with affected populations of 13.6 (67%), 13.1 (56%), 7.6 (82%), 7.4 (49%) and 4 (60%) million people respectively. Closer home, the Global Humanitarian Assistance Report (2018) indicated that Uganda had a population of 5.6 million people in need of humanitarian aid representing 12% of the total population. In light of the above facts, the spotlight has turned on humanitarian organizations and specifically the humanitarian supply chain upon which humanitarian organizations are dependent. There is need for them to adopt techniques that will optimize the supply chain to enable efficiency in the flow of relief goods to disaster areas. Supply chain optimization is thus a formidable tool that can be used to enhance service delivery in humanitarian organizations (Parwanto, Mohorosi & Oyama, 2015).

Wassenhove (2006) asserts that logistics account for 80% of the cost of providing humanitarian aid; as a result, it's critical to use efficient supply chain management strategies in order to meet operational goals. According to him, the effectiveness of humanitarian activities will be determined by the supply chain function. Given the volatility and complexity that define humanitarian activities, it is crucial for humanitarian organizations to pay close attention to supply chain management. The success of humanitarian activities depends on the efficiency with which the supply chain operates, and supply chain optimization is a crucial instrument in this regard (Wassenhove, 2006). For sustainability and competitiveness, humanitarian organizations must consistently optimize their supply chain to adopt more efficient and cost-effective processes that will give them an edge in their operations (Abidi, Leeuw & Klumpp, 2014). For the desired levels of service delivery to be realized, there has to be a high level of coordination among the various stake holders affecting the supply chain; donors, the government, Aid agencies, organizational interests and the logistics expertise (Balcik, Beamon, Krejci, Kyle & Magaly, 2010).

According to Longenecker and Scazzero (2000), a company's total success, including higher customer satisfaction and staff morale, will be impacted by the quality of its services. Therefore, efficient service delivery is essential to the competitiveness and sustainability of humanitarian organizations. Supply chain service delivery may be accomplished by continuously developing the skills required to provide the desired services and providing solutions that provide service providers a competitive advantage (Ojasalo & Gronroos, 2017).

The following factors can be evaluated in order to measure service delivery, which is a crucial aspect of humanitarian organizations: response time, which is largely based on supply chain strategies used, flexibility of the organization, which is determined by the response rate to different disasters, rate of intended objectives being met, which includes the number of lives saved, and

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level of efficiency, which can be determined by how well the organization performs (Beamon & Balcik, 2015). Schiffling and Piecyk (2014) delved into the aspect of service delivery measurement in humanitarian organizations in two ways; donor expectations and direct beneficiaries. Donors majorly focus on financial reports, media reports and overall disaster response. On the other hand, in the case of direct beneficiaries, there has to be evidence to show improved life situation or input and output measures that capture supply chain efficiency. This study has adopted response time, rate at which intended objectives are met, supply chain input and output and the number of lives touched as the measures for service delivery. This decision is informed by the fact that the identified parameters are best suited to determine supply chain efficiency as an effect of optimization.

Human welfare progress depends heavily on humanitarian groups. Organizations go to considerable efforts to ensure that the planned service delivery levels are met in order to accomplish this goal. However, these initiatives are hampered by fundamental problems such as the inability to predict disasters, a lack of connectivity between organizational systems and the supply chain, demand unpredictability, inadequate infrastructure in disaster zones, and budgetary restrictions were all mentioned by Kamau (2013). On the other side, Kaluki (2015) highlighted the absence of performance metrics, knowledge, and supply chain coordination. Nyamu (2012) cited unclear service delivery objectives, a lack of information integration, insufficient transportation infrastructure, technology deficiencies, and coordination and management issues. Efforts have been made to ameliorate some of these challenges, according to Ojwang (2016) humanitarian organizations made a significant investment towards automation of service delivery efforts (71% of respondents). USAID delivery project (2014) also shows efforts towards optimization of supply chain design, network and transport in various operations around the globe to enhance service delivery. Onyango 2016 indicated there being significant efforts towards inventory management among various humanitarian organizations operating in the country. The study addresses initiatives that can be undertaken in specific stages of supply chain to translate in a more efficient and reliable chain.

The study's main goal was to determine how supply chain optimization affected the way certain Ugandan humanitarian groups delivered services. The specific objectives that guided this study were; To determine the effect of inventory management on service delivery in selected humanitarian organizations in Uganda; To determine how strategic sourcing has affected the way some humanitarian groups in Uganda offer services. To assess the effect of technology on service delivery in selected humanitarian organizations in Uganda. To ascertain the impact of distribution and transportation on the provision of services in certain Ugandan humanitarian organizations

2.0 LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Resource Based Theory

Penrose (1959) initially presented the notion in her book (The theory of the growth of the firm). Theoretically, if a business successfully deploys the ideal mixture of tangible and intangible resources heterogeneously throughout its operations flow, it will obtain a competitive edge (Rungtusanatham, Salvador, Forza & Choi, 2003). To put diverse resources under their control under varying degrees of emphasis, businesses build the resource bundle that best satisfies their

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aims and objectives. The strategy an organization develops constantly influences the resource choices; the objective is to have a resource mix that is unique. The strategic combination and deployment of chosen resources, including persons and technology, throughout the humanitarian supply chain improves the achievement of organizational goals and objectives. a source of competitive advantage However, the resource-based theory has its limitations; the resource under consideration must possess certain characteristic qualities for there to be a competitive advantage that is sustainable. The resource must add value to the organization in terms of efficiency; it must be differentiated to give a competitive edge, the resource must be inimitable to avoid replication by competitors, It must be tailored to the firms specific needs; imperfectly mobile and finally the resource must be hard to substitute (Peteraf & Bergen, 2003). This theory supports the inventory management concept. Based on this theory inventory management efficiency can be assessed in terms of carrying cost, inventory turnover, return on investment and days in inventory.

2.1.2 Network Theory

Sociologist Barnes was the first to investigate social networks in the area in 1954. The social network theory describes how people relate to one another within a system and ties their interactions to those of other players. A social network can exist online or offline and is made up of nodes and ties, where nodes are the network's acting components and ties are the connections between the actors (Rodriguez, 2016). Supply chain networks are highly intricate and rely largely on the interactions between members to function well. The greatest way to study how businesses are connected is through CEOs and other employees at various levels within their unique networks is through the network theory (Newman, 2003).For seamless flow of activities within supply chain, relationships are extremely important; this is promoted by the network theory. Humanitarian organizations rely on networks for information gathering and drafting of policies for disaster response (Lincoln, 2015). The theory has limitations; the identification of the critical links that will interlink processes and critical partners to create a network is a challenge. The success of the theory is also dependent on ‘contact’ to crate the ties that form the network. The strength of the network is dependent on the frequency of contact, duration of the interaction and the level of energy invested in building the relationship (Lui, Sidhu, Beacom & Valente, 2017). Strong networks enable supply chains to respond effectively to changes in the areas of operation like people’s needs and competitors’ reactions; this enhances relations which promote efficiency (Bantham, Celuch & Kasouf, 2003). Based on this theory strategic sourcing can be measured in terms of cost savings, purchased product quality, purchase process efficiency, lead time and vendor quality.

2.1.3 Systems Theory

Bertalanffy (1969) introduced the idea for the first time as the general systems theory. He came to the conclusion that, rather than concentrating on particular characteristics of an entity's constituent components, one should pay attention to the arrangements and relationships between the parts that pertain to the total. As a consequence of the component arrangement decision taken into account, systems with comparable components may nonetheless operate and act differently; the outcome is defined by the method of interaction between the components. The majority of systems are open, which makes them susceptible to the environment in which they function, which causes them to change and acquire new qualitative qualities. However, a clearly defined barrier must exist between the system and the environment it functions in; this border must let inputs and outputs to

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enter and exit the system.In supply chain, the systems theory brings together the various components like inventory handling, sourcing, human capital, information flow, transport and distribution and finances to form the larger supply chain system (Faharani, Asgari & Davarzani, 2009). The theory is limited to the extent that it assumes that all organizations are big with complex systems and overlooks the small organizations. The bigger the system, the harder decision making becomes because of the need to consult; systems pose the risk of being counterproductive if not well managed (Singh, Wen & Jain, 2017). As supported by this theory technology can be assessed in terms of the level of process automation, level of information flow, organizational flexibility and the extent to which it helps in resource planning.

2.2 Empirical Review

At St. Martin's hospital in Agroyesum, Ghana, Osei (2015) investigated the impact of inventory management procedures on service delivery. The study used a descriptive survey approach and included 235 personnel from different hospital departments as its target group. The study recruited 60 employees from the finance, retail, records, and pharmacy sections using the purposive and convenience sampling techniques. ABC analysis, economic order quantity, material requirement planning, manufacturing resource planning, enterprise resource planning, distribution resource planning, and just-in-time system were among the inventory management techniques that were the subject of the study. The study concluded that inventory management procedures had a significant impact on the institution's service delivery; this was supported by data showing a mean of 6.26 and a standard deviation of 0.681.The study also identified long procurement procedures, insufficient funds and inadequate training as some of the challenges affecting inventory management. However, the study was limited to one institution thus denying the findings the effect of comparability. The study also failed to address other factors relating to inventory management that affect service delivery.

Wanyonyi (2017) examined the service delivery and inventory management procedures of significant supermarkets in Uganda. The study used an expressive research design and had a population of 17 people. It was a census of all large supermarkets that were between 1000 and 5000 square feet in size. The study concentrated on inventory management techniques, such as vendor controlled inventory, economical order quantity, just in time, and the ABC system, and how these affected service delivery. According to the survey, most supermarkets use just-in-time for perishable commodities and vendor controlled inventory for high value items. The high value objects were given additional attention by using advanced security methods while the ABC system was also implemented. The regression analysis revealed that the identified variables contributed to a 55.8% of service delivery levels, the findings also revealed that the practices improved supplier-buyer relationship. The study however discriminated against the small supermarkets yet inventory management challenges are more pronounced when the stock levels are low.

Maurice (2014) examined how Ugandan power's procurement procedures affected the delivery of services. 160 respondents were selected using random stratified sampling from a population of 7000 Uganda Power employees who were gathered from various deports across the nation for the study. The respondents came from the organization's procurement, customer service and marketing, finance and audit, and technical units. The study concentrated on the factors that affect service delivery, including procurement policy, procurement strategy, and sustainable procurement practices. The study concluded that procurement strategies did have an influence on

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service delivery inside the company; however, sustainable procurement had the most impact, with a respondent agreement rate of 88.8 percent.Despite the research being a case study, which limited comparability, data collection was centered at the head office. This may have skewed the data to represent service provision within the urban areas at the expense of the rural areas.

Thuo and Njeru (2014) examined effects of public procurement reforms on service delivery at national spinal injury referral hospital. The study targeted a population of 224 and sampled 67 respondents using stratified random sampling. The study identified tender committee transparency, fair competition, transparency of the procurement process, tender committee knowledge of the public procurement and disposal act. In conclusion the study revealed that the identified aspects had a positive effect on the levels of service delivery, however prolonged procurement cycles were identified as an impediment to service delivery because it resulted in stock outs in the facility. The research was however limited to one public institution, the study needed to spread the findings across various public institutions for better understanding of the subject under consideration.

Ojwang (2016) examined the use of information technology on humanitarian logistics of relief organizations in Uganda. The study targeted a population of 53 organizations based on Enterprise Human Resource and Payroll (2015) which showed that 53 such organizations operated in Uganda. The study adopted a census sample in consideration of the fact that the target population was small. The study assessed various information technology uses like automation of processes, organizational flexibility, information flow and resource planning. The findings established a positive relationship between technology use and the effectiveness of relief logistics; technology use resulted in improved coordination levels, reduced lead times, improved quality and cost efficiency. Due to the ever-changing face of technology, the study may not apply in the next few years; furthermore, the study will need to be replicated in other sectors to assess the level of pervasiveness.

Transportation management system: an analysis of development and potential futures was the topic of Griffis and Goldsby's (2015) study. The study used an electronic survey approach and had 1651 people as its target audience, who were American Supply and Demand Chain Executive magazine members. The research concentrated on decisions related to the whole network and lanes, carrier choice, service negotiation, service evaluation, dock level decisions, and over-the-road decisions. The study concluded that stakeholders in the transportation industry needed to implement transport management systems to more effectively manage the logistical components of their companies due to the complexity of modern transport management. Additionally, it was shown that the majority of firms thought that failing to implement a transport management system had a greater risk than adoption, and that the investment had a rapid return. The findings also revealed the need for inter-operability of the adopted management system with other aspects within the supply chain for strategic and sustainability purposes. However, the study failed to address other factors outside the transport function which have influence on the success of the transport function within the supply chain.

3.0 METHODOLOGY

The study employed a descriptive design and a census survey sample approach because it was just 28 people in the population being studied. A self-administered questionnaire containing both open-ended and closed-ended questions was used to collect the data. All quantitative variables were estimated using descriptive statistics, such as percentages, means, standard deviations, and

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frequencies. The data was collected, analyzed using multiple regressions, and then displayed as tables and graphs.

4.0 DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Demographic Characteristics

The study targeted 28 humanitarian organizations with respondents comprising of supply chain and related units' heads. Out of the 28 questionnaires issued, 21 were returned dully completed representing 75% of the total target population. According to Nulty (2008), a response rate of 50% is considered adequate. 76.2% of the respondents were male, 23.8% female and 0% intersex. This indicates gender imbalance in the selected humanitarian organizations; the female percentage however lower is adequate and thus safe to conclude that views from all genders were accommodated by this study. No intersex respondent was captured. The majority of the respondents fell under the Degree category with a percentage of 57.1% followed by Diploma with 23.8%, Masters 9.5%, Certificate 4.8% and PhD 4.8%. This shows that the respondents could be relied upon to give accurate information regarding the subject under study. Majority of the respondents fell within the 40-50 bracket represented by 47.6%, followed by 30- 40 with 28.6%, 50-60 with 14.3% and 20-30 with 9.5%. This shows that the findings were well distributed across generations.

4.2 Descriptive Analysis

4.2.1 Service Delivery

The respondents were asked to indicate their level of agreement on aspects relating to service delivery for the last five year.

Table 1: Trends of aspects of service delivery

Statements	Mean	Std. Dev.
The number of lives saved has increased	2.6190	1.32198
There is better resource utilization	2.7143	1.18924
There is better organizational flexibility	2.7619	1.17918
Disaster response time has improved	2.7143	1.38358

From the table above, the respondents agreed that for the last five years there has been better organizational flexibility as indicated by a mean of 2.76. Better resource utilization and improved response time followed with a mean of 2.71; increased number of lives saved came in last with a mean of 2.61.

4.2.2 Inventory Management

The study sought to establish the influence inventory management has on service delivery in selected humanitarian organizations in Uganda.

4.2.2.1 Extent of Inventory Management on Service Delivery

The respondents were asked to specify the extent to which inventory management affects service delivery. The results are displayed in table 2.

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Table 2: Extent of inventory management on service delivery

Extent	Frequency	Percent
Not at all	2	9.5
Small extent	4	19.0
Moderate extent	4	19.0
Great extent	5	23.8
Very great extent	6	28.6
Total	**21**	**100.0**

According to the findings, majority of the respondents agreed that inventory management did affect service delivery with 28.6% very great extent, 23.8% great extent, 19% moderate extent, 19% small extent and 9.5% not at all. This is in line with Miller (2012) who holds that stock administration framework adopted by an organization directly influences its gainfulness; humanitarian organizations stand to achieve the desired service delivery levels.

4.2.2.2 Influence of Aspects of Inventory Management

The study also sought to establish the level of agreement on various aspects of inventory management and their influence on service delivery.

Table 3: Influence of aspects of inventory management

Statements	Mean	Std. Dev.
The firm makes deliberate efforts to minimize carrying coast	2.1905	1.16701
The firm manages the number of days in inventory to minimize funds tied in stock	2.6667	1.23828
Inventory held is consumed continuously throughout the year	2.4286	1.20712
The firm maximizes benefit from the inventory used to justify holding stock	2.4286	1.32677

From table 3, the respondents largely agreed that the organization managed the number of days in inventory to minimize tying funds in stock as indicated by a mean of 2.67. It was also indicated that inventory held was continuously consumed throughout the year as shown by a mean of 2.43, that the firm maximized benefit from inventory used to justify holding stock as shown by a mean of 2.43 and that the firm made deliberate efforts to minimize holding costs as indicated by a mean of 2.19. The results imply that there is need to strike a balance between holding stock levels that will guarantee un-interrupted service delivery and the need to manage cash flow by limiting costs associated with stock. This is in line with the works of Gonzalez and Gonzalez (2010) that emphasize on the use of re-order points to better manage inventory levels to avoid over and under stocking which may lead to a knock-on effect that may affect the entire supply chain.

4.2.3 Strategic Sourcing

4.2.3.1 Extent of Strategic Sourcing on Service Delivery

The objective was to determine the extent to which strategic sourcing influences service delivery in selected humanitarian organizations in Uganda.

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Table 4: Extent of strategic sourcing on service delivery

Extent	Frequency	Percent
Not at all	2	9.5
Small extent	1	4.8
Moderate extent	2	9.5
Great extent	8	38.1
Very great extent	8	38.1
Total	**21**	**100.0**

As illustrated, 38.1% of the respondents indicated that strategic sourcing influenced service delivery to a great and very great extent. This was followed by 9.5% moderate, 4.8% small extent and 9.5% not at all. This is in agreement with Kotabe and Murray (2004) who posit that great levels of collaboration between the organization and suppliers form a basis for the use of concepts like JIT which give organizations a competitive edge and thus enhanced service delivery levels.

4.2.3.2 Influence of Aspects of Strategic Sourcing on Service Delivery

The questionnaire gave the respondents an opportunity to indicate their level of agreement on various aspects strategic sourcing influence on service delivery in selected humanitarian organizations in Uganda.

Table 5: Influence of aspects of strategic sourcing

Statements	Mean	Std. Dev.
The sourcing function makes deliberate efforts to minimize costs relating to product acquisition	1.9524	0.97346
The sourcing function continuously improves on the quality of vendors	2.4286	1.20712
The firm is conscious of the quality of products used in the delivery of services	2.3810	1.16087
The sourcing function continuously shortens purchase lead time	2.4762	1.12385
The firm has a sourcing strategy in place	3.2381	1.22085

Table 5 shows that the respondents strongly agreed on the importance of strategy in sourcing as indicated by a mean of 3.2, this was followed by a mean of 2.48 who believed on the importance of shorter purchase lead time. The importance of continuous improvement of the quality of vendors in service delivery was represented by a mean of 2.43 followed by the importance of quality products with a mean of 2.38 and the reduction of cost of products by a mean of .973. This means that sourcing should be approached from a strategic point of view where it is synchronized with the general organizational goals and objectives for optimal output. This is in line with Eltantawy, Giunipero and Handfield (2014) who posit that there is a shift from the ordinary sourcing function to a more strategic and comprehensive function that integrates purchase of goods and services with the long-term organizational goals and objectives.

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4.2.4 Technology

4.2.4.1 Extent of Technology on Service Delivery

Below is a representation of the extent to which technology affects service delivery as indicated by the respondents.

Table 6: Extent of technology on service delivery

Extent	Frequency	Percent
Not at all	3	14.3
Small extent	3	14.3
Moderate extent	2	9.5
Great extent	6	28.6
Very great extent	7	33.3
Total	**21**	**100.0**

Table 6 shows that 33.3% agreed to a very great extent that technology did affect service delivery, followed by 28.6% great extent, 9.5% moderate and 14.3% represented small extent and not at all. Sanders and Premus (2011) hold a similar view that a technology enabled supply chain ensures a seamless flow of information and supplies along the chain which in turn translates to efficiency and enhanced service delivery levels.

4.2.4.2. Influence of Aspects of Technology on Service Delivery

The study sought opinions from respondents on the level of agreement on various aspects of technology influence on service delivery. The response is indicated in table 7.

Table 7: Influence of aspects of technology

Statement	Mean	Std. Dev.
Most supply chain processes are automated	2.2857	0.90238
Technology is used in the dissemination of information across the supply chain	1.7143	0.78376
The firm uses technology to enhance organizational flexibility	2.9048	1.04426
The firm uses technology in resource planning and allocation	2.9524	1.24403

From table 7, respondents strongly agreed on the role of technology in resource allocation and planning (2.95) followed by use of technology in enhancing organizational flexibility (2.90), automation of supply chain processes (2.29) and use of technology in dissemination of information (1.71). The results imply that technology is an integral aspect in the success of humanitarian organizations and thus should be continuously improved for enhanced efficiency and accountability. This is in agreement with Fowler, King, Marsh and Victor (2000) who posit that technology plays a key role in the integration of all aspects of supply chain with organizational goals and objectives to achieve the desired outcome.

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4.2.5 Transport and Distribution

4.2.5.1 Extent of Transport and Distribution on Service Delivery

The respondents indicated the extent to which transport and distribution influences service delivery in selected humanitarian organizations in Uganda. The results are shown in Table 8 below.

Table 8: Extent of Transport and Distribution on Service Delivery

Extent	Frequency	Percent
Not at all	2	9.5
Small extent	1	4.8
Moderate extent	2	9.5
Great extent	6	28.6
Very great extent	10	47.6
Total	**21**	**100.0**

Table 8 shows that 47.6% of the respondents agreed to very great extents that transport and distribution did affect service delivery in humanitarian organizations. This was followed by 28.6% great extent, 9.5% moderate extent, 4.8% small extent and 9.5% not at all. This is supported by Yue, Tseng and Taylor (2014) who hold that transport is the most important function within supply chain; a good transport system creates a competitive edge by enhancing efficiency through reduction of operational costs and promoting service quality.

4.2.5.2 Influence of Aspects of Transport and Distribution

The study sought respondent's opinion on the level of agreement with various aspects of transport and distribution influence on service delivery in selected humanitarian organizations in Uganda.

Table 9: Influence of aspects of transport and distribution

Statement	Mean	Std. Dev.
The firm continuously maintains manageable transport costs in creating access to service delivery	2.1429	1.15264
The firm balances various transport modes to minimize time in transit	2.0952	0.99523
The firm relies on the transport function to create access and connectivity within the supply chain	2.1429	0.91026
The firm employs transport management practices to create efficiency and better access	2.1905	0.87287

From table 9, respondents strongly agreed that the use of transport management practices did influence service delivery with a mean of 2.19. This was followed by the firm relies on transport crate access and connectivity at a mean of 2.14, that the firm balances various transport modes to minimize time in transit (2.09) and that the firm continuously maintains manageable transport costs in service delivery with a mean of 2.14. This means that transport plays a key role in the creation of access to services as well as maintaining physical links along the supply chain; the function must thus be given special focus. This is supported by Anderson and Wincoop (2004) who opined

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that costs associated with transport can hinder or promote international movement of goods and services which in turn determines the level of service delivery; adoption of progressive transport management practices is thus imperative.

4.3 Multiple Regression

A multiple regression analysis was conducted to investigate the joint causal relationship between the independent and the dependent variable as represented by the model $S = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$

Table 10: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.586	0.343	0.309	1.09904

a. Predictors: (Constant), Inventory Management, Strategic Sourcing, Technology, Transport and Distribution

The coefficient of determination R square and correlation coefficient (r) shows the degree of association between the independent and dependent variable. As shown in Table 17, R2= 0.343 and R= 0.586, this shows a strong relation between the variables. From the model summery, adjusted R2 was 0.309; this indicates that supply chain optimization explains 30.9% of variation in service delivery of selected humanitarian organizations in Uganda.

Table 11: ANOVA results

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	12.001	1	12.002	9.937	0.005
Residual	22.950	19	1.208		
Total	34.952	20			

a. Dependent Variable: Service Delivery b. Predictors: (Constant), Inventory Management, Strategic Sourcing, Technology, Transport and Distribution

From the table, an F statistic of 9.937 indicated overall significance of the model as it is greater than the critical F value of 3.88with $P \leq 0.05$(level of significance). This implies that supply optimization concepts were statistically significant in explaining service delivery in selected humanitarian organizations in Uganda.

Table 12: Regression coefficient

Model	Unstandardized Coefficients		Standardized Coefficient		Sig
	B	Std. Error	Beta	t	
Constant	0.675	0.662		1.02	0.021
Inventory management	0.753	0.241	0.497	3.124	0.006
Strategic sourcing	0.645	0.216	0.475	2.985	0.008
Technology	0.796	0.245	0.437	2.559	0.028
Transport and distribution	0.888	0.282	0.586	3.152	0.005

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a. Dependent Variable: Service Delivery from Table 12, the Analysis Model Is as Follows;

$S = 0.675 + 0.753X_1 + 0.645X_2 + 0.796X_3 + 0.888X_4 + E$

Service Delivery = 0.675 + 0.753 Inventory Management + 0.645 Strategic Sourcing + 0.796 Technology + 0.888 Transport and Distribution

If all factors were held at zero, service delivery in selected humanitarian organizations was 0.675. The findings as indicated in Table 4.18show that the relationship between inventory management and service delivery is positive as indicated by a significance level of 0.006which below the 0.05 mark. In addition, when all other independent variables are held at zero, a unit increase in inventory management would lead to a 0.753 increase in service delivery in the selected humanitarian organizations in Uganda. This is in line with Lambert (2008) who holds that inventory management is critical in improving supply chain performance through effective cost management which in turn translates to enhanced service delivery levels. From the results in table 12, transport and distribution had the most influence on service delivery followed by technology, inventory management and strategic sourcing respectively.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

From the findings, the study concluded that inventory management influences service delivery in selected humanitarian organizations. Days in inventory emerged as the most influential aspect of inventory management. Days in inventory is an efficiency ratio that measures the average number of days an organization holds its inventory before liquidating and indicates the period funds are tied in stock. Days in inventory measures value, liquidity and cash flow; the shorter the days in inventory the more efficient the organization's inventory management function is. The study concludes that humanitarian organizations observe the economic order quantity when re-stocking in order to achieve the ideal number of days in inventory. The study also concluded that strategic sourcing influences service delivery in selected humanitarian organizations in Uganda. Existence of a strategy was the most influential aspect of strategic sourcing; by formulating a strategy to guide the sourcing function, organizations align all organizational goals and objectives with the sourcing function. This brings on-board long-term supply partners who the organization can pre-qualify and mentor to offer the desired levels of services at the lowest price possible. The study concludes that humanitarian organizations formulate a strategy to guide their sourcing function.

5.2 Recommendations

The study recommends that humanitarian organizations integrate supply chain functions using technology to accurately capture organizational needs and requirement; this should be matched with enhanced resource capabilities to adequately respond to modern-day inventory management challenges. It is also recommended that humanitarian organizations automate inventory management processes to better manage risk and costs associated with the same. Humanitarian organizations should put in place a strategy to guide the sourcing function as well as establishing standard operating procedures to ensure that the sourcing process is competitive and devoid of manipulation. Aid organizations should also ensure that concerned staff is continuously equipped with modern trends to ensure the sourcing function remains strategic. The study further

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recommends that humanitarian organizations invest in customized technology that will best facilitate their mode of operation. The technology should link all the aspects of supply chain to offer the required synergy and make it possible to measure the same for decision making. The technology should also aid in the management of staff responding to disasters through time management and communication. Humanitarian organizations should consider going green in bid to address high costs associated with the transport function. By embracing greener and more sustainable transport options, humanitarian organizations will reduce their transport and distribution costs and at the same time manage environmental impact through reduction of greenhouse gas emissions. It is also recommended that humanitarian organizations invest in a transport management system to better manage their fleet.

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Conflict of Interest

The authors declares no conflict of interest.

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