# MAKERERE UNIVERSITY

## MAKERERE UNIVERSITY BUSINESS SCHOOL

# Information technology capabilities, distribution management and logistics performance: a case of third-party logistics firms in Uganda.


**BY**

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**A DISSERTATION SUBMITTED TO MAKERERE UNIVERSITY BUSINESS SCHOOL (FACULTY OF GRADUATE STUDIES AND RESEARCH) IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN PROCUREMENT AND SUPPLY CHAIN MANAGEMENT OF MAKERERE UNIVERSITY**

**DECEMBER, 2023**

**PLAN 'A'**

## DECLARATION

I, **SEKYOLE HENRY** declare that this dissertation is my own original and unaided work. Any assistance and guidance that I have received has been duly acknowledged.

Signature..... Date.....8/12/2023.....

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**APPROVAL**

This is to certify that this dissertation was prepared under our guidance as academic supervisors and is now ready for submission.

Sign..... Date..... 8/12/2023

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Sign..... Date..... 8/12/2023

**MR. KAYISE DENIS**

~~Sign.....~~ ~~Date.....~~

## DEDICATION

I dedicate this piece of work to my God, and family especially my beloved Mother Mrs Birungi Costance Sekyole and my Father Mr. Peter Sekyole for both financial and spiritual support towards my education.

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My sincere gratitude and glorification is to my everlasting heavenly Father, my provider in time of need. This research would not have been complete without your unending guidance and unconditional love. Special and sincere thanks are bestowed to my supervisors Associate Prof. Benjamin Tukamuhabwa and Mr. Denis Kayise for their consistent guidance in accomplishing this piece of work. Many thanks to the management of Uganda Clearing and Forwarding Association for the assistance provided in accessing some information especially in these hard times.

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**ABSTRACT**

The purpose of this study was to examine the relationship between information technology capabilities, distribution management and logistics performance in Ugandan third-party logistics firms. A quantitative cross-sectional survey was conducted using a sample of 227 third party logistics firms out of a sample size of 293 firms that were contacted. Data were collected using self-administered questionnaires that were hand delivered to the respondents. Overall, 366 usable questionnaires from the 227 firms representing 80% response rate were collected for analysis.

The analysis of data involved descriptive statistics for demographics, correlations and regression analyses for answering the research questions in accordance with the set objectives. The results revealed positive and significant relationships between the following variables; IT capabilities and logistics performance, IT capabilities and distribution management and distribution management and logistics performance. Furthermore, IT capabilities and distribution management were found to account for up to 45.7% of the variance in logistics performance. Lastly, distribution management emerged as a partial mediator in the relationship between IT capabilities and logistics performance.

Based on the study findings, recommendations were advanced regarding the need to strengthen IT capabilities and distribution management so to enhance logistics performance in Ugandan third party logistics firms.

# CHAPTER ONE

## 1.0 Introduction

This chapter contains the background of the study, the problem statement, purpose of the study, research objectives, research questions, scope of the study, significance of the study, and the conceptual framework.

## 1.1 Background of the study

In today's global supply chains, logistics has been used as a competitive tool that facilitates companies in integrating their trading activities with their supply chain partners (Amonkar *et al.*, 2021). This is because logistics facilitates trade across borders through a set of activities including transportation, warehousing, brokerage, express delivery, terminal operations, and information management (Ekici *et al.*, 2019). Besides firm level, the logistics performance of a country is crucial to national and international trade since it has a direct effect on economic development of a country (Ekici *et al.*, 2019). Furthermore, the World Bank's Logistics Performance Index (LPI), published every two years since its initial release in 2007, has raised awareness on the importance of the logistics performance of countries (Arvis *et al.*, 2016). Notable is that the logistics performance indicator is based on a worldwide survey of third-party logistics operators in different countries (Yildirim and Mercangoz, 2019). Logistics performance has been defined by many different researchers. For example, Fugate *et al.*, (2010) defined logistics performance as the degree of efficiency, effectiveness, and differentiation associated with the accomplishment of logistics activities in a country.

Previous studies have shown the significance of logistics performance in helping third party logistics firms to enhance their performance (Ozoglu & Buyukkeklik, 2017), since logistics is a subset of the larger notion of company performance (Chow *et al.*, 1994). Third Party Logistics (3PL) firms can be defined as a provider of a single or multiple logistics services of

a client company's logistics activities on a contractual basis (Lai, 2004). Services that a 3PL provide include transportation, warehousing, inventory management, material handling, cross-docking, reverse logistics, freight forwarding, customer service & information-related services, freight consolidation and distribution management (Payaro & Papa, 2017; Tukamuhabwa *et al.,* 2021; Oluwakoya, 2022). Accordingly, third-party logistics firms in Uganda have faced a lot of constraints that deter their performance. For example, 3PLs in Uganda operate in situations of poor-quality infrastructure, delays at weighbridges coupled with congestion, breakdowns and maintenance costs leading to low-quality and unreliable services (Tukamuhabwa *et al.,* 2021). Similarly, Trademark East Africa, (2019) reveals that because of logistics inefficiencies, and ineffectiveness, Uganda loses close to Ugx 3 trillion (USD 827 million) owing to the fact that logistics accounts for 18 to 20 per cent of the cost of goods sold in the country.

Previous studies on Information Technology (IT) adoption, have shown its significant contribution to logistics performance especially in third party logistics firms (Lai *et al,* 2008; Evangelista *et al,* 2013; Moons *et al.,* 2018) For example, Evangelista *et al,* (2013) reveals that the dissemination of information technology has contributed to change the supply chain role of 3PL companies since information technology is an important element influencing the performance of modern logistics companies. Technologies can help to improve a third-party logistics firm's competitive standing by aiding service innovations or improving existing logistics solutions (Mathauer and Hofmann, 2019). Whereas this is the case, there is still scant evidence on the role of IT capability in the business performance of third-party logistics firms (Ahimbisibwe *et al.,* 2016). For example, Uganda and Africa at large lags behind in adoption and usage of ICT in general business and by third party logistics in particular (Ahimbisibwe *et al.,* 2016). Zeng & Lu (2020) conceptualized IT capabilities using the

dimensions of IT talent capabilities, IT infrastructure capabilities, IT internal communication capabilities and IT external communication capabilities.

Furthermore, contemporary research has shown the contribution of distribution management towards logistics activities in a supply chain (Rexhausen *et al.*, 2012; Abushaikha *et al.*, 2018; Oluwakoya, 2022). This is because a good distribution structure is essential to meet customer service levels, for example, by delivering the right product on time (Oluwakoya & Ogundipe, 2019). Pires *et al.*, (2017) as cited by Abushaikha *et al.*, (2018) revealed that improved distribution management operations such as warehousing and transportation will ultimately be reflected in the logistics performance of downstream retailers and the whole supply chain (Satyam *et al.*, 2017). As such, the role of distribution management is to provide a third-party logistics firm with the accomplishment of delivering the product at a suitable time, place, and quantity at a minimum cost (Oluwakoya, 2022). Similarly, Karia (2022), reveals that halal warehouse activities and transportation management positively affect logistics performance in Arab countries. For example, through halal transportation management, a strict segregation policy will enhance a logistic performance in terms of service quality and flexibility by segregating shipments of halal items from non-halal items and using different pallet, container and refrigerator (Karia, 2022). Kalubanga and Namagembe (2022), assert that the limitations in logistics infrastructure, and existing low-level technologies, logistics in developing countries like Uganda revolves around conventional operating mechanisms. Thus, distribution management can be conceptualized using warehouse management, transportation management and distribution management adherence (Rexhausen *et al.*, 2012).

**1.2 Problem statement**

Logistics, identified as a potent competitive tool for companies globally (Sergi *et al.*, 2021), plays a pivotal role in facilitating cross-border trade through a spectrum of activities,

including transportation, warehousing, brokerage, express delivery, terminal operations, and information management (Ekici *et al.,* 2019). Despite its crucial contribution, the impact of logistics deficiences on Uganda's economic landscape is glaring. Trademark East Africa's findings in 2019 revealed a staggering annual loss of close to Ugx 3 trillion (USD 827 million) for Uganda. This substantial economic setback is attributed to logistics, which accounts for 18 to 20 percent of the sale price of goods in the country. The logistics landscape in Uganda is marred by challenges, particularly in the operations of third-party logistics (3PLs) providers. Poor quality infrastructure, delays at weighbridges, congestion, breakdowns, and maintenance costs plague the operations of 3PLs, resulting in the delivery of low-quality and unreliable services (Tukamuhabwa *et al.,* 2021). Furthermore, deficiencies in building information technology capabilities and distribution management exacerbate the logistics performance crisis. Managers in Uganda's logistics sector information technology the absence of a tracking system, inadequate cargo handling equipment, varied effectiveness, licensing restrictions, and high technology costs (Ahimbisibwe et al., 2016). Since IT capabilities and distribution management are related to logistics performance, this study presupposes that the deficience in logistics performance could be attributed to problems relating to IT capabilities and distribution amangement.

### 1.3 Purpose of the study

The study sought to examine the relationship between IT capabilities, distribution management and logistics performance of third-party logistics firms in Uganda.

### 1.4 Research objectives

i. To examine the relationship between IT capabilities and logistics performance in Ugandan third party logistics firms.

ii. To examine the relationship between IT capabilities and distribution management in Ugandan third party logistics firms.

iii. To examine the relationship between distribution management and logistics performance in Ugandan third party logistics firms.

iv. To examine the mediation effect of distribution management on the relationship between IT capabilities and logistics performance.

**1.5 Research questions**

i. What is the relationship between IT capabilities and logistics performance in Ugandan third party logistics firms?

ii. What is the relationship between IT capabilities and distribution management in Ugandan third party logistics firms?

iii. What is the relationship between distribution management and logistics performance in Ugandan third party logistics firms?

iv. What is the mediation effect of distribution management on the relationship between IT capabilities and logistics performance in Ugandan third party logistics firms?

**1.6 Scope of the study**

The scope covered the geographical, content and time scope of the study.

**1.6.1 Geographical scope**

The study was carried out in third party logistics firms located in Kampala district in Uganda.

**1.6.2 Content scope**

The study investigated IT capabilities as independent variable, distribution management as mediating variable and logistics performance as the dependent variable.

**1.6.3 Time Scope**

The study was conducted between May, 2023 and August, 2023.

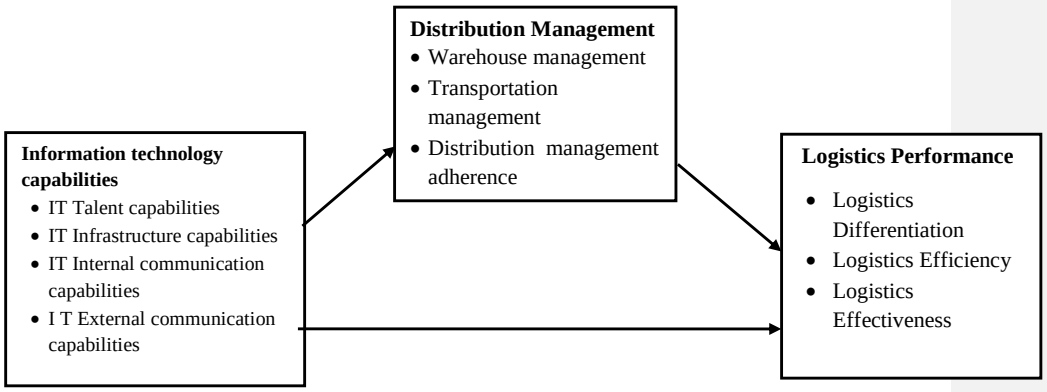
### 1.7 Significance of the study

**To the third-party logistics firms**: This study may help third party logistics firms to enhance their performance. This is because through the study, the logistics firms may know the causes of poor logistics performance and thereby draw strategies to solve them in the long run.

**To future researchers**: The study might be a useful material for academic research by adding on to already existing literature on IT capabilities, demand management, distribution management and logistics performance.

**Policy makers**: The different government agencies such as ministry of works and transport can use the research findings to enforce polices that help firms improve their logistics performance.

### 1.8 Conceptual framework




**Source**: *Developed from literature review based on (Zeng & Lu, 2020, Rexhausen et al., 2012, and Fugate et al., 2010*)

#### 1.8.1 Description of the model

The conceptual model suggests that both information technology capabilities and distribution management are positively related to logistics performance. The model further proposes that distribution management mediates the relationship between information technology capabilities and logistics performance.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 Introduction

This chapter provides a review of literature relating to information technology capabilities, distribution management and logistics performance. The chapter begins with the theoretical grounding and later explains the study variables and their relationships in accordance with the objectives of the study.

## 2.1 Theoretical review

The study was underpinned by the theoretical lens of dynamic capabilities theory. According to Teece, Pisano, & Shuen, (1997), dynamic capabilities can be defined as a holistic approach of the firm ability to integrate, build, and reconfigure their resources and competence to address the changing of market environments. More specifically, a dynamic capability is a pattern of activity through which the organization modifies operating routines for purposes of improved effectiveness (Zollo and Winter, 2002). Thus, dynamic capabilities theory explains how companies can achieve a temporary or even long-term, competitive advantage in dynamic markets (Teece *et al.,* 1997; Teece, 2007; Gruchmann *et al.,* 2019). Capabilities are those distinctive competencies that consist of attributes, abilities, organizational processes, knowledge, and skills that allow a firm to achieve superior performance and sustained competitive advantage (Kwak *et al.,* 2018). As such, organizations need to develop their internal and external skills and resource utilization for achieving adaptation, integration, and reconfiguration to the fast-changing and highly competitive business environments (Karadağ, 2019). The notion of dynamic capabilities is related to logistics performance. This is because logistics activities are operated in dynamic environments which make it suitable to apply

dynamic management theories such as the dynamic capabilities theory (Beske, 2012). According to Defee and Fugate (2010) logistics capabilities can be included logistics integration activities and logistics information system capabilities that are linked with firm performance. These provide unique organizational skills which give competitive advantage to the firm hence enhancing logistics performance (Bag *et al.,* 2020). Sandberg and Abrahamsson, (2011), argue that logistics performance is sustained through various dynamic capabilities such as managerial knowledge and presence, cross-functional teamwork, control, learning and supply chain relationships. As such, the main concern of logistics managers is the strategic application of firm's capabilities to achieve logistics performance (Bag *et al.,* 2020). The notion of dynamic capabilities is also applicable to information technology capabilities since IT-business research has revealed that IT capabilities enables firm to attain a state of competitive advantage by strengthening organizational capabilities (Mikalef *et al.,* 2020). Similarly, Ravichandran *et al.,* (2005) reveal that IT capabilities enable firms to mobilize and deploy IT-based resources which are a source of competitive advantage. Further, it is found that the ability of firms to create technological capabilities such as ability to generate information, ability to handle information and ability to use information gives a cutting edge to the firm and keeps it ahead of competitors (Eisenhardt and Martin, 2000; Bag *et al.,* 2020). As such, firms can possess an infrastructure capable of storing, sharing, and analyzing data in real time (Ji-fan Ren *et al.,* 2017). Lastly, the notion of dynamic capabilities relates to distribution management. Dynamic capabilities hold promise for explaining sustainable practices related to the expansion of physical distribution of items (Gruchmann *et al.,* 2019). Firm resources include innovations in online distribution management channels (Wollenburg *et al.,* 2018).

**2.2 Logistics performance**

Logistics is a network of services that supports the physical movement of goods (Ekici *et al.*, 2019). Such network facilitates the flow of materials, finances and information throughout the entire supply chain including a set of activities such as transportation, warehousing, brokerage, express delivery, terminal operations, and information management (Ekici *et al.*, 2019). Logistics services provide sectoral connections within the local economy since it connects the domestic economy to the international economy (Gani, 2017). This connectivity of the domestic economy is strengthened through an efficient transport and logistics systems as one of the motives of producers is to securely transport their goods to consumers in a cost-effective way with minimal time lags (Gani, 2017)**.** Therefore, the contribution of the logistics sector to the national output in many countries is likely to accelerate as the pace of trade liberalization strengthens and countries become more and more outward oriented (Gani, 2017). Logistics is increasingly viewed as a core competency of the firm, thus measuring and understanding logistics performance has long been of interest to logistics researchers (Fugate *et al.*, 2010). For example, Toyli *et al.*, (2008) noted that performance measurement has a vital role for companies like those providing logistics services. When logistics performance is the subject, there are multiple and conflicting goals and multiple service metrics such as lead time, low logistics cost, on-time delivery. Wang (2018) suggest that logistics performance is a success factor for both logistics service providers and their customers.

Though there are many scholars who define logistics performance (Toyli *et al.*, 2008; Fugate *et al.*, 2010; Wang, 2018; Ekici *et al.*, 2019), many agree that it is concerned with degree of efficiency, effectiveness and differentiation associated with the accomplishment of logistics services. Cohen & Roussel (2005) define performance measurement as the indicators of the work performed and the results achieved in an activity, process or organizational unit. Various indicators and attributes of logistics performance have been discussed including

service and quality, transport cost among others while customer service is considered an important aspect of logistics performance (Martinez *et al.,* 2019). Fugate *et al.,* (2010) revealed that companies that attempt to improve logistics processes may improve customer service. The revenue generated from better customer service may offset any costs incurred as a result of improving logistics processes. Also, Kireyeva, & Satybaldin (2019) pointed out that improvements in logistics have the potential to enhance economic growth, as investments and infrastructure upgrades increase demands for goods and services.

Many scholars have conceptualized logistics performance, for example Helena (2012) measured logistics performance using measures of on-time delivery, frequency of damage freight, frequency of operation disruption, and flexibility. Also, Wang *et al.,* (2018) measured logistics performance using dimensions of customer service, delivery operations, freight safety and information accuracy. For this study, the dimensions of logistics performance by Fugate *et al.,* (2010), shall be considered. These include; logistics differentiation, logistics efficiency and logistics effectiveness. Also, it is worth noting that studies on logistics performance in third party logistics firms have concentrated on the impact of logistics performance on customer purchasing behavior and sales in e-commerce platforms (Deshpande & Pendem, 2023). Moreover, some have concentrated on specific aspects of logistics such as transport performance (Nikolaidou *et al.,* 2023). Whereas this is the case, scholars call for futther studies on the role of Digitalization in third party logistics firms (Zhou *et al.,* 2023).

**2.3 Information technology capabilities**

IT capability has been defined as an ability to mobilize and deploy IT-based resources in combination with other organizational resources and capabilities (Lu & Ramamurthy, 2011). Consistent with the rationale of RBV, an IT capability reflect a firm's valuable and non-substitutable ability to acquire, deploy, combine and reconfigure internal and external IT

resources to effectively support business flow, logistics flow and capital flow (Zeng & Lu, 2020). Though there are many definitions of IT capabilities, Lu & Ramamurthy (2011) claim to have a comprehensive understanding of the concept. They define IT capability as the ability to mobilize and deploy IT-based resources in support of and for the enhancement of business strategies and work processes. Lu & Ramamurthy (2011) and Zeng & Lu (2020) measure IT capabilities using dimensions of IT infrastructure capability, IT business spanning capability, IT proactive stance, IT talent capabilities and IT internal & external communication capabilities. Infrastructure capabilities are defined as the organizations' ability to manage data accurately and create connected network channels, the business spanning capabilities dimension indicates an integrated relationship among the overall IT capabilities inside the organization and decision makers in order to gain superior analysis, planning and execution for organizations strategies (Lu & Ramamurthy, 2011) and proactive stance which describes how organizations are continuously looking for innovative methods to find out and determine the best use of its IT potentials, to seize on various opportunities in the market (Lu & Ramamurthy, 2011). IT talent capabilities relate to employees' skills to IT usage, self-study and high motivated to do IT related work. IT internal and external communication capabilities describes how organizations deploy IT systems for partners' management, making full use of IT systems to communicate and cooperate with key partners' other information technologies. This study will adapt the measures by Zeng & Lu (2020), which are more recent and have been used in the logistics context. Also, it is worth noting that studies on information capabilities have concentrated on the ability of information technology capabilities in enabling supply chain and value chain activities (Chou & Shao, 2023). Whereas this is the case, scholars call for further studies on digital marketing, digital orientation, marketing capability, and information technology capability to assess the market performance (Sultoni *et al.*, 2023).

### 2.4 Distribution management

Distribution management is concerned with a firm's capability to ensure reliable and efficient flow and storage of goods in order to meet customers' requirements (Frankel *et al.,* 2008). In this sense, three important practices can be distinguished that create this capability: warehouse management and transportation management (Larson *et al.,* 2007; Rexhausen *et al.,* 2012), which both focus on operations related to efficient storage and handling of goods and materials, and distribution adherence. Rexhausen *et al.,* (2012) conceptualized distribution management using dimensions of warehouse management, transportation management and distribution management adherence. Warehouse management commonly bundles practices related to the efficient storage, handling and picking of raw materials, work in progress, and finished goods inventories (Chang *et al.,* 2011; Rexhausen *et al.,* 2012). Also, transportation management relates to the efficient flow of materials and goods from the suppliers via different internal facilities to the customers, firms seek to optimize their transportation networks (Rexhausen *et al.,* 2012; Faber *et al.,* 2018; Kushakova, 2022).

Holistically, optimizing transport routes and schedules and bundling transports to achieve economies of scales may increase utilization and decrease transportation cost significantly without sacrificing customer service (Naim *et al.,* 2006). In this sense, effective transportation management practices add to a firm's capability of ensuring efficient flow of goods (Kushakova, 2022). Lastly, distribution management adherence is concerned with the level of adherence to the distribution management processes such as supply, production, inventory management, warehousing, transportation among others (Rexhausen *et al.,* 2012). Further, Rexhausen *et al.,* (2012) noted that adherence to distribution management helps in ensuring that distribution processes are well-defined, implemented and strictly complied with and this plays an important role for a firm to develop superior distribution management capabilities.

**2.5 Information technology capabilities and logistics performance.**

New technologies can directly increase productivity and improve performance in logistics and the entire supply chain (Ivanov *et al*.,2019). Also, Ekici *et al.,* (2016) indicates that firms with high information technologies tend to outperform their rivals on a variety of profit- and cost-based performance measures. Further, Wang (2016) noted that third party providers' use track and trace technology which allows different users to access shipping information and obtain real-time information, this has changed traditional shipping processing since all parties including individual customers can now access and monitor the movement of freight, new technologies and upgrading their products and services at low cost while improving their performance. Relatedly, Wang (2016) revealed that improving logistics performance requires access to new technologies and upgrading products and services at low cost. Furthermore, policy makers and managers should push ahead the digital connectivity by fostering the fixed broadband and 4G coverage to enhance the national logistics performance (Wang,2016).

As stressed by Ivanov *et al.,* (2019) as well as Hoffmann & Prause (2018), the application and useful implementation of innovative technologies (e.g., IoT, delivery robots), as well as smart and connected products and services will facilitate the development of digital supply chains and smart logistics operations. Also, Philipp (2020) and Sumiati, (2020) postulated that the level of technological readiness and innovation potential of a country form the basis for the improvement of the logistics and business performance as well as the aspired digital transformation of the economy and society. Logistics organizations are forced to consider how they can take advantage of the novel information technologies to better manage supply chain activities, safeguard smooth functioning of logistics operations and keep pace with competitors (Prause, 2014). Ekici *et al.,* (2016) found that availability of the fixed broadband internet is the most important factor that influences the logistics performance.

**2.6 Distribution management and logistics performance.**

In order to ensure the efficient flow of materials and goods from the suppliers via different internal facilities to the customers, firms seek to optimize their transportation networks and this helps to improve customer service levels (Frankel *et al.,* 2008). Transportation management is a frequent subject in supply chain management and accounts for a substantial share of overall supply chain cost (Rexhausen *et al.,* 2012). Further, Amer *et al.,* (2017) revealed that companies (shippers) that outsource their logistics activities such as transportation to third-party logistics (3PL) providers, which assists them in gaining advantages and promoting their overall logistics performance. Faber *et al*., (2018) noted that the primary focus of warehouse is accuracy and timely fulfilment of customer orders. Additionally, Naim *et al.,* (2006) revealed that a proactive flexibility strategy in distribution should actually lead to customer satisfaction while ensuring that total costs are minimized. Also, Chang *et al.,* (2011) noted that both service level and cost should be considered and balanced to enhance the performance of distribution centers. Zhang *et al.* (2005) noted that the ability of a firm to respond quickly and efficiently to changing customer needs in inbound and outbound delivery, support and services should be driven by distribution abilities.

**2.7 Information technology capabilities and distribution management**

Digital technologies increase particularly responsiveness in case of fluctuations in demand as well as enhance flexibility in distribution regarding limited capacities (Ivanov *et al.,* 2019). Under the progress of information technology, order transaction data can be utilized not only to record daily transactions but also to assign product locations for improving warehousing activities such as picking efficiency (Chang *et al.,* 2011). Additionally, Faber *et al.,* (2018) found that integrating advanced radio frequency and bar-coding technologies with core warehousing functionality to provide comprehensive fulfilment center and warehouse management, technology will help to deliver all of the functionality needed to maximize

operational efficiency and increase throughput (Faber *et al.,* 2018). Further, Chang *et al.,* (2011) revealed that a high degree of automation supported by information technology may increase internal process efficiency and reliability, this can be through less manual labor and errors, ultimately resulting in lower cost and inventory levels as well as better delivery service and higher flexibility.

Also, He *et al.,* (2014) revealed that artificial intelligence techniques can resolve the conflicts of distributed group decisions. Liu *et al.,* (2015) realized that information sharing and process coordination through using technologies are crucial in harnessing flexibility in distribution. Lastly, Digital technologies such as the internet of things, block chain technology, and digital twin are proving great potential to enhance distribution management through providing high connectivity, accuracy, and transparency between the supply chain members (Ralston & Blackhurst, 2020). Lai *et al.,* (2006) revealed that using technologies in distribution improves delivery speed, reliability, customer relations and order accuracy. Organizations which use IT in distribution helps to increase efficiency and effectiveness in business process, facilitates sharing of information quickly and efficiently by bringing down barriers of linguistic and geographic boundaries (Macharia *et.al*, 2015).

**2.8 Mediation effect of distribution management on information technology capabilities and logistics performance.**

Firms may improve their distribution capabilities through their warehouse structures in terms of size, location, resources and automation leading to improved customer service levels (Philipp, 2020). Relatedly, Ivanov *et al.,* (2019) revealed that enabling technologies of the digital transformation heavily decrease lead times due to additive manufacturing and at the same time increase inventory control leading to improved logistics performance. The inherent digital technologies increase particularly responsiveness in case of fluctuations in demand as

well as enhance flexibility regarding limited capacities (Moldabekova *et al.*, 2021). Further, Stopka &Luptak (2018) found that introducing automatic identification system through barcodes will lead to effective implementation of warehouse management. Similarly, Stopka &Luptak (2018) concluded that using automation systems in distribution leads to greater system clarity, saving order time, eliminating paper documentation, eliminating errors and streamlining the material flow thus improving customer service levels. Information and communication technologies, computing and robotics contributes to improved distribution activities through the diversification of its skills, methods and tools (Masudin *et al.*, 2018), which later may improve the overall logistics efficiency and effectiveness.

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.0 Introduction

This chapter provides the methodology that guided the study. The research methodology contains the research design, population of the study, sampling procedure, sources of data, measurement of variables, ethical considerations and the challenges faced during the study.

## 3.1 Research Design

The researcher used a quantitative cross-sectional survey research design. A cross-sectional survey design is carried out at one point in a time which enables one to collect large amounts of data in a snapshot. This is because given the short timeframe allocated for the study, it was imperative to collect a considerable amount of data in a relatively short period of time in order to meet the research objectives. A quantitative design was adopted because the research investigated an existing phenomenon and used research questions derived from the extant studies.

## 3.2 Population of the Study

The study population comprised of 572 licensed third-party logistics (3PL) companies in Kampala (URA Web portal, 2022). Kampala district covers many third-party logistics firms when compared to other parts of Uganda (URA Web portal, 2022). This is because the majority of firms operating in other districts have branches in Kampala district. The unit of analysis was a third-party firm and the unit of inquiry included operations managers and logistics managers and others deemed to have knowledge in logistics related functions.

## 3.3 Sample Size

The sample size was 293 third party firms, these were selected using the sample determination table developed by Krejcie and Morgan (1970) through simple random

sampling targeting at least two respondents from each firm to minimize bias. Useable questionnaires were obtained from a total of 227 firms.

### 3.4 Sampling procedure

A simple random sampling without replacement was applied to select a sample of the third-party logistics firms. This involved listing down the names of the Third-party logistics firms (3PLs) and allocating a number to each of them. Then numbers were selected randomly, and each number selected will be removed from the population to avoid duplication, until the required number is achieved. Purposive sampling was used to select respondents who are knowledgeable and have expertise to understand the phenomenon and meet the purpose of the study.

### 3.5 Sources of data and data collection

The researcher used primary data sources. This was collected by administering questionnaires to 293 respondents of each selected 3PL company in Uganda. All questionnaires were either hand delivered or emailed to the respondents and filled questionnaires were retrieved after a period of two months

### 3.7 Measurement of the study variables

i. Information technology capabilities were measured based on dimensions of IT talent capabilities, IT infrastructure capabilities, IT internal communication capabilities and IT external communication capabilities adapted from Zeng & Lu (2020).
ii. Distribution management was measured based on dimensions of warehouse management, transportation management and distribution management adherence adapted from Rexhausen *et al.,* (2012).
iii. Logistics performance was measured using dimension such as logistics differentiation logistics efficiency and logistics effectiveness adapted from Fugate *et al.*, (2010).

### 3.8 Validity and reliability

To ensure content validity, the questionnaires was tested before their final administration by use of professionals and experts. Content Validity Index (CVI) was computed. To ensure reliability of the research instrument, a Cronbach Alpha test was also computed to determine consistency. According to Nunnally (1978), the reliability coefficients of 0.70 or more will be considered very acceptable. Exploratory factor analysis will be conducted to assess the loading of questionnaire items to respective constructs.

**Table 1: Reliability and Validity**

| | *Cronbach Alpha Coefficient* | *Number of Items* | *Content Validity Index* |
|---|---|---|---|
| IT Capabilities | .869 | 12 | .833 |
| Distribution Management | .837 | 08 | .875 |
| Logistics Performance | .890 | 02 | .800 |

### 3.9 Data processing, analysis, and presentation

The data collected were compiled, sorted, classified, and entered into the computer and analysed using the Statistical Package for Social Scientists (SPSS) version 25. Descriptive statistics and inferential statistics were used. Pearson correlation analysis was applied to establish the relationship between study variables. Regression analysis was run to determine the degree to which information technology capabilities and distribution management predict logistics performance in third party logistics firms in Uganda.

#### 3.9.1 Ethical considerations

The researcher got an introductory letter from Makerere University Business School that was presented to the respondents (third party logistics firms). The researcher had to seek permission from the officers in charge before the questionnaires are administered. The respondents were assured of anonymity. After data collection and analysis, the questionnaires were destroyed by burning or shredding to ensure confidentiality.

# CHAPTER FOUR

# DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF FINDINGS

## 4.0 Introduction

This chapter presents the data analysis and interpretation of the results to answer the research questions accruing from the objectives earlier stated in chapter one and recapped here below;

i. To examine the relationship between IT capabilities and logistics performance in Ugandan third party logistics firms.
ii. To examine the relationship between IT capabilities and distribution management in Ugandan third party logistics firms.
iii. To examine the relationship between distribution management and logistics performance in Ugandan third party logistics firms.
iv. To examine the mediation effect of distribution management on the relationship between IT capabilities and logistics performance.

## 4.1 Background characteristics

This includes the individual and organizational characteristics of the respondents as discussed below;

### 4.1.1 Characteristics of Respondents/Individuals

The results presented in table 2 below reflect the attributes of individual respondents obtained from the study. These include; age group, level of education and position in the firm.

**Age Group**: The respondents were dominantly in the 26 – 35-year age group (57.9 %) and only 2.7% were aged above 46 years of age group. The results are an indication that the majority of the employees working in third party logistics firms, are relatively youthful persons and could be relied upon to give information for the study which is quite credible and constructive.

**Table 2: Age Group Distribution**

| | Count | Percent | Cumulative Percent |
|---|---|---|---|
| Below 22 Yrs | 15 | 4.1 | 4.1 |
| 26 - 35 Yrs | 212 | 57.9 | 62.0 |
| 36 - 45 Yrs | 129 | 35.2 | 97.3 |
| 46 Yrs & above | 10 | 2.7 | 100.0 |
| Total | 366 | 100.0 | |

***Source*: Primary Data**

**Level of education:** The results in table 3 below show that majority of the respondents (79.8 %) in the third-party logistics firms hold a Bachelor's degree and above while a few (7.4%) of the respondents hold a qualification at master's level. This is an indication that majority of the respondents are able to read, understand and interpret the questionnaires thus being able to give valid information.

**Table 3: Highest Level of Education**

| | Count | Percent | Cumulative Percent |
|---|---|---|---|
| Diploma | 43 | 11.7 | 11.7 |
| Degree | 292 | 79.8 | 91.5 |
| Masters | 27 | 7.4 | 98.9 |
| Others | 4 | 1.1 | 100.0 |
| Total | 366 | 100.0 | |

***Source*: Primary Data**

**Position in the firm:** The majority of the respondents as reflected in the table below are logistics managers (36.6%), followed by both operations managers (30.9%), those in other positions (25.4%), and the least being firm owners (7.1%).

**Table 4: Position in the firm**

| | Count | Percent | Cumulative Percent |
|---|---|---|---|
| Owner | 26 | 7.1 | 7.1 |
| Operations Manager | 113 | 30.9 | 38.0 |
| Logistics Manager | 134 | 36.6 | 74.6 |
| Other | 93 | 25.4 | 100.0 |
| Total | 366 | 100.0 | |

***Source*: Primary Data**

### 4.1.2 Characteristics of third-party logistics firms

The results presented in table 3 below depict attributes third party logistics firms attained from the study, including firm age and number of employees in organization.

**Firm age:** The results in table 3 below indicate that majority (45.8 %) of the third-party logistics firms have been in operation within Uganda for over 10 years and only a few (10.1%) have operated for less than 5 years. This implies that majority of the third-party logistics firms have a strong understanding of the business environment.

**Table 5: Firm age**

| *Business Age* | Count | Percent | Cumulative Percent |
|---|---|---|---|
| Less than 5 Yrs | 23 | 10.1 | 10.1 |
| 5 - 10 Yrs | 100 | 44.1 | 54.2 |
| Over 10 Yrs | 104 | 45.8 | 100.0 |
| Total | 227 | 100.0 | |

**Number of employees in organization**: The results in table 3 below show that majorly small third party logistics firms with employee between 6-50 (59.9%) responded to the questionnaires compared to large firms with more than 100 employees (8.4%). This implies

that majority of the small third-party logistics firms can easily accessed due their strategic locations

**Table 6: Number of employees in Business**

| *Workforce Size* | Count | Percent | Cumulative Percent |
|---|---|---|---|
| 5 *Employees* Micro | 27 | 11.9 | 11.9 |
| 6 - 50 *Employees* Small | 136 | 59.9 | 71.8 |
| 51 - 100 *Employees* Medium | 45 | 19.8 | 91.6 |
| 100 *Employees* Large | 19 | 8.4 | 100 |
| Total | 227 | 100 | |

***Source*: Primary Data**

**4.2 Factor analysis for the study variables.**

The results in the tables below show factor analysis for all the study variables i.e. Information technology capabilities, distribution management, and logistics performance. Items that had loadings of less than 0.500 were eliminated from the factor components while those that had values of above 0.500 were retained.

**4.2.1 Factor analysis for information technology capabilities**

The results in the table below show that the main components of information technology capabilities include: IT talent capabilities, IT infrastructure capabilities, IT internal communication capabilities and IT external communication capabilities which jointly account for 68.297% of the variance in information technology capabilities. The most dominant component was IT internal communication capabilities which accounts for 26.880 %, followed by IT infrastructure capabilities with 15.543% of the study variable. On IT internal communication capabilities, the most outstanding features were "ITCC2-Our IT-related employees are highly motivated and proactive in their work" which had a loading of .869, "ITCC3- Our IT-related employees are good at self-study" which had a loading of .824 and "ITCC1- Our IT-related employees can skill fully use IT/the IT system" which had a loading of .631. This implies that IT Internal Communication Capabilities and IT

Infrastructure Capabilities are considered the best components of Information technology capabilities in third party logistics firms.

**Table 7: Factor Analysis for Information technology capabilities**

| | *IT Internal Communication Capabilities* | *IT Infrastructure Capabilities* | *IT Talent Capabilities* | *I T External Communication Capabilities* |
|---|---|---|---|---|
| ITCC1 | .631 | | | |
| ITCC2 | .869 | | | |
| ITCC3 | .824 | | | |
| ITIC1 | | .712 | | |
| ITIC2 | | .798 | | |
| ITIC3 | | .667 | | |
| ITTC1 | | | .517 | |
| ITTC2 | | | .772 | |
| ITTC3 | | | .855 | |
| ITEC1 | | | | .528 |
| ITEC2 | | | | .722 |
| ITEC3 | | | | .719 |
| Eigen Value | 3.526 | 1.765 | 1.566 | 1.339 |
| Variance % | 26.880 | 15.543 | 13.882 | 11.991 |
| Cumulative % | 26.880 | 42.423 | 56.305 | 68.297 |
| *Kaiser-Meyer-Olkin Measure of Sampling Adequacy.* | | | | .866 |
| *Bartlett's Test of Sphericity* | | | Approx. Chi-Square | 1666.029 |
| | | | df | 66 |
| | | | Sig. | .000 |

**4.2.2 Factor analysis for distribution management.**

The results in the table below were presented so as to explore the factor structure of the distribution management. The results reveal that the components account for 73.148% of the distribution management variable. The most dominant component was distribution management adherence which accounts for 29.583% and transportation management accounts for 23.640%. With distribution management adherence which accounts for the biggest variance, it was noted that the most critical issues include "DMDIM3- Our

distribution management adherence processes are 100% executed and followed by our staff" which had a loading of .800 and "DMDIM2- Our distribution management processes are clearly defined" which had a loading of .724. This implies that distribution management adherence and transport management are regarded as the best components of distribution management.

**Table 8: Factor Analysis for Distribution Management**

| | | *Distribution Management Adherence* | *Transportation Management* | *Warehouse Management* |
|---|---|---|---|---|
| DMDIM1 | | .669 | | |
| DMDIM2 | | .724 | | |
| DMDIM3 | | .800 | | |
| DMTM1 | | | .863 | |
| DMTM2 | | | .855 | |
| DMWM2 | | | | .771 |
| DMWM3 | | | | .904 |
| Eigen Value | | 2.807 | 1.671 | 1.374 |
| Variance % | | 29.583 | 23.640 | 19.925 |
| Cumulative % | | 29.583 | 53.224 | 73.148 |
| *Kaiser-Meyer-Olkin Measure of Sampling Adequacy.* | | | | .801 |
| Bartlett's Test of Sphericity | *Approx. Chi-Square* | | | 1123.401 |
| | *Df* | | | 28 |
| | Sig. | | | .000 |

***Source*: Primary Data**

### 4.2.3 Factor Analysis for logistics performance

The items used for logistics performance in the study were grouped under three components i.e. logistics effectiveness, logistics efficiency and logistics differentiation. The results in the table below show that these components jointly account for 63.243% of the variance in logistics performance. The most superseding component is logistics effectiveness which accounts for 29.874% of the study variable, followed by logistics differentiation which accounts for 19.102% and the least being logistics efficiency which accounts for 14.267% of the study variable. On logistics effectiveness, the most prominent features were; "LPEF3- We ensure forecasting accuracy" which had a loading of .810 and "LPEF4 -We received a

higher percentage of shipments requiring expediting" which had a loading of .768. This implies that the logistics effectiveness and logistics differentiation can be regarded as the best components for logistics performance in third party logistics firms in Uganda

**Table 9: Factor analysis for Logistics Performance**

| | *Logistics Effectiveness* | *Logistics Differentiation* | *Logistics Efficiency* |
|---|---|---|---|
| LPEF1 | .666 | | |
| LPEF2 | .741 | | |
| LPEF3 | .810 | | |
| LPEF4 | .768 | | |
| LPEF5 | .757 | | |
| LPDF1 | | .631 | |
| LPDF2 | | .605 | |
| LPDF3 | | .663 | |
| LPDF5 | | .666 | |
| LPDF6 | | .724 | |
| LPLE1 | | | .779 |
| LPLE2 | | | .840 |
| LPLE4 | | | .666 |
| LPLE5 | | | .830 |
| Eigen Value | 4.779 | 3.385 | 2.588 |
| Variance % | 29.874 | 19.102 | 14.267 |
| Cumulative % | 29.874 | 48.977 | 63.243 |
| *Kaiser-Meyer-Olkin Measure of Sampling Adequacy*. | | | .899 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | | 2804.140 |
| | Df | | 136 |
| | Sig. | | .000 |

***Source*: Primary Data**

### 4.3 Correlation Analysis

The Pearson (r) correlations coefficient was employed to examine the relationship between variables to answer research questions. The Pearson correlation coefficients only range between -1.0 and +1.0. A Correlation coefficient value of .10 is considered weak, while that between .30 - .50 is considered as being moderate. Those values which are above .50 are rated as large (Cohen, 1988), as presented below in table 10;

**Table 10: Relationship between the study variables**

| | Mean | SD | IT Capabilities | Distribution Management | Logistics Performance |
|---|---|---|---|---|---|
| IT Capabilities | 4.277 | .449 | 1.000 | | |
| Distribution Management | 4.094 | .626 | .648** | 1.000 | |
| Logistics Performance | 4.105 | .610 | .609** | .629** | 1.000 |

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

***Source:*** **Primary Data**

The results in the table above showed that the third -party logistics firms in the study were rated moderately on the study concepts of IT capabilities and distribution management and the variable descriptives were (Mean = 4.277, SD = .449) and (Mean = 4.094, SD = .626) respectively. Further research shows that there is need to improve on the concepts of logistics performance (Mean = 4.105, SD = .610).

**4.3.1 The relationship between IT capabilities and logistics performance.**

A positive and significant relationship is revealed between IT capabilities and logistics performance (r = .609**, $p$<.01). This implies that firms that enhance IT capabilities in their systems are likely to have enhanced logistics performance in their operations.

**4.3.2 The Relationship between IT capabilities and distribution management**

The results in the table above show a positive and significant relationship between IT capabilities and distribution management (r =. 648**, $p$<.01). This implies that firms that enhance their IT capabilities have a possibility of enhancing their distribution management.

**4.3.3 The Relationship between distribution management and logistics performance**

The results in table 8 reveal that there is a positive and significant relationship between distribution management and logistics performance (r = .629**, p<.01). This means that an increase in the level of distribution management was likely to be associated with an increase in the level of logistics performance in third party logistics firms.

**4.4 Regression Analysis**

The regression analysis was applied as reflected in table 11 below to examine the level to which the predictor variables such as IT capabilities and distribution can predict logistics performance in third party logistics firms. The results in table 11 below show that in the first model, i.e. Model-1, the model contains attributes of the third party logistics firms (control variables) and these included; firm age and number of employees. The results showed that firm age is not a significant predictor of the dependent variable while the number of employees is a significant predictors of logistics performance. However, in Model-2, when we added IT capabilities, we realize it is a significant predictor of logistics performance and can account for 36.5% of the variance in the dependent variable (Adjusted R Square = .365). In Model-3, with the addition of distribution management variable, the model prediction changes from 36.5% to 45.7% and this time, IT capabilities is still a statistically significant predictor ($p$<.05) of the logistics performance. Distribution management is statistically still a significant predictor (p<.05) of logistics performance. Finally, we note that IT capabilities and distribution management can account for 45.7% of the variance in logistics performance (Adjusted R Square = .457) and the remaining percentage (54.3%) may be attributed to other factors outside the scope of this study. The significant predictors of the study in Model-3 are IT capabilities and distribution management (p<.05). However, IT capabilities has a stronger influence on logistic performance (*Beta* = .354, p<.05). The results in table show that the regression model was statistically significant (p < .05).

**Table 11: Hierarchical Regression Model**

| | *Model* 1 | | *Model* 2 | | *Model* 3 | |
|---|---|---|---|---|---|---|
| | B | *β* | B | *β* | B | *β* |
| (Constant) | 3.804 | | .642 | | .537 | |
| Firm Age | .034 | .037 | .055 | .060 | .044 | .047 |
| Number of Employees | .170** | .214** | .023 | .029 | .005 | .007 |
| IT Capabilities | | | .828** | .610** | .480** | .354** |
| Distribution Management | | | | | .392** | .403** |

| Dependent Variable: Logistics Performance | | | |
|---|---|---|---|
| R | .200 | .611 | .683 |
| R Square | .040 | .373 | .467 |
| Adjusted R Square | .031 | .365 | .457 |
| Std. Error | .600 | .486 | .449 |
| R Square Change | .040 | .333 | .094 |
| F Change | 4.655 | 118.550 | 39.014 |
| Sig. F Change | .010 | .000 | .000 |
| variance Inflation Factor | 1.285 | 1.290 | 1.578 |

***Source:*** **Primary Data**

**4.5. *Mediating effect* of *distribution management* on the relationship between IT capabilities and logistics performance.**

The mediating effect of distribution management on the relationship between IT capabilities and logistics performance was examined using the approach suggested by Baron and Kenny (1986). The approach consists of three steps which involve; Regressing the Dependent variable on the Predictor, the Mediator on the Predictor and Regressing the Dependent variable on the Predictor and the Mediator simultaneously-something that has been considered in the hierarchical regression model estimates.

**Table 12: Mediation Model Regression Statistics**

| | | β | $R^2$ | Adj. $R^2$ | *Sig.* |
|---|---|---|---|---|---|
| *Step*-**1** | Logistics Performance On IT Capabilities | .609** | .370 | .368 | ** |
| *Step*-**2** | Distribution Management on IT Capabilities | .648** | .420 | .418 | ** |
| Step-**3** | Summary of Hierarchical Regression Model statistics, Dependent Variable: *Logistics Performance* | | | | |
| | *Model* 2 IT Capabilities | .610** | .372 | .364 | ** |
| | *Model* 3 IT Capabilities | .354* | .466 | .457 | ** |
| | Distribution Management | .403** | | | |

** $p$<.01, * $p$ <.05

***Source: Primary Data***

***Step*-I**: The results showed in step-1 that IT Capabilities significantly predict the Logistics Performance (β = .609**, $p$<.05). These results show that the IT Capabilities can reliably be used to improve the Logistics Performance.

***Step-2***: In the second step of the approach suggested by Baron and Kenny (1986), the focus was on understanding as to whether the main predictor i.e. IT Capabilities, is a significant predictor of the Distribution management. This was verified from the regression estimates as well (β = .648**, $p$<.05). Noting that the first and second steps are showing signifncant effects, then the hierarchical regression estimates were observed since at this point, mediation was possible.

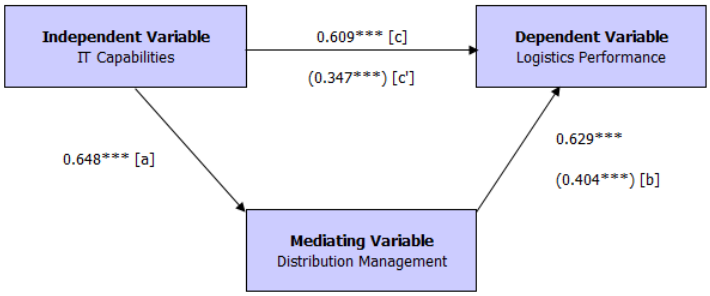
***Step*-3**: In the final stage, of the hierarchical model, the results showed that the IT Capabilities and the Distribution management, are both significant predictors of the Logistics Performance with the effect of IT capabilities reducing at this stage. The above steps showed that the mediation is possible so a further test iet the Sobel test was employed to test to establish the mediating effect.

To understand whether distribution management has a mediating effect in the relationship between IT capabilities and Logistics performance, mediation analysis was performed using Medgraph which specifically employs the *Sobel* Z-value to explore the indirect effect. The results are shown in the table below together with the model. The results indicated that the indirect effect in the model was statistically significant (Z =5.674, $p$ <0.01). This shows that there is a significant mediating effect. Further, if the lower and higher confidence intervals values do not have a zero in between, then it's a further confirmation that the mediation is significant. This therefore shows that distribution management plays a partial mediating role of 42.9% in the relationship between IT capabilities and logistics performance.

**Table 13: Mediation Model Estimates**

| *Type of mediation* | *Significant* | |
|---|---|---|
| Sobel z-value | 5.674 | $p$ <0.000 |
| *95% Symmetrical Confidence interval* | | |
| | Lower | .233 |
| | Higher | .478 |
| *Unstandardized indirect effect* | | |
| | a*b | .355 |
| | Se | .063 |
| *Effective Size measures* | | |
| Standardised Coefficients | | $R^2$ Measures |
| Total: | .609 | .370 |
| Direct: | .347 | .069 |
| Indirect: | .261 | .300 |
| Indirect to Total ratio | .429 | .811 |

**Figure1: Med graph Structural Model**




**Note: The numerical values in parentheses are beta weights taken from the second regresssion and the other values are zero order correlations.**

The results further show that firms having capabilities in IT in Ugandan third- party logistics may improve their logistics performance either directly or indirectly through effectively managing their distribution.

# CHAPTER FIVE

# DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

## 5.0 Introduction

This chapter provides the discussion of the findings of the study and thereafter delivers conclusions, recommendations, limitations and areas for further research.

## 5.1 Discussion of results

### 5.1.1 The relationship between information technology capabilities and logistics performance

The results suggest that information technology capabilities are positively and significantly related with logistics performance. This finding implies that third party logistics firms which build IT capabilities in terms of IT internal and external communication capabilities, infrastructure capabilities and Talent capabilities may help to achieve improved logistics performance. This finding is in line with studies by (e.g., Ekici *et al.,* 2016; Ivanov *et al.*,2019). Ekici *et al.,* (2016) indicate that firms with high information technologies tend to outperform their rivals on a variety of profit- and cost-based performance measures. Similarly, Liu *et al*., (2015) revealed that information sharing and process coordination through using technologies are crucial in harnessing flexibility, distribution efficiency and effectiveness thus improving the overall logistics outcomes. Conclusively, New technologies can directly increase productivity and improve performance in logistics and the entire supply chain (Ivanov *et al.*,2019).

### 5.1.2 The relationship between information technology capabilities and distribution management

The results suggest that information technology capabilities are positively and significantly related with distribution management. This finding implies that third-party logistics firms

which build IT capabilities in terms of IT internal communication capabilities, infrastructure capabilities and talent capabilities may be in better position to enhance their distribution management abilities. This finding relates to the study by Amer *et al*., (2017) who revealed that those companies (shippers) that outsource their logistics activities such as transportation to third-party logistics (3PL) providers, gain advantages that promote their overall logistics performance. This finding agrees with the study by Faber *et al.,* (2018) which found that warehouse accuracy as an element of distribution management helps to enhance timely fulfillment of customer orders which in turn improves logistics performance. In addition, Ralston & Blackhurst, (2020) indicated that digital technologies such as the internet of things, block chain technology and digital twin are crucial in enhancing distribution management through providing high connectivity, accuracy, and transparency between the supply chain members (Ralston & Blackhurst, 2020).

### 5.1.3 The relationship between distribution management and logistics performance

The results revealed that distribution management is positively and significantly related with logistics performance. This finding implies that third party logistics firms which improve their level of distribution management are likely to enhance their level of logistics performance. This is in agreement with Ivanov *et al.,* (2019) who concluded that firms with digital technologies can increase their responsiveness in case of fluctuations in demand as well as enhance flexibility in distribution regarding limited capacities.

### 5.1.4 Mediating effect of distribution management on the relationship between IT capabilities and logistics performance.

To achieve objective 4, mediation analysis was performed using Med graph mediation model estimates (Sobel z-value mediation). The results indicate that distribution management has a partial significant mediating effect in the relationship between IT capabilities and logistics

performance. This suggests that third party logistics firms having capabilities in IT may improve their logistics performance through managing distributions. Hence, distribution management acts as a pipeline in the influence of IT capabilities on logistics performance. This finding supports Stopka &Luptak (2018) who argue that using automation systems in distribution leads to greater system clarity, saving order time, eliminating paper documentation, eliminating errors and streamlining the material flow thus improving customer service levels. In line with that, Masudin *et al.*, (2018) also found that information and communication technologies, computing and robotics contributes to improved distribution activities through the diversification of its skills, methods and tools, which later may improve the overall logistics efficiency and effectiveness.

### 5.2 Conclusions

The purpose of this study was to establish the relationship between information technology capabilities, distribution management and logistics performance in third party logistics firms from a dynamic capability perspective. An analysis of survey data collected from a sample of 227 third party logistics firms in Uganda revealed that IT capabilities positively and significantly influence both distribution management and logistics performance. Furthermore, it was found that distribution management partially mediates in the relationship between IT capability and logistics performance in third-party logistics firms.

### 5.3 Recommendations

In light of the study findings discussed in the previous section, the following recommendations are provided;

Managers of third -party logistics firms need to embrace IT capabilities in terms internal communication capabilities which can be implemented through motivating IT-related employees thereby enabling them to be proactive in their work. Managers should also ensure

availability of eemployees who can skill fully use IT system, and good at self-study in order to enhance logistics performance.

Third – party logistics firms in Uganda should need to adhere to their distribution management through clearly defining distribution management processes and regularly monitoring and acting upon distribution management adherence key performance indicators.

Lastly, managers of third- party logistics firms should optimize their transportation modes through scheduling and routing across the distribution network that can help in reducing on order delays, transit costs and increasing the overall customer responsiveness which is a signal of improved logistics performance.

**5.4 Limitations of the study and areas for further study.**

The study used a cross sectional research which makes it difficult to empirically test causality. Some of the study variables such as relating to performance improvement need to be studied over time to acertain the positive or negative changes at different periods of time. With cross-sectional data, there is a risk of analyzing a temporary situation in the organization and not its capability for improving logistics performance over time. Hence, future research that could, where possible, collect longitudinal data on the study variables would add value to the findings.

The study was only limited to third party logistics firms in Uganda and specifically in the greater Kampala. Further research needs to be done in other sectors such as 4 PLs and other geographical locations in Uganda and other developing economies to provide more generality of the findings.

The study was based on information technology capabilities, distribution management and logistics performance. There are other variables that affect logistics performance such as system orientation and flexibility among others which can be interesting for further research.

Finally, the structured questionnaire limits in-depth understanding of the study variables and therefore it could be important to carry out a qualitative case- based studies with a similar focus..

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**APPENDIX I: Questionnaire**

**MAKERERE UNIVERSITY**

**MAKERERE UNIVERSITY BUSINESS SCHOOL**

Dear respondent,

I am a student at Makerere University Business School pursuing a master's degree in procurement and supply chain management. My research is about: **IT capabilities, distribution management and logistics Performance: a case of third-party logistics firms in Uganda.** I kindly request you to spare some time and respond to this questionnaire. The study is purely for academic purposes and your response will be handled with confidentiality.

**SECTION A: Background Information (Individual /institutional).**

**Please tick appropriate box for the items below.**

1. **Age**

| Below 25yrs | 26-35yrs | 36-45yrs | 46yrs and above |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

2. **Level of Education**

| Diploma | Degree | Masters | PhD | Others(specify) |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

3. **What is your position in the firm?**

| Owner | Operations Manager | Purchasing manager | Others(specify) |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

4. **How long has this organization been in existence?**

| Less than 5 years | 5-10 years | Over 10 years |
|---|---|---|
| 1 | 2 | 3 |

5. **How many employees are there in your organization?**

| < 5 employees<br>Micro | 6-50 employees<br>Small | 51-100 employees<br>Medium | > 100 employees<br>Large |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

These following sections focus your responses on the stated study statements and your response will be guided as below.

Strongly Disagree (SD) =1, Disagree (D) =2, Not sure (NS) =3, Agree (A) =4, strongly agree (SA) =5.

Please indicate by ticking in the appropriate box to what extent you agree/ disagree to the given statement below.

| **SECTION B: INFORMATION TECHNOLOGY CAPABILITIES** | | **Strongly Disagree** | **Disagree** | **Not Sure** | **Agree** | **Strongly Agree** |
|---|---|---|---|---|---|---|
| **TC** | **IT Talent capabilities** | | | | | |
| TC1 | Our IT-related employees can skill fully use IT/the IT system | **1** | **2** | **3** | **4** | **5** |
| TC2 | Our IT-related employees are highly motivated and proactive in their work | **1** | **2** | **3** | **4** | **5** |
| TC3 | Our IT-related employees are good at self-study | **1** | **2** | **3** | **4** | **5** |
| **IC** | **IT infrastructure capabilities** | | | | | |
| IC1 | We have a complete hardware and software platform | **1** | **2** | **3** | **4** | **5** |
| IC2 | Our IT systems are highly compatible and scalable. | **1** | **2** | **3** | **4** | **5** |
| IC3 | We have a unified information system to manage supply, sales and other information. | **1** | **2** | **3** | **4** | **5** |
| **CC** | **IT internal communication capabilities** | | | | | |
| CC1 | Each department fully exchanges orders, production, sales and other information | **1** | **2** | **3** | **4** | **5** |
| CC2 | All departments cooperate fully | **1** | **2** | **3** | **4** | **5** |
| CC3 | Internal staff can communicate well | **1** | **2** | **3** | **4** | **5** |
| **EC** | **IT external communication capabilities** | | | | | |
| EC1 | We fully communicate with our key partners | **1** | **2** | **3** | **4** | **5** |
| EC2 | We have complete IT/IT systems for partners management | **1** | **2** | **3** | **4** | **5** |
| EC 3 | We make full use of IT systems to communicate and cooperate with key partners (such as using networks, We-chat, e-commerce and other information technologies). | **1** | **2** | **3** | **4** | **5** |

*Adapted from Zeng & Lu (2020*).

| SECTION C: DISTRIBUTION MANAGEMENT | | Strongly Disagree | Disagree | Not Sure | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **WM** | **Warehouse management** | | | | | |
| WM1 | Our warehousing facilities and processes are designed to deliver the desired performance | **1** | **2** | **3** | **4** | **5** |
| WM2 | Our warehousing processes are sufficiently automated. | **1** | **2** | **3** | **4** | **5** |
| WM3 | We use a state-of-the-art Warehouse Management System (WMS) | **1** | **2** | **3** | **4** | **5** |
| **TM** | **Transportation management** | | | | | |
| TM1 | We have optimized the transportation modes and corresponding routes within our given distribution network | **1** | **2** | **3** | **4** | **5** |
| TM2 | We have optimized transportation scheduling and routing across our distribution network | **1** | **2** | **3** | **4** | **5** |
| DiM | **Distribution management adherence** | | | | | |
| DiM1 | We regularly monitor and act upon distribution management adherence key performance indicators. | **1** | **2** | **3** | **4** | **5** |
| DiM2 | Our distribution management processes are clearly defined | **1** | **2** | **3** | **4** | **5** |
| DiM3 | Our distribution management adherence processes are 100% executed and followed by our staff | **1** | **2** | **3** | **4** | **5** |

*Adapted from Rexhausen et al., (2012)*

| | SECTION E: LOGISTICS PERFORMANCE | StronglyDisagree | Disagree | Not Sure | Agree | Strongly Agree (5) |
|---|---|---|---|---|---|---|
| **LP** | **Overall logistics performance** | | | | | |
| **LP1** | Our overall logistics performance is well above industry average. | **1** | **2** | **3** | **4** | **5** |
| **LP2** | In general, our logistics performance is excellent | **1** | **2** | **3** | **4** | **5** |
| **LP3** | We are outstanding at performing our logistics activities. | **1** | **2** | **3** | **4** | **5** |
| **LD** | **Logistics differentiation** (*For the following items, please rate your business unit's performance on logistics activities in comparison to your major competitors*). | | | | | |
| **LD1** | We have the ability to make damage free deliveries to our customers. | **1** | **2** | **3** | **4** | **5** |
| **LD2** | We have the ability to properly manage inventory. | **1** | **2** | **3** | **4** | **5** |
| **LD3** | We ensure forecasting accuracy | **1** | **2** | **3** | **4** | **5** |
| | We have the ability to reduce the time between order receipt and customer delivery to as close to zero as possible. | **1** | **2** | **3** | **4** | **5** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **LD5** | We ensure minimal time on backorder | **1** | **2** | **3** | **4** | **5** |
| **LD6** | We minimize total inventory turns | **1** | **2** | **3** | **4** | **5** |
| **LD7** | We make on-time delivery to our customers | **1** | **2** | **3** | **4** | **5** |
| **EL** | **Logistics efficiency** *(For the following items, please rate your business unit's performance on logistics activities for the previous fiscal year)* | | | | | |
| **LE01** | We ensure a higher percentage of orders shipped to customers from the primary location designated to serve those customers | **1** | **2** | **3** | **4** | **5** |
| **LE03** | We ensure a higher percentage of order items delivered to customers on time | **1** | **2** | **3** | **4** | **5** |
| **LE04** | We received a higher percentage of shipments requiring expediting | **1** | **2** | **3** | **4** | **5** |
| **LE05** | We had lower inventory turns per year | **1** | **2** | **3** | **4** | **5** |
| **LE06** | We had less average order cycle time (time in days between order receipt and order delivery) | **1** | **2** | **3** | **4** | **5** |
| **LES** | **Logistics effectiveness** *(For the following items, please rate your business unit's actual performance compared to budgeted performance, based on the previous fiscal year results)* | | | | | |
| **LES1** | We made more Sales/ revenue (UGX | **1** | **2** | **3** | **4** | **5** |
| **LES2** | We incurred less transportation costs | **1** | **2** | **3** | **4** | **5** |
| **LES3** | We incurred less warehousing costs | **1** | **2** | **3** | **4** | **5** |
| **LES4** | We incurred less inventory costs | **1** | **2** | **3** | **4** | **5** |
| **LES5** | We incurred less over all logistics costs | **1** | **2** | **3** | **4** | **5** |

*Adopted from Fugate et al., (2010)*

**Appendix 2: Sample list of Third party logistics firms in Kampala**

Below are some of the third party firms that were sampled and are licensed by URA for the year 2022.

| NO. | NAME OF THE FIRM |
|---|---|
| 1 | 20 CUBE LOGISTICS (U) LIMITED |
| 2 | A.O. CONSULTANTS (U) LTD |
| 3 | ACE FORWARDERS LIMITED |
| 4 | AFRIASIA GLOBAL LOGISTICS LTD |
| 5 | AFRO-FREIGHT CLEARING & FORWAR |
| 6 | ALACA CLEARING AND FORWARDING LIMIT |
| 7 | B AND P CLEARING AND FORWARDING SER |
| 8 | CHEER LOGISTICS LTD |
| 9 | B.T.S. CLEARING AND FORWARDING LTD |
| 10 | BAHARI FORWARDERS UGANDA LIMITED |
| 11 | CHRONICLE LOGISTICS UGANDA LTD |
| 12 | DHL GLOBAL FORWARDING (U)LTD |
| 13 | EAGLE LOGISTICS SOLUTIONS LIMITED |
| 14 | GODWILL AGENCIES LIMITED |
| 15 | GO-AFRICA CLEARING & FORWARDING LTD |
| 16 | "FREEWAYS TRADELINKS LIMITED |
| 17 | GRULAND LOGISTICS LIMITED |
| 18 | J.M. FREIGHT SERVICES LIMITED |
| 19 | BEMUGA FORWARDERS LIMITED |
| 20 | CITY FORWARDERS UGANDA LIMITED |
| 21 | EDRU MOVERS LOGISTICS LIMITED |

22 GREEN FREIGHT SERVICES LIMITED

23 FIKA SALAAMA IMPORTERS AND EXPORTER LTD

24 LANDMARK FREIGHTERS LIMITED

25 ZORI LOGISTICS (U) LTD

26 AKA CLEARING AND FORWARDING (U) LTD

27 EXCEL FREIGHT CONSULT LIMITED

28 DAKS COURIERS LIMITED

29 ACOLINE (U) LIMITED

30 JUPITER FORWARDERS (U) LIMITED

31 ZION FREIGHT FORWARD

32 VIP SHIPPERS LIMITED

33 WAGYVA LOGISTICS UG SMC LIMITED

34 UNION LOGISTICS (U) LIMITED

35 THREE WAYS SHIPPING SERVICES

36 SPEDAG INTERFREIGHT

37 ROCKET LOGISTICS LTD

38 ROCKLAND LOGISTICS LIMITED

39 PEARL CARGO FREIGHT (U) LTD

40 Others