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MAKERERE UNIVERSITY BUSINESS SCHOOL

INFORMATION TECHNOLOGY ADOPTION, SUPPLY CHAIN INTEGRATION AND LOGISTICS PERFORMANCE: A CASE OF LOGISTICS FIRMS IN UGANDA

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PLAN A

MARCH 2022

DECLARATION

DECLARATION

I **Ainomugisha Edgar** declare that this dissertation is my original piece of work and that it has never been submitted for any academic award.

Signed..... Date 04th/04/2022

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APPROVAL

This is to certify that this dissertation has been submitted with our approval as supervisors.

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DEDICATION

I dedicate this piece of work to my beloved family for the moral support rendered to me to make my studies a success.

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LIST OF ACROYMNS

ASYCUDA Automated System for Customs Data

H Hypothesis

ICT Information and Communication Technology

IT Information Technology

SPSS Statistical Package for Social Scientist

Ugx Uganda shillings

USD United States Dollar

ρ Significance value (*P* value)

ABSTRACT

This study focused on establishing the relationship between Information Technology (IT) adoption, supply chain integration, and logistics performance of logistics firms in Uganda. The unit of analysis was 230 logistics firms within Uganda while the unit of inquiry was three employees who were either a Logistics officer (or Transport Officer), a Clearing and Forwarding officer, or a member of the management team. The three employees were selected from each of the 230 logistics firms that were studied which totaled to 690 respondents. Using a quantitative cross-sectional survey, the study realized a response rate of 66.5% for the unit of analysis (153 logistics firms). The Statistical Package for Social Scientists (SPSS) version 26 was used for analyzing data with focus on descriptive statistics, Pearson's correlation coefficient, regression analyses and mediation tests. The study revealed a significant correlation between IT adoption and supply chain integration. A positive and significant relationship between IT adoption and logistics performance was established in the study. The study reveals a significant positive relationship between supply chain integration and logistics performance. The study reveals that supply chain integration mediates the relationship between IT adoption and logistics performance of logistics firms in Uganda. The regression results indicate that 14.6% change in the logistics performance of logistics firms in Uganda is ascribed to IT adoption and supply chain integration (Adjusted R Square = .146). This implies that logistics firms in Uganda need to put emphasis on both IT adoption and supply chain integration if they are to boost their logistics performance. Logistics firms need to integrate their IT Systems with that of their key suppliers and customers.

Key words: IT adoption, supply chain integration, logistics performance

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The logistics performance of countries like Germany, Sweden, Belgium, Australia, Japan, Netherlands, Singapore, Denmark, United Kingdom, and Finland gradually improved in 2018 compared to 2016 as per the Global Logistics Performance Index (Arvis et al., 2018). As for Uganda, the logistics performance declined in 2018 compared to 2016, with logistics infrastructure, logistics service provisions, and cross-border trade facilitation being the logistics measurement scale (Arvis et al., 2018; Arvis et al., 2016). Indeed, Uganda's logistics performance in the 2018 Global Logistics Performance Index fell short compared to its neighboring states of Rwanda and Kenya who were ranked 57 and 65 respectively compared to Uganda's position of 102 out of 167 countries that were assessed (Arvis et al., 2018, Arvis et al., 2016). Logistics management is critical for business firms as it enables the creation of value for customers, suppliers and other business stakeholders like distributors and service providers (Kirono et al., 2019).

Logistics performance is the degree of effectiveness, efficiency and differentiation in performing logistics activities (Karagoz & Argun, 2015). The Council of Logistics Management (2011) observes that logistics management denotes the process of planning, implementing, and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods and related information from point of origin to point of consumption for the purpose of conforming to customer requirements. Uganda's logistics performance is dependent on the actions of several players such as the logistics companies (Arvis et al., 2018). Logistics companies in Uganda deal in freight logistics including customs clearance, transport, shipping, Inland Container Depot (ICD, and warehouse operations (Uganda Freight Forwarders Association, 2020).

Kasemire (2018) cites logistics bottlenecks and inefficiencies in the multiple stages in Uganda's supply chain including loading, delivery, warehousing, packaging, and waste management. There are delays in the delivery of cargo which pushes up the logistics costs and such extra costs are passed onto the shippers and finally borne by the consumer (Kasemire, 2018). Logistics firms in Uganda are further faced with high transport costs, limited technical expertise, delays in loading and verification of cargo, and longer transit times in cargo transportation which create logistics inefficiencies (Trademark East Africa, 2019; Shippers Council of Eastern Africa, 2015; Uganda Country Report, 2014). Indeed, logistics inefficiencies in import and export of goods are estimated to cost Uganda 3.1 trillion annually, with logistics cost accounting for 18 to 20 per cent of the sale price of goods sold in Uganda (Kasemire, 2018).

Kasemire (2018) pinned that Uganda losses about 30 per cent of its major staple crops harvest which is damaged annually due to inappropriate stocking and transportation. Logistics performance of companies is dependent on the satisfaction derived by customers and the level of use of information technology applications (Mehmeti et al., 2016; Zaryab & Rana, 2012). This study explores the logistics performance of Uganda's logistics firms in the perspective of Technology Acceptance Model (TAM) crafted by Davis (1986). TAM reveals that technology adopters develop perceptions about the ease and usefulness of adopting technologies and in turn, these perceptions influence their attitudes, which later influences their behavioral intentions and ultimately the actual use of the system (Calantone et al., 1986). IT adoption relates to the perceived usefulness and perceived ease of use (Davis, 1986) of information technology (IT) systems for processing information, storage and retrieval of data (Yusuf, 2005).

However, TAM does not put into consideration supply chain integration which too affects logistics performance (Morash et al., 1996). In fact, Ladu (2019) posits that the success of the

logistics industry in Uganda will depend on the smooth collaboration with all the other economic operators. This study was further guided by the Resource Based View (RBV) theory in explaining the logistics performance of logistics firms in the perspective of supply chain integration. RBV emphasizes that firms can accumulate resources and capabilities that are rare, valuable, non-substitutable, and difficult to imitate and in so doing they gain a competitive advantage over competing firms (Barney, 1991). Supply chain integration refers to the alignment of supply chain goals and objectives along with the related information and physical linkages (Rodrigue et al., 2013).

1.2 Statement of the Problem

The logistics performance in Uganda's logistics firms is characterized by logistics inefficiencies, ineffectiveness and lack of proper differentiation as manifested in high costs of transportation, delays in delivery of consignments, delays in verification of cargo and customs clearance, theft and loss of consignments, poor coordination of processes, unprofessional drivers, among other issues (Trademark East Africa, 2019; Kasemiire, 2018; Uganda Country Report, 2014). Close to Ugx 3 trillion (USD 827 million) is lost each year in Uganda due to logistics inefficiencies, ineffectiveness and yet logistics accounts for 18 to 20 per cent of the sale price of goods sold in Uganda (Kasemiire, 2018). The underlying causes are not clear but the cited challenges undermining the logistics performance in logistics firms in Uganda could be due to limited adoption of information technology and poor supply chain integration across the supply chain. The problem could also be cause by inefficiencies in logistics differentiation, logistics efficiency and logistics effectiveness. This study therefore aimed at examining logistics performance of logistics firms in Uganda in the perspective of IT adoption and supply chain integration, where scholarly explanation is still limited.

1.3 Purpose of the Study

This study sought to examine the relationship between IT adoption, supply chain integration and logistics performance of logistics firms in Uganda.

1.4 Objectives of the study

1. To examine the relationship between IT adoption and supply chain integration in logistics firms in Uganda.
2. To examine the relationship between IT adoption and logistics performance in logistics firms in Uganda.
3. To examine the relationship between supply chain integration and logistics performance in logistics firms in Uganda.
4. To assess the mediating effect of supply chain integration on the relationship between IT adoption and logistics performance in logistics firms in Uganda.

1.5 Research Hypotheses

H1: IT adoption and supply chain integration in logistics firms in Uganda are significantly associated.

H2: IT adoption positively relates to logistics performance in logistics firms in Uganda.

H3: Supply chain integration positively relates to logistics performance in logistics firms in Uganda.

H4: Supply chain integration mediates the relationship between IT adoption and logistics performance in logistics firms in Uganda.

1.6 Scope of the Study

1.6.1 Content Scope

The study intended to explain logistics performance using the concepts of Information Technology (IT) adoption and supply chain integration.

1.6.2 Geographical Scope

The study focused on the logistics firms within Uganda. This is because logistics firms in Uganda have been reported to be experiencing logistics inefficiencies such as high cost of transportation ad delay in delivery of consignments which undermine their logistics performance.

1.6.3 Time Scope

The study was conducted between October 2018 to July 2021.

1.7 Significance of the Study

To theory: This study will provide theoretical insights on how the Technology Acceptance Model and Resource Based View theory explain the logistics performance of logistics firms in Uganda using information technology adoption and supply chain integration as predicator variables.

To practice: this study will examine the strategies of improving logistics performance especially ways of reducing costs incurred by logistics firms. The study contributes to the development of literature in the debate about how ICTs contribute to customer relationship management, inventory cost reduction, improvement in internal and external service levels, and enhancement of inventory turnover rate, and overall logistics cost reduction, as observed earlier by United Nations Conference on Trade and Development (UNCTAD) (2018), Ahimbisibwe et al., (2016), and Bhandari (2014).

To policy: this study is likely to help government, relevant ministries (like Ministry of Transport and Works, and the Ministry of Trade and Industry), Uganda Revenue Authority, Uganda Logistics Platform, Uganda Clearing and Forwarding Agents Association to come up with policy guidelines and measures of improving the performance of the logistics industry, as a way of facilitating trade and revenue growth in the economy.

1.8 Conceptual framework for Logistics Performance

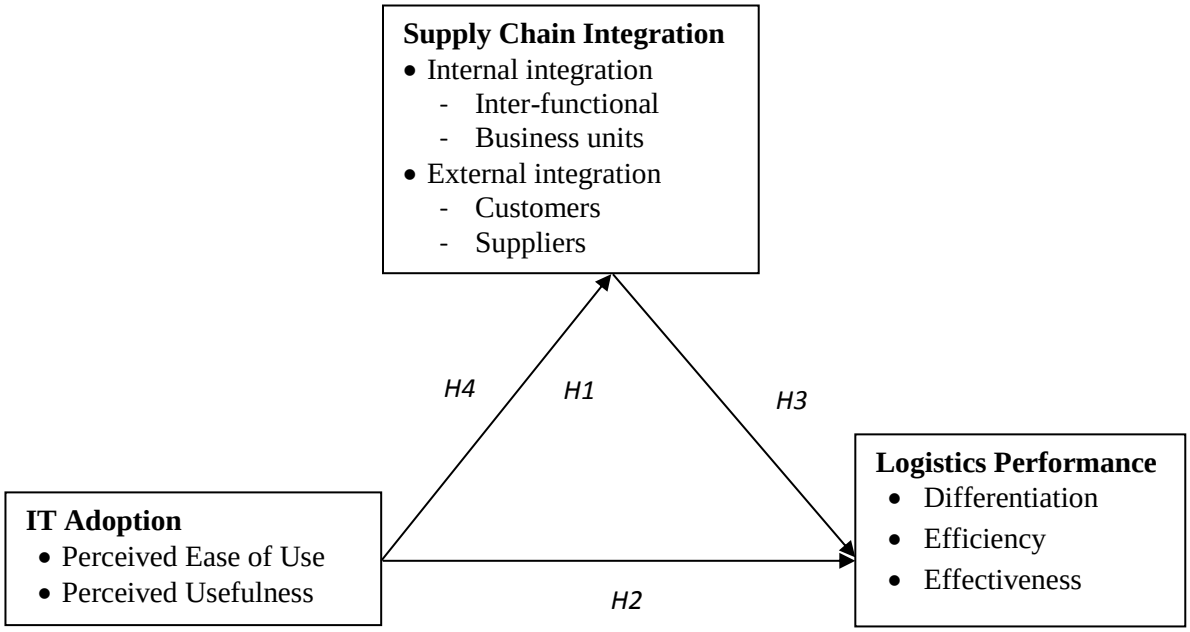


Figure 1: Conceptual framework

***Source**: Adopted from Davis et al. (1989); Fugate et al. (2010); Huo et al. (2014); Fawcett et al. (1997); Mentzer et al. (2004); Wang et al. (2018).*

Explanation of the Conceptual Framework

The conceptual model above depicts that there could be correlations between IT adoption, supply chain integration and logistics performance. The model portrays that information technology adoption as measured by Davis et al (1989) using the Technology Acceptance Model (TAM 1) could have a significant impact on logistics performance (as measured by differentiation, efficiency and effectiveness. The model also depicts that supply chain integrations could mediate the relationship between IT adoption and logistics performance in 3rd party logistics firms. The model suggests that internal and external supply chain integration relates with logistics performance.

The relationship between supply chain integration and logistics performance is supported by Zilani et al. (2019) who posit that higher levels of integration across the focal firm's supply chain guarantees improvement in the firm's supply chain through increased awareness of

customer needs, quick information exchange and quick customer response time. Evangelista et al. (2012) views IT adoption as a resource that allows logistics firms to develop specific logistics capabilities and thus achieving competitive advantage through enhancing the value-added services provided to clients. Chen et al. (2009) also reiterated that supply chain integration enhances the development of distinctive logistics capabilities that can enhance logistics performance.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical framework

2.1.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model introduced by Davis (1986) posits that perceived usefulness and perceived ease of use of the system determine one's intention to use the system with intention to use serving as a mediator of actual system use. The dimensions of TAM are perceived usefulness and perceived ease of use of information technology systems (Davis, 1989). Perceived usefulness is the user's subjective probability that using a specific application system will increase his or her job performance while perceived ease of use is the degree to which the prospective user expects the target system to be free of effort (Davis et al., 1989). TAM reveals that whenever a firm introduces a new information system or software package, the perceived usefulness and perceived ease of use of such a system will influence the users' decisions about how and when they will use the new system.

Deci et al. (1996) argued the effort put in place by people to use a system will largely depend on how enjoyable, satisfying and materially rewarding the system is. Perceived enjoyment and perceived attractiveness as revealed by Van der Heijden (2004) are the rewarding benefits of adopting technology. When a system produces beneficial outcome, people naturally accept and so is a transparent and less bureaucratic system in procurement practices (Bediako & Osman, 2016). To establish the perceived ease of use of the system, users assess the mental effort involved in the use of the system and not on objectives external to the interaction with the system (Van der Heijen, 2004). The rapid expansion and continuous development of logistics technologies like ASYCUDA World in clearing and forwarding have impacted on the logistics operations with most logistics firms in Uganda routing for the adoption of electronic technologies to cover a number of their logistics processes. When a

person deems a particular system to boost his/her job performance, then such a person perceives the system as useful (Mathwick et al., 2001).

Perceived usefulness relates to the perception of the consumers regarding the outcome of the experience (Davis et al., 1992). Davis (1989) reckons that people will use or not use an application depending on whether it will help them execute their tasks better. Logistics technologies like supply chain management systems (SCMS), Internet/Web, electronic data interchange (EDI), radio frequency identification (RFID), and mobile technologies, allow firms to carry out plans precisely, perform logistics operations efficiently, and to share information and receive quick response relating business transaction (Quayle, 2005; Malhotra et al., 2005). Improved speed of services to customers can be realized with the usage of electronic technologies like Enterprise Resource Planning since with the help of internet, exchange of information between the firm and their customers will be in short time and hence supply speed can be improved (Ruzindana & Prashant, 2016).

Perceived ease of use 'describes the individual's perception of how easy the innovation is to learn and to use' (Venkatesh et al., 2003). For the end user to perceive the system as easy to use, the application system should be user friendly (Davis et al., 1989). The perceived ease of use of the system is determined by: easy to use, easy to read, using understandable terms, ability to link to search for related information and easy to return to previous page (Bugembe, 2010). The information technologies like ASYCUDA World have been embedded with features to ease its use by stakeholders. Perceived usefulness has a direct positive correlation with attitude towards using the system and behavior intention to use the system (Davis et al, 1989). Perceived usefulness of the system is directly impacted by perceived ease of use of the system (Davis et al., 1989). Davis (1989) revealed that despite the usefulness of an application, at times potential users may perceive it too hard to use hence the effort of using the application outweighs its performance benefits. Van der Heijen (2004) argued that unlike

perceived ease of use of the system, the perceived usefulness of the system is more relevant in predicting the intention to use a system in utilitarian systems.

Ahimbisibwe et al. (2016) observed that adoption of IT contributes immensely to logistics service quality and overall logistics performance. This has however not yet happened in Uganda. ICTs can for instance facilitate sharing of business data using EDI, e-procurement, and collaboration among logistical system players or generally in the entire supply-chain. The internet has specifically made information sharing possible at every stage of the supply-chain, and this has presented opportunities for logistics improvement, using systems like Enterprise Resource Planning (ERP) systems, Warehouse Management Systems (WMS), Transportation Management Systems (TMS), and techniques Vendor Managed Inventory management (VMI), Just-In-Time Distribution/Delivery (JITD), Collaborative Planning, Forecasting and Replenishment (CPFR), and Collaborative Forecasting and Replenishment (CFAR) in which logistics partners such as vendors and retailers collaborate vertically. Frydlinger and Vitasek (2013) add that building collaborative relationships among organizations can help businesses achieve "win-win" results and outperform power-based relationships, and improved overall supply chain performance. IT has been earmarked as a major force that can be used to reduce the cost of doing business among logistics players and their supply-chain partners (like importers, exporters, manufacturers, and other businesses).

TAM is relevant in explaining the perceived usefulness and ease of use of the logistics technologies like ASYCUDA, EDI, Global Positioning System, Radio Frequency Identification Device and their subsequent adoption in Uganda's logistics firms. The perceived usefulness of information technologies in logistics operations include; reduction in corruption, easy preparation of business documents, improved quality of work. The perceived ease of use of information technologies in logistics operations include; clarity and user-friendly environment, easy of getting business documents, easier preparation of documents,

easier modification or withdrawal of documents, and ease of using the system. The adoption of information technologies necessitates changes that include reengineering the existing system within the organization that will ultimately impact on the way tasks are executed. Information technology offers the most effective means of interaction and communication, though its fusion of information technologies, telecommunications and the internet. These interactions foster a sustained behavior of hitherto single autonomous elements to develop common standards of communicating and sharing resources.

In a supply chain and logistics system for example, shipping companies are able to use their websites to log in and trace the exact position of the vessel. Transporters have an automated mechanism of tracking and managing their freight activities, third and fourth party logistics service providers have tools like Automated Guided Vehicle System (AGVS), Automated Inventory tracking system (AITS), Bar-Code system, Radio Frequency Identifier Device (RFID), EDI, Enterprise resource planning (ERP) and Electronic Funds Transfer (EFT) for managing seamless data and funds transfer across the supply chain (Bhandari, 2014; Ndonye, 2014). All of this leads to integration of supply chains and improved logistics efficiency. Whereas TAM is relevant in explaining the perceived usefulness and ease of use of the logistics technologies which affect logistics performance of firms, the model does not put into consideration supply chain integration which too affects logistics performance (Morash et al., 1996). Therefore, this study further used the Resource Based View (RBV) theory in explaining the logistics performance of logistics firms in the perspective of supply chain integration.

2.1.2 Resource Based View (RBV) Theory

The Resource Based View (RBV) theory postulates that each firm has a unique bundle of resources and capabilities that puts it at a competitive advantage (Mohamed et al., 2014). The RBV theory reveals that through accumulating internal resources and capabilities that are

rare, valuable and difficult to imitate, a firm can gain competitive advantage (Barney, 1991). The RBV theory postulates that competitive advantage results from the firm, relative to its competitors, if the firm can produce products or services that are perceived to be of superior value (Hunt & Morgan, 1995). According to RBV, firms that are able to accumulate resources and capabilities that are rare, valuable, non-substitutable, and difficult to imitate, will achieve a competitive advantage over competing firms (Barney, 1991). Competitive advantages are only achieved when the firms combine basic resources in a manner that they are able to achieve a unique capability that is valued by the customers (Morgan & Hunt, 1999).

This implies that firm-specific logistics capabilities that meet these criteria can help enhance the firm's level of competitive advantage. Logistics capability constitutes part of a firm's resources including all assets, competencies, organizational processes, firm attributes, information, knowledge and others which enhance the firm build and realize strategies that improve its logistics efficiency and effectiveness (Barney, 1991). Logistics capabilities can be strategically designed to meet the criteria espoused within RBV (rare, valuable, non-substitutable, and difficult to imitate). In fact, logistics capabilities have been empirically demonstrated to be a source of competitive advantage for the firm (Zhao et al., 2001; Lynch et al., 2000; Bowersox et al., 1999). No wonder logistics firms apply RBV in identifying and developing their capabilities in order to compete favorably in the competitive market (Day, 1994).

The logistics processes of logistics firms vary exceedingly across different company's right from domestic distribution to global shipping. This requires firms to integrate their logistics processes and activities with actors across their supply chain in order build capabilities and raise resources for executing logistics operations efficiently and effectively. Similarly, Langlois (1992) revealed that capabilities within a supply chain network of firms often

complement the focal firms' internal resources. Firms can gain competitive advantages through building a pool of knowledge-based resources (Jugdev & Mathur, 2013) particularly through integrating supply chain activities so as to take advantage of the unique resources and skills possessed by partners like suppliers and customers. In order to attain competitive advantage in a highly competitive business environment, individual businesses need no longer to compete as separate entities but rather share resources and capabilities with both upstream and downstream supply chain partners (Carter et al., 2015; Gligor & Holcomb, 2012, Lambert & Cooper, 2000).

Supply chain process integration has the potential to facilitate the creation of unique supply chain capabilities that can enhance the overall organizational performance (Chen et al., 2009). Firms have to design, manage or simply nurture specific logistical activities along a network to achieve the goals of their logistics targets (Pienaar, 2003). The nodes and links in the logistical network that makes information and product flow a reality include factories or production plants where products are manufactured and/or assembled, warehouses where products and materials are stored for use in the next stage of the supply chain, distribution centers that facilitate order processing and fulfillment, transport systems and points that facilitate cross-docking activities, like reassembly of cargo units based on deliveries scheduled, and conventional distribution stores like supermarkets, dealerships, hypermarkets, discount stores and voluntary agents.

The RBV theory emphasizes on the integration of business processes which is regarded a critical asset since firms are able to jointly share information and align their processes between the supply chain partners (Sahin & Robinson, 2005; Mellat-parast & Spillan, 2014). The RBV pinned by Barney (1991) emphasis that managers or the management team are a critical resource that have the potential for creating sustainable competitive advantage (Barney, 1991). However, the RBV is limited as managers tend to be incapable of perfectly

manipulating all the attributes and characteristics of their firms (Barney & Tyler, 1991). According to Amit & Schoemaker (1993), the RBV theory expounded by Barney (1991) does not consider managerial decisions.

The RBV theory ignores the need for managers to select, develop, and bundle both tangible and intangible resources in the creation of capabilities (Hitt et al., 2015). Sirmon et al. (2007) argue that holding valuable, rare, inimitable, and non-substitutable resources is a necessary but insufficient condition for firms gain competitive advantage. Sermon et al. (2007) recommend an efficient management of these resources if firms are to gain competitive advantage. Whereas Barney (1991) attempted to delineate resources and capabilities, these two concepts are still used without clear distinction (Leiblien, 2011).

Consistent with the RBV theory, firms can realize competitive performance through the sharing of physical, financial and information resources with supply chain partners between supply chain partners enhances the competitive performance of participating organizations (Yen & Hung, 2017; Huo et al., 2014; Huo, 2012). It is a common practice amongst logistics companies in Uganda to share information and to align their logistics operations with supply chain partners especially where the firm is unable to perform their entire logistics operations particularly transportation of cargo across different countries. Therefore, the logistics management system is a complex integration of many functions that must be designed and managed well to ensure efficiency and effectiveness (Azmi et al., 2017). Lambert & Cooper (2000) postulate that the overall logistics performance of the firms is a synergy of the integrated companies in the process of supply chain management (SCM). Logistics performance depends on the performance of the supply chain stages (Aramyan et al. (2007).
Consistent with RBV, it is the premise of this study that supply chain integration can be a source of competitive advantage. While previous research has examined logistics

performance, there are few studies that have attempted to empirically test the RBV theory is explaining the logistics performance of logistics firms in Uganda especially at such a time when the Global Logistics Performance Index for 2018 shows that Uganda has declined in the global logistics ranking (Arvis et al., 2018). The purpose of this study is to address this gap of knowledge.

Figure 2: A matrix synthesis for Resource Based View (RBV) theory

Author & year	Assumptions of RBV theory	Theoretical gap of RBV theory
Mata et al. (1995)	Resource heterogeneity (or unique resources) Resource immobility (i.e. competitors are at a significant disadvantage when they attempt to obtain, develop, and use the resource unique to a competitor.	Does not consider managerial decisions
Barney (1991)	Firms can create a competitive advantage over a long period of time using resources that are heterogeneous and perfectly immobile.	There is confusion between resources and capabilities where these constructs are used without clear distinction despite the author's attempt to delineate them. Static nature of the arguments and the fact that it ignores the potential influence of external environment Ignores the need for managers to select, develop, and bundle both tangible and intangible resources in the creation of capabilities.
Barney & Tyler (1991)	Firms can create competitive advantage if they have a collection of resources which are valuable, rare, in-imitable and non-substitutable.	Limited ability of managers to manipulate all the attributes and characteristics of their firms.

2.2 Logistics performance

Logistics management is that part of Supply Chain Management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customer requirements (Council of Logistics Management, 2003). Ballou (2006) observes that the main goal of business logistics management is ensure that the right goods or services are delivered to the right place, at the right time, and in the desired condition, while making the greatest contribution to the firm. Logistics performance refers to the effectiveness and efficiency in performing logistics activities (Mentzer & Konrad, 1991). Besides effectiveness and efficiency, Langley & Holcomb (1992) added logistics differentiation in the definition of logistics performance since one of the indicators of logistics performance is the value customers receive from logistics activities.

Differentiation refers to the value that can be generated by the elements of customer service with regards to competitors (Bobbitt, 2004; Langley & Holcomb, 1992). Logistics performance is the degree of efficiency, effectiveness, and differentiation related with the accomplishment of logistics activities (Bobbitt, 2004; Cameron, 1986). Effectiveness is the resource getting ability and indeed an absolute level of outcome attainment (Ostroff & Schmitt, 1993). Effectiveness is "the extent to which an objective has been achieved" while efficiency is "the degree to which resources have been used economically" (Gleason & Barnum, 1986). Logistics efficiency is best defined by the internal functioning of a logistics firm, and relates to the normal ratio of inputs to the real level of outputs in the logistics firm (Fugate et al., 2010). Efficiency is achieved if the proportionate input cost in the logistics firm is less than the dollar value of outputs or benefits accruing to the logistics firm (Mentzer & Konrad, 1991).

Broadly speaking, logistics efficiency refers to the ability of a logistics firm to manage resources wisely. It specifically refers to least cost management of logistics activities by a firm, usually measured by how much resources are saved in the expenditure chain. Delivery service, logistics cost and tied-up capital are the dimensions of logistics performance cited by Kirono et al. (2019). Logistics performance has been measured in terms of service (like order cycle time and fill rates), cost, return on assets (or investments), and managers' perceptions of customer satisfaction and loyalty (Brewer & Speh, 2000; Morash et al., 1996; Chow et al., 1994; Holmberg, 2000). Fugate et al., (2010) measures logistics efficiency using constructs like percentage of orders shipped to customers from the primary location, line-item fill rate, percentage of orders shipped in a specific time, percentage of shipments required to expedite an order, inventory turns per year, and average cycle time or lead time.

2.3 IT adoption

IT adoption refers to the extent to which a firm embeds a certain set of technologies in its processes and makes them fully operational for being used (Li et al., 2009). Khasawneh (2008) defines IT adoption as the first use of acceptance of a new technology or a new product. IT involves the use of computers to process information, provide storage of data and retrieve data (Yusuf, 2005). Adoption goes beyond decision making to actual use of the technology (Venkatesh, et al., 2003). The rationale of the technology acceptance model is that the influence of external variables on technology acceptance behaviour is mediated through user beliefs and attitudes, in which beliefs represent a degree of instrumentality tied to action and attitudes are purely affective. Beliefs relate to an individual's subjective assessment that performing some behaviour will result in a specific consequence, whereas attitudes relate to an individual's positive or negative affective feelings about performing the behaviour (Lee et al., 2003).Various scholars posit that there are four key constructs: 1) performance expectancy which is sometimes referred to as perceived usefulness, 2) effort

expectancy which entails perceived ease of use, 3) social influence, and 4) facilitating conditions.

Perceived ease of use is defined as "the degree to which an individual believes that using a particular system would be free from physical and mental effort" Davis, (1991). It has also been defined as a user's subjective perception of the effortlessness of a computer system. This follows from the definition of the word "ease": "freedom from difficulty or great effort."

Perceived ease of use may contribute towards performance whilst lack of it can cause frustration and impair technology adoption (Venkatesh & Davis, 2000). The impact of perceived ease of use on user's intention to adopt a technology has been documented well in the literature. However, its role in TAM research remains controversial. For example, Fang et al. (2005) found that the nature of a technology may influence its perceived ease of use. In fact, perceived ease of use can be explained by usability characteristics which have been empirically validated by Lederer et al. (2000).

Perceived usefulness been defined as a person's subjective perception of the ability of a computer to increase job performance when completing a task, which affects their perceived usefulness thus having an indirect effect on user's technology acceptance. It is defined as 'the degree to which a person believes that using a particular technology will enhance his or her job performance' (Davis, 1986). In the words of Davis, Bagozzi, and Warshaw (1992), perceived usefulness refers to consumers' perceptions regarding the outcome of an experience. Gender, age, experience, and voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behavior.

2.4 Supply chain integration

Supply chain integration is the relationship within an enterprise, as well as with supply chain partners to streamline the flow of information, materials, and finished goods and services to the final customers (Yang & Jung, 2016). Supply chain integration is the 'alignment and interlinking of business processes' (Mangan et al., 2012). Supply chain integration means that the business processes of the firms in the involved in the supply network will have to share their functionalities as if they are operating in a single firm (Mathu, 2019). The dimensions of supply chain integration are supply chain coordination, cooperation, collaboration, information sharing, and information visibility (Silvestro & Lustrato, 2014).

2.5 IT adoption and supply chain integration

Previous studies reveal a relationship between IT adoption and supply chain integration. IT adoption is a key enabler of internal and external supply chain integration through well-coordinated flow of materials, information and finances amongst partners in the supply chain (Li et al., 2009). Adoption of IT by a firm facilitates information sharing and collaboration such as vendor managed inventory and jointly developed demand forecasts between customers and suppliers (Li et al., 2009). Mathu (2019) reckons that the adoption of information technology speeds internal alignment of firms and cooperation with external partners. Increased used of IT leads to high levels of supply chain integration through better sharing of information relating to demand forecasts and productions schedules (Karoway, 1997).

IT adoption helps in information flow management besides supporting communication and collaboration with supply chain partners (Brandyberry et al., 1999). Jovanovic & Colovic (2017) revealed that timely access of accurate information increases logistics efficiency through enhancing on-line tracking, and facilitating prompt response to changes and risk that manifest in the focal firm's supply chain. Ruiz-Torres et al. (2018) affirm that continued

exchange of relevant logistics related information enables logistics service providers to better understand the needs of their customers and how to meet the needs. Liviu (2015) avers that firms can realize best performance when IT investments are aligned with internal capabilities and organizational processes with the organization strategy. IT boosts the performance of the focal firm and its supply chain partners arising from the provision of timely, accurate and reliable information across the supply chain (Jin, 2006).

The use of information technologies in commercial transactions enhances information flow, eases documentation, and leads to product alignment (Mathu, 2019) which builds a fertile ground for integration of logistics operations across the supply chain. Ahimbisibwe et al. (2016) reckoned that IT adoption especially ASYCUDA World would enable logistics firms to network with many customs stations and reduce delay in the Entry processing. System tools like Enterprise Resource Planning Systems (ERPs), automated order tracking systems, Electronic Data Interchange (EDI) provide logistics firms with mechanisms of sharing product and service data in real time, making orders online, payment of goods purchased, order fulfillment and delivery, without the necessity for parties in the supply chain to meet (Ndonye, 2014; Fugate et al., 2010). From the literature above, it is apparent that IT adoption enhances supply chain integration. Therefore, it is hypothesized that,

H1: IT adoption and supply chain integration in Uganda are positively associated.

2.6 IT Adoption and logistics performance

For firms to reap greater success in the provision, receipt and integration of information with their clients in an effort to offer differentiated logistics services, firms need to increasing adopt information technology (Gligor & Holcomb, 2012). The success of any system introduced depends on its acceptance by the users (Mahbubuu, 2008) that it satisfies their needs and wants (Bediako & Osman, 2016). Adopting information technology leads to reduction in lead time, reduced customer complaints which translates into customer

satisfaction (Harvie & Lee, 2002). Information technology adoption increases the output of a firm, enhances industrial linkage and promotes flexibility (Harvie & Lee, 2002). In fact, the increased spend by companies on logistics technologies is influenced by specific requests from customers who are aware that adoption of technologies in logistics operations improves the logistics performance of the beneficiary firms (Capgemini, 2007).

The use of modern technology like the Automated Systems for Customs Declaration (ASCYUDA) World for customs clearance cuts down transactional costs besides saving time (Harvie & Lee, 2002). Adopting new methods of technological development leads to improvement in service delivery (Venkatesh & Davis, 2000) hence customer satisfaction because of reduced service delays and costs (Al-Ansari, 2006). Technology innovations like Electronic Data Interchange (EDI) when adopted enhance the flexibility of logistics firms to address the special and abnormal requests and events of such firms (Ahimbisibwe et al., 2016). Ahimbisibwe et al. (2016) revealed that IT adoption specifically ASYCUDA World reduces the time taken to process documents, clearing cargo with Customs for transit and for home use. The use of technology information systems increases organizational flexibility and responsiveness besides enhancing organizations to implement their strategies and to develop plans thus making decisions more effectively and quickly (Karagoz & Argun, 2015). The increased use of IT facilitates decision making, information sharing and communication in an efficient manner (Hall et al., 2012).

The internet has increasingly become an important technology that has automated logistics functions and also improved operational efficiency. Internet based tools like EFT, e-procurement, e-reverse auctions, e-payments, e-vehicle tracking systems are helping to reduce waste and costs that would have been suffered in a non-automated, non-IT based logistics system (Lambert & Cooper, 2000; Mehmeti et al., 2016). Firms that adopt IT adoption are able to boost their logistics quality, productivity, and customer service (Chow et

al, 2007; Liu et al., 2010). Evangelista et al. (2012) reveals that EDI greatly contributes in reducing the daily time required to contact clients and to input data into the information systems. Having the global positioning system (GPS) installed on roads ensures accurate position of desired destinations and traffic conditions hence on-time delivery and reduced delivery costs (Poon et al., 2009).

With the adoption of IT, firms have the opportunity to expand the markets in which they compete, attract and retain customers, customize products and services, and restructure their business strategy which boosts the overall logistics performance of firms across the entire supply chain (Azevedo et al., 2007; Capgemini, 2007). Sambamurthy et al. (2003) argue that IT enhances the logistics performance of a firm through innovations in products, channels and customer segmentation. Firms are motivated to adopt IT as channel of achieving low-cost delivery of goods and services, delivery of differentiated goods and services, offering innovative goods and services, and focusing on specific market segments in its supply chain. IT adoption enhances customer service, increases productivity and process quality which translate into improved logistics performance (Liu et al., 2010; Lau et al., 2006; Chow et al., 2007). Adoption of IT has facilitated reduction of process costs in the supply chain, and the effective conversion of the logistics chain into a value chain (Bhandari, 2014; Ndonye, 2014; Fugate et al., 2010). Mehmeti et al. (2016) reveal that information technology reduces the cost of communication and data sharing, thus facilitating information flow in the logistics process.

Yvanovic et al. (2014) argued that logistics technologies permit interconnection with all supply chain partners which boost logistics performance arising flow efficient management of all logistics processes. A study conducted in Italy by Evangelista et al. (2012) found a positive correlation between technologies like data gathering technologies (EDI, barcode, radio frequency and RFID) and performance related to efficiency (asset utilization

improvement) and effectiveness (operations improvement, customer service improvement and flexibility improvement) amongst the third-party logistics firms. IT tools like EDI enable transfer of information and structured data between for example manufacturers and logistics service providers, thus leading to lower costs incurred by all players (Mehmeti et al., 2016; Lambert & Cooper, 2000). Ordering costs are also reduced and higher levels of efficiency in order management are achieved using information technology and information systems (Lambert & Cooper, 2000; Mehmeti et al., 2016).

Accurate and timely sharing of information through the use of information technology facilitates the supplier' capability to predict upcoming demand, and retailer's ability to effectively serve ultimate customers through providing them with products or services ordered as per the delivery scheduled agreed upon (Angeles, 2009; Cachon & Fisher, 2000). The use of electronic payment systems across the supply chain can reduce the billing costs, payment cost and fraud (Patterson et al., 2018; Raina, 2014). IT based logistics management brings multiple benefits to all supply-chain players, including ensuring automation of logistics, on time delivery of consignments, agility, flexibility, least cost operation and ultimate value for every firm and customer (Gudehus & Kotzab, 2009; Bartlett et al., 2007). In organizations where IT has been adopted, managers have access to timely information that is critical for addressing the changes in product and process designs in an effort to effectively satisfy the changing customer requirements (Zaryab & Rana, 2012).

Dewett & Jones (2001) reveal that firms that adopt IT are able to improve their overall performance through pooled resources, innovation, and collaboration across organizational boundaries. Indeed, the adoption of ICT in logistics management can enable firms achieve competitive advantage in terms of Lee (2004)'s famous tri-advantage of 'agility', 'alignment' and 'adaptation' (triple-A's). However, Wue et al. (2006) cautioned that due to the rapid diffusion of innovation, the advantages tagged to IT may diminish fairly quickly. Brown et

al. (2003) revealed that the empirical research trying to support the positive correlation between IT expenditure and firm performance, has often revealed mixed results, a phenomenon known as the "productivity paradox" of IT adoption. Therefore, the study proposes the following hypothesis:

H2: IT adoption positively relates to logistics performance.

2.7 Supply Chain Integration and logistics performance

Most of the literature suggests that integration of supply chain activities leads to improvement in the logistics performance of firms. In an integrated supply chain, the specific logistic activities that constitute the chain are conducted expeditiously to facilitate successful flow of products and information from origin to point of consumption or application (Bowersox et al., 2012). Integrated supply chains combine and coordinate demand forecasting, facility location, procurement, materials handling, product packaging, warehousing, inventory management, order management, logistics communications, transport, waste disposal, managing return goods, and service support to facilitate logistics efficiency (Bowersox et al., 2012). Blanchard (2004) revealed that the integration of supply chain processes will lead to reduced costs of operation, and higher resource savings in the logistics firm.

Hendjani & Saei (2020) revealed that internal integration facilitates better demand forecasting as a result of receiving more accurate information relating to the end users' demand. Collaborative relationships involving firms and their supply chain partner's leads to efficiency, flexibility and sustainable competitive advantage (Nyaga et al., 2010) which translates into improve logistics performance for firms. Min & Mentzer (2000) disclose that inter-functional coordination is a prerequisite for creating customer value which means that boundaries between functions have to be indistinct. Supply chain process integration enhances the retailers' competitive advantage due to increased flexibility of order fulfillment

hence superior customer experience across distribution channels (Song et al., 2019; Murfield et al., 2017).

Integration across the supply chain mitigates demand uncertainty leading to inventory and subsequent revenue increase to beneficiary firms (Xu et al., 2014). Higher levels of integration across the focal firm's supply chain guarantees improvement in the firm's supply chain through increased awareness of customer needs, quick information exchange and quick customer response time (Zilani et al., 2019). An integrated supply chain guarantees efficiencies and generation of customer value for participant firms hence boosting their logistics performance (Gawankar et al., 2016; Ralston et al., 2015). Liu et al (2013) reiterated that integration with suppliers and customers helps the focal firm to share resources, knowledge and risks with its partners in the supply chain hence improvement in logistics performance of the focal firm.

Kandampully (2002) avers that external relationship networks across the supply chain are essential prerequisite for a firm to develop capabilities and knowledge required to serve the holistic needs of customers. Supply chain integration specifically with regards to information influences logistics capabilities hence boosting services delivery to clients and reducing costs along the supply chain (Liu & Luo, 2012). Firms that coordinate their internal and external resources are usually successful in creating and developing their supply chain capability by linking their systems and operational interfaces in order to reduce redundancy while maintaining operational synchronization (Mentzer et al., 2004). Chen et al. (2009) avers that supply chain integration makes it possible for a firm to realign its processes and resources more effectively with strategic partners in the supply chain hence contributing to the development of certain critical logistics capabilities.

Collaborating parties that share information across their supply chain can build good capabilities which can achieve optimal logistics performance (Kirono et al., 2019). Increased focus on supply chain integration results into increased sensitivity of the firms to the needs of their customers and consequently higher customer value with faster response times (Sezen, 2008). Supply chain integration boosts logistics performance of the firms through improving forecasts, synchronizing production and delivery processes, coordinating inventory-related decisions, and shortening invoice payable and receivable cycle time (Rai et al., 2006; Wu et al., 2006). Gligor & Holcomb (2012) reveal that developing integration capability in a firm helps it to achieve efficiency thus improved logistics performance. For a focal firm, supply chain integration enhances just-in-time delivery, cycle time reduction (Lowson, 2001), automatic replenishment, vendor inventory control (Daugherty et al., 1999) and shelf space utilization (Van Hoek, 2000).

Companies like DHL and DELL operate an integrated supply chain system with a database of suppliers and customers that they deal with on a routine basis. (Bhandari, 2014; Ndonye, 2014; Fugate et al., 2010). Supply chain integration helps partners to reduce customer complaints and operational costs by interlocking supply chain elements (Song et al., 2019; Rosenzweig, 2009). A firm that integrates its supply chain process with supplier and customer operations is able to facilitate its logistics like inventory management, supply chain coordination, and sharing of demand and forecasting information across the supply chain (Angeles, 2009). A firm with an integrated supply chain is capable of identifying and eliminating non-value-added activities consequently boosting its flexibility in meeting customer requests (Wiengarten et al., 2014). Lee & Billington (1992) acknowledge that poor supply chain integration creates a ‘‘bullwhip effect’’ with its negative consequences like excess inventory and stock outs. From the literature, it is evident that supply chain integration enhances the development of distinctive logistics capabilities that can enhance logistics

performance (Chen et al, 2009). From this discussion, the researcher derived the hypothesis below;

H3: Supply chain integration positively relates to logistics performance.

2.8 Mediating effect of supply chain integration in the relationship between IT adoption and logistics performance

The use of information technology coupled with supply chain integration boosts coordination in the firm's supply chain which helps a firm to lower the risks of bullwhip effects, increase real time information flow, increase efficiency, improve productivity, boost the capability of the firm to deliver fast and better products and services, align the balances between supply and demand, and to reduce transaction cost (Koh et al., 2007; Hair et al., 2006; Frohlich & Westbrook, 2002). Today's supply chain network heavily depends on key information technologies like RFID, sensors and ERP which enable integrated planning, logistics visibility, autonomous logistics, smart procurement, smart warehousing, spare part management and advanced analytics (Schrauf & Berttram, 2016). Successfully supply chain integration necessitates increased use of information technology for fluent flow of timely and accurate information across the supply chain (Li et al., 2009).

The use of internet stimulates good integration between suppliers and customers in carrying out inventory planning, demand forecasting, joint designs, order replenishments, and customer relationship (Geunes et al, 2002). Kirono et al. (2019) posit that supply chain integration has a positive effect on information sharing and that both have a positive effect on logistics performance. Bititci et al. (2004) reveals that information in the supply chain is a shared resource amongst collaborating partners and that it can build and improve logistics capabilities and consequently logistics performance. Relevant and continuous information flow enables logistics service providers to have a better understanding of logistics risks and how to address such risks early hence better logistics performance (Ruiz-Torres et al., 2018).

Integrating the flow of information with the supply chain partners like customers and suppliers enhances information sharing which leads to the transfer of consistent information and knowledge across the supply chain hence boosting quick response to the dynamic challenges in the market place (Li et al., 2006). Daugherty et al. (1995) reveal that integrating information technology in the supply chain enhances information accessibility and responsiveness to the needs of suppliers and customers in the supply network.

Hou (2019) argues that IT enhances suppliers, manufacturers, distributors, and customers in a supply chain network to share information thus reducing the overall cost of doing business. Firms that succeed in building customer-focused, value added and customer integration capabilities are able to target specific customers, and meet or exceed customer expectations due to their ability to provide customized value-added services (Zhao et al., 2001; Lynch et al., 2000; Gligor & Holcomb, 2012). IT adoption enhances the sharing of physical, financial and information resources amongst firms in a supply chain network which in turn boost the competitive performance of firms through increased responsiveness to supply chain partners and consumers (Rajagulu & Matanda, 2019; Yen & Hung, 2017). High levels of supply chain integration paves way for the focal firm to react more flexibly to each customer's demand, shorten delivery times and reduce inventories hence improved logistics performance (Clark & Lee, 2000; Barrat, 2004). From the foregoing discussion, it is hypothesized as follows;

H4: Supply chain integration mediates the relationship between IT adoption and logistics performance.

2.9 Conclusion

In relation to the above discussion, various studies and theories have established the relationship between IT adoption, supply chain integration and logistics performance. It should be noted that most of the established relationships have been scanty and in other sectors particularly in the manufacturing sector rather than in logistics firms. Therefore, a

study attempting to establish these relationships in the logistics firms was necessary for logical and universal conclusions as well as the application of such relationships.

CHAPTER THREE

METHODOLOGY

3.1 Research Design

The researcher adopted a cross-sectional survey design involving the collection and analysis of data about the predictors of logistics performance of logistics firms in Uganda and the relationships between the variables. This type of research design is frequently used to determine the prevailing characteristics in a population at a certain point in time. Because you only collect data at a single point in time, cross-sectional studies are relatively cheap and less time-consuming than other types of research (Sekaran, 2003).

Since the study was intended to test rather than originating a theory, the study adopted a quantitative approach. The quantitative approach focused on describing and drawing inferences from the findings on the relationships between IT adoption and supply chain integration on logistics performance of logistics firms in Uganda. A quantitative approach also enabled the aggregation of opinions, views and positions of the respondents so that the data can easily be summarized into descriptive statistics using frequency tables, as well as inferential statistics using correlation and regression analysis (Babbie, 2020).

3.2 Study Population

The study population comprised of 572 logistics firms licensed by Uganda Revenue Authority to operate in Uganda in 2020 (Uganda Revenue Authority, 2020). The logistics firms were categorized according to the activities that they perform namely; freight logistics, customs clearance, transportation, shipping, Inland Container Depot (ICD), and warehousing.

3.3 Sample Size

A sample size of 230 logistics firms was drawn from the study population basing on Krejcie & Morgan (1970) sample determination table (Uganda Revenue Authority, 2020).

3.4 Unit of analysis

The unit of analysis was a logistics company licensed by Uganda Revenue Authority to operate in Uganda.

3.5 Unit of inquiry

The unit of inquiry was three people from each firm. These include a Logistics officer or Transport Officer, Clearing and Forwarding officer, and a member of the management team with knowledge of the logistics operation of the company. The employees were selected from each of 230 logistics firms that were studied which constituted a total to 690 respondents. The study was restricted to the unit of inquiry above because they are the main implementers of logistics tasks, decisions and their actions largely determine the logistics performance of their companies.

3.6 Sample Design and Procedure

The study used both simple random sampling and purposive sampling methods. The study used simple random sampling in order to select a sample size of 230 firms from a study population of 572 firms registered by Uganda Revenue Authority. The researcher listed the names of the registered companies and thereafter randomly chose the required sample size of 230 with the option of replacing those firms that were not be interested in the study. Simple random sampling method was used in order to obtain accurate data which was representative of the views of various logistics companies in Uganda with regards to the variables studied. Simple random sampling design gave all the 230 logistics firms a chance of being selected for the study.

Purposive sampling method was used for selecting three respondents from each logistics firm who would take part in the study and these respondents were those who were knowledgeable about logistics operations. Purposive sampling was preferred in this study as it allowed the researcher to use his judgement to select respondents who were more experienced and

knowledgeable about the variables under investigation (Saunders et al., 2019). In so doing, the researcher was able to appropriately meet the study objectives and to address the research hypotheses raised in this study. The sample constituted of three employees who were either a Logistics officer (or Transport Officer), a Clearing and Forwarding officer, and a member of the management team who were involved in the logistics operations in their companies.

Table 1
Showing the Sample Size for all selected companies

Description of firms studied	**Target population**	**Sample size**	**Sampling technique**	**Data collection tools**
Logistics firms in Uganda	572	230	Simple Random	Questionnaire
Total	**572**	**230**		

Source: *Adopted from Uganda Revenue Authority (2020)*

3.7 Data sources

Primary data was directly collected from respondents through administering a structured questionnaire. These primary respondents included three employees per logistics firm. The researcher employed the services of 2 research assistants who were closely monitored during data collection to ensure that they collected reliable data from the respondents. Respondents were guided through questionnaires to ensure high level of accuracy in the data collection process.

3.8 Data Collection Instrument

Primary data relating to the study variables was captured through administering structured questionnaires. Structured questionnaire is a closed ended type of questioner where the respondents could only choose the answer from the given alternatives provided by the interviewer. The questionnaire enabled the respondents to read and understand the questions before responding. Questionnaires were also used to investigate the feelings of respondents

using a 5-point Likert scale. The respondent's answers were based on the extent to which they agreed or disagreed with the statements in the questionnaire.

3.9 Measurement and instrument design

In this study, the study variables are measured based on the works of previous scholars indicated below;

i. **Logistics performance** was measured according to Fugate et al. (2010) and Bobbitt & Smith (2004) and these measures include; logistics effectiveness, efficiency and differentiation.

ii. **IT adoption** was measured by perceived usefulness and perceived ease of use of information technology as pinned by Davis (1989). The measurement scale for perceived usefulness include; Job performance, Effectiveness, Improved speed of working, Convenience of use, Control over work, Needs met, Quality of work, Ease of doing job, Usefulness, Criticality to the job, increase of productivity, and Accomplish more work (Ruzindana & Prashant, 2016; Davis, 1989). Perceived ease of use of information technology was measured by Simplicity of operation, Easy to understand, Ease of use, Error prone, Confusing, Dependence on manual, Mental effort, Error recovery, Rigid and inflexible, Controllable, Unexpected behavior, Cumbersome, Ease of remembering, Provision of guidance, Frustrating, and Effort to become skillful (Ruzindana & Prashant, 2016; Bugembe, 2010; Davis 1989).

iii. **Supply chain integration** – was measured according to Cao et al. (2015) and the measures include; cross-functional integration (internal integration), and external integration (integration with raw material suppliers and integration with distributors or customers) and have been studied by Wang et al. (2010) with other several scholars like Flynn et al. (2010).

The adapted items for each study variable were anchored on a five-point Likert scale in the questionnaire ranging from;1- strongly disagree, 2 – disagree, 3 – somehow agree, 4 - agree, and 5 - strongly agree.

3.10 Validity and Reliability of the Instrument

The researcher pre-tested the data collection instrument among a section of the intended respondents, inappropriate questions, were revised. The Content Validity Index and the Cronbach's Alpha value were used to measure validity and reliability of the instrument respectively. Table 2 reveals that the instrument was valid and reliable since all the coefficients were above 0.7 which is the minimum as suggested by Amin (2007). This is in line with Sekaran (2000) who argued that the research instrument used to collect data should be valid and able to yield similar results at all time. Data cleaning was then carried out to eliminate questionnaires with inconsistent information. Factor analysis was applied to the questions of all variables in order to test their factor loadings. In the analysis, Varimax Rotation was used to achieve a more meaningful factor structure. While performing factor analysis, certain questions that were explained by more than one factor were excluded from the scales. All factor loadings were above 0.5.

Table 2

Results of Content Validity Index and Cronbach Alpha Coefficient

Variable	Anchor	Cronbach Alpha Value	Content Validity Index	Number of items
Logistics performance	Five point	.906	.810	21
IT adoption	Five point	.919	.897	26
Supply chain integration	Five point	.952	.875	28

3.11 Data Processing, Analysis and Presentation

In processing, analysis and presentation of data, the collected data was coded, edited for incompleteness and inconsistence to ensure correctness of the data given by the respondents.

Data was tabulated and input in the Statistical Package for Social Scientists (SPSS) version 26. The Pearson's correlation coefficient was used to establish the relationship between independent variables and the dependent variable. Multiple regression analysis was conducted to determine variance in the dependent variable, which is explained by the independent variables. Reliability and confirmatory factor analysis were used to test the research data. Mediation test was done using the MedGraph program version 3 developed by Jose (2013). This program was used to compute the Sobel z-value and the significance of the mediation effect of supply chain integration on the relationship between IT adoption and logistics performance in Uganda.

3.12 Ethical Considerations

The researcher obtained the consent of research subjects/ participants before involving them in the study. The participants, who are respondents in this case, were informed about all aspects of the study, potential risks and benefits of their participation, expected duration of the study, and extent of confidentiality, all of which were important in determining their decision to participate in the study. The privacy of the research participants was ensured, so that no personal data was collected from respondents, and all the data collected were used purely for academic purposes. In order to avoid plagiarism, the works that did not belong to the author of this study were acknowledged using American Psychology Association (APA) Referencing System in an appropriate format, as required by Makerere University School of Graduate Studies in its academic integrity policy (Makerere University, 2013).

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction

This chapter covers presentation, analysis and interpretation of the data collected from the respondents. The chapter entails the demographic information about logistics firms, respondents, correlation, regression analysis, and mediation analysis. The presentation was guided by the study objectives below;

1. To examine the relationship between IT adoption and supply chain integration in Uganda.
2. To examine the relationship between IT adoption and logistics performance in Uganda.
3. To examine the relationship between supply chain integration and logistics performance in Uganda.
4. To assess the mediating effect of supply chain integration on the relationship between IT adoption and logistics performance in Uganda.

4.1 Response rate

The study targeted 230 logistics firms in Uganda. In each of the 230 logistics firms, 3 respondents were selected to participate in the study hence totaling to 690 respondents. However, only 153 logistics firms fully answered and returned the questionnaires, giving a response rate of 66.5%. In all the 153 logistics firms that participated in the study, a total of 459 respondents fully filled and returned the questionnaires to the researcher. The three responses from each firm were aggregated to show that it was from a single firm. A response rate above 60% for logistics firms is considered excellent and the results are representative of the population being studied (Gordon, 2002), given that the average response rate in most such studies is 60%.

4.2 Characteristics of logistics firms

Here, nature of activities carried out by logistics firms, number of employees serving in logistics firms, and period of existence of the logistics firms are described.

4.2.1 Nature of activities carried out by logistics firms

According to table 3, majority of logistics firms in Uganda (21.7%) are engaged in the provision of transport services, 21.1% are engaged in customs clearance, 18.6% provide freight logistics services, and 12.6% provide warehouse operations services. Other services provided by logistics firms in Uganda are shipping (11.3%), ICD (2.7%), distribution (2.6%), cargo handling (1.9%), packaging (1.7%), consolidation (1.3%), tracking (1.2%), door to door delivery (1.1), parcels (1.0%), insurance (0.6%), and car freight station (0.5%). A minority of logistics firms in Uganda (0.3%) provide car inspection services. These findings imply that most logistics firms in Uganda provide a narrow range of services namely; transport, customs clearance, warehousing, freight logistics, and shipping.

Table 3

Nature of activities carried out by Third party logistics firms

	Responses		
	N	Percent	Percent of Cases
Freight logistics	405	18.6%	74.0%
Customs clearance	458	21.1%	83.7%
Transport	459	21.7%	86.3%
Shipping	245	11.3%	44.8%
ICD	59	2.7%	10.8%
Warehouse operations	273	12.6%	49.9%
Car Freight Station	10	0.5%	1.8%
Tracking	26	1.2%	4.8%
Cargo handling	41	1.9%	7.5%
Packaging	38	1.7%	6.9%
Distribution	56	2.6%	10.2%
Door to door delivery	23	1.1%	4.2%
Insurance	12	0.6%	2.2%
Cargo inspection services	7	0.3%	1.3%
Consolidation	28	1.3%	5.1%
Parcels	21	1.0%	3.8%
Total	2174	100.0%	397.4%

Source: Primary Data

4.2.2 Number of employees serving in the firm

The table 4 below shows that majority of logistics firms in Uganda (60.1%) had over 50 employees engaged in logistics related activities, 20.3% had between 25 to 50 employees whereas 13.5 percent had between 10 to 25 employees and a minority of 6.5 percent had less than 10. With 80.3% of the logistics firms having over 25 employees engaged in logistics related activities, the implication is that there is reduced workload for staff and that the staff have diverse skills which are relevant for delivery of logistics services.

Table 4

Number of employees serving in the firm

	Count	Valid Percent
Less than 10	10	6.5
Between 10 to 25	20	13.1
Between 25 to 50	31	20.3
Over 50	92	60.1
Total	153	100.0

Source: Primary Data

4.2.3 Period of existence of the firm

Table 5 below shows that 45.8% of the logistics firms in Uganda had existed for over 20 years, 19.8% had existed for 11-15 years, 15.7% had existed for 5-10 years, 13.7% had existed for 16-20 years while 5% of the logistics firms had existed for less than 5 years.

Based on the act that most of the logistics firms in Uganda have been in existence for a period of over 5 years, the implication is that logistics firms in Uganda have gained sufficient experience in logistics operations over the years which is relevant for delivery of logistics services to the satisfaction of both internal and external customers.

Table 5

Period of existence of the firm

	Frequency	Valid Percent
Less than 5 years	8	5.0%
5-10 years	24	15.7%
11-15 years	30	19.8%
16-20 years	21	13.7%
Over 20 years	70	45.8%
Total	153	100.0

Source: Primary Data

4.3 Individual characteristics of respondents

Here, gender, age, highest academic qualification, position held, and number of years served by the respondents in the firm are described.

4.3.1 Gender

The results in table 6 show that the proportion of males (50.3%) is greater than that of females (49.7%). This implies that there are more male engaged in the provision of logistics related services in Uganda's logistics firms.

Table 6

Gender of respondents

	Frequency	Valid Percent
Male	234	50.3
Female	231	49.7
Total	465	100.0

Source: Primary Data

4.3.2 Age Group

Table 7 reveals that majority (38.7%) of the respondents were between 41-50 years. Respondents in the age group between 31-40 years constituted 31.2% and those between 51-60 years were 21.5%. A minority of the respondents were in the age group of 21-30 years and these constituted only 8.6% of the total respondents. These findings imply that most employees in logistics firms in Uganda are in the age group of between 31-50 years and this age group is well experienced in delivery of logistics services.

Table 7

Age group distribution

	Frequency	Valid Percent
21-30 years	40	8.6
31-40 years	145	31.2
41-50 years	180	38.7
51-60 years	100	21.5
Total	465	100.0

Source: Primary Data

4.3.3 Highest Academic Qualification

Table 8 shows that most of the respondents had degrees (43.4%). This was followed by respondents with diplomas (23%) and masters (17.2%). The respondents with professional

qualification were 8.8%, those with certificate were 7.5%. This implies that most of employees working in the logistics firms in Uganda had the relevant academic qualifications relevant for performing logistics operations.

Table 8
Highest academic qualification

	Frequency	Valid Percent
Certificate	35	7.5
Diploma	107	23.0
Degree	202	43.4
Masters	80	17.2
Professional	41	8.8
Total	465	100.0

Source: Primary Data

4.3.4 Position held by respondents in the firm

Table 9 shows that majority of the respondents held positions other than Transport / Logistics Assistant, Transport/ Logistics Officer, Marketing Officer and Pump Attendant and these accounted for 35.9%. These other respondents were mainly Clearing and Forwarding Officers, Operations Officer, Supervisors, ICT officers, Warehousing Assistants, Warehousing Officers and Accounts Officers.

In the study, Transport/ Logistics Officers constituted 30.8% of the total respondents, Transport / Logistics Assistant were 17.8% whereas 0.2% of respondents were Pump Attendants. These findings show that the respondents were representative enough of all categories of employees who perform logistics operations in the logistics firms and that the findings are reliable.

Table 9

Position held by respondents

		Frequency	Percent
Valid	Transport / Logistics Assistant	83	17.8
	Transport/ Logistics Officer	143	30.8
	Marketing Officer	71	15.3
	Pump Attendant	1	.2
	Others	167	35.9
	Total	465	100.0

Source: Primary Data

4.3.5 Period served by respondents in the firm

The findings in table 10 reveal that 38.1% of the respondents had served in the logistics firms for 6-10 years, 33.3% had served for 2-5years, 14.6% had served for less than 2 years while 14% had served for over 10 years. Since the large majority of respondents had worked for over 2 years, it implies that respondents had a true understanding of the operations of their logistics firms and that their responses were a true reflection of the logistics operations of their firms.

Table 10

Period served in the firm

	Frequency	Valid Percent
Less than 2 years	68	14.6
2-5 years	155	33.3
6 – 10 years	177	38.1
Over 10 years	65	14.0
Total	465	100.0

Source: Primary Data

4.4 Correlation Results

This study used the Pearson (*r*) correlation coefficients to establish the nature of the relationship between the study variables. SPSS version 26 was used for obtaining the correlation coefficients based on the findings obtained from the respondents. In this study, the correlation coefficients in are read off and interpreted by focusing on two variables at a

time. The *r* correlation coefficient value of ± 1.0 indicates either a perfect positive or negative correlation. Consistent with Cohen (1988), a correlation coefficient between 0.10 – 0.29 represents a weak or small association, 0.30 – 0.49 indicates a moderate or medium correlation whereas 0.50 or larger is considered a strong or large correlation.

Table 11

Relationships between Variables

Variable/indicator	1	2	3	4	5	6	7	8	9	10
1. IT Adoption	**1**									
2. Perceived Usefulness	.824**	1								
3. Perceived Ease of Use	.883**	.463**	1							
4. Supply Chain Integration	**.754****	**.483****	**.780****	**1**						
5. Internal Integration	.686**	.445**	.706**	.947**	1					
6. External Integration	.735**	.465**	.766**	.936**	.774**	1				
7. Logistics Performance	**.348****	**.254****	**.335****	**.351****	**.348****	**.311****	**1**			
8. Logistics Performance Efficiency	.300**	.197**	.306**	.343**	.338**	.308**	.839**	1		
9. Logistics Performance Effectiveness	.285**	.233**	.253**	.252**	.251**	.221**	.910**	.601**	1	
10. Logistics Differentiation	.345**	.240**	.342**	.350**	.348**	.309**	.880**	.624**	.742**	1

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

Source: Primary Data

4.4.1 The relationship between IT adoption and supply chain integration

The findings in table 18 show a positive significant relationship between IT adoption and supply chain integration ($r = .754$, $\rho \leq .01$). Therefore, hypothesis ***H1*** is accepted. The findings show that a positive change in IT adoption is associated with a positive change in supply chain integration.

These findings indicate that improvement in IT adoption with regards to perceived usefulness and perceived ease of use leads to improvement in internal and external supply chain integration especially with regards to information sharing, cooperation, collaboration and supply chain coordination. Logistics firms that adopt IT are capable of sharing logistics information in real time across the supply chain which enhances coordination and cooperation across the supply chain.

4.4.2 The relationship between IT adoption and logistics performance

The findings in 18 show a positive significant relationship between IT adoption and logistics performance ($r = .348$, $\rho \leq .01$). Consequently, hypothesis ***H2*** which states that IT adoption positively relates to logistics performance in Uganda is accepted. This means that a positive change in the perceived usefulness and perceived ease of use is associated with a positive change in logistics performance.

In other words, increased productivity, ease of doing job, ease of use, convenience, simplicity of operations, and improved speed of work associated with using IT tools results into increased efficiency, effectiveness and differentiation in the delivery of logistics services hence better logistics performance.

4.4.3 The relationship between supply chain integration and logistics performance

In table 18, a positive and significant relationship exists between supply chain integration and logistics performance ($r = .351$, $\rho \leq .01$), hence hypothesis ***H3*** is supported. This means that a

positive change in supply chain integration is associated with a positive change in logistics performance.

In other words, an increase in supply chain integration with regards to information sharing, cooperation, coordination and coordination across the supply chain employee attitude will lead to an increase in the efficiency, effectiveness, and differentiation in the provision of logistics services.

4.5 Regression Models

4.5.1 Multiple Regression

In order to ascertain the predictive effect of the independent variables on the dependent variable, a regression model was run. Regression analysis is a quantitative research method which is used when the study involves modelling and analyzing several variables, where the relationship includes a dependent variable and one or more independent variables. The results are shown in table 19:

Table 12

Multiple Regression Results

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.283	.323		3.977	.000
	IT Adoption	.311	.106	.194	2.935	.004
	Supply Chain Integration	.288	.093	.205	3.099	.002

R=0.373, R Square=0.139, Adjusted R Square=0.136, Std. Error of the Estimate=0.46551

a. Dependent Variable: Logistics Performance

The results in table 19 show that both IT adoption and supply chain integration predict 13.6 percent of the variance in logistics performance (Adjusted R Square = 0.136). This implies that the remaining 86.4 percent is explained by factors other than the two independent variables.

More to that, the results show that Supply chain integration (β=.205, p<.05) is a significant predictor of logistics performance and so is IT adoption (β=.194, p<.05) a significant predictor. This implies that as regards logistics performance, both IT adoption and supply chain integration hold significant influence.

4.5.2 Hierarchical regression model for logistics performance

The hierarchical regression analysis was carried out to determine the predictive power of IT adoption and supply chain integration on logistics performance.

Table 13
Hierarchical Regression Analysis

Variable	**Model 1**		**Model 2**		**Model 3**	
	Beta	**Std Err.**	**Beta**	**Std Err.**	**Beta**	**Std Err.**
Number of employees	.161	.027	.133	.025	.124	.025
Tenure of the Firm	-.062	.019	-.061	.018	-.067	.017
IT adoption			.339	.070	.193*	.105
Supply chain integration					.195**	.093
R	.150		.370		.391	
R Square	.022		.137		.153	
R Square Change	.022		.114		.016	
Adjusted R Square	.018		.131		.146	
Std Error of the Estimate	.49614		.46673		.46279	
F	5.243		24.043		20.532	
Sig.	.006		.000		.000	

Constant: dependent Variable which is Logistics Performance
Source: primary data

From the table 20 above, Model 1 indicates that number of employees and tenure of the firm both account for 2.2 percent of logistics performance (R^2= .022; p<.05). The findings further confirm a positive and significant relationship between number of employees and logistics

performance (β= .161; p<.05) though in the case of tenure of the firm the relationship is negative (β= -.062; p<.05).

The addition of IT adoption into Model 2, reveals 13.7% of variability in logistics performance (R^2=.137) which represents an addition of 11.4% (R^2 Δ =.114). The model results also show that there is a significant relationship between IT adoption and logistics performance (β= .339; p<05).

The addition of supply chain integration in Model 3, reveals 15.3% of variability in logistics performance (R^2 =.153; p<.05) which represents an addition of 1.6% (R^2 Δ =.016). The model results also show that there is a significant relationship between supply chain integration and logistics performance (β= .195; p<.05).

In conclusion, the variables entered in the regression model explain an overall of 14.6% (AdjR^2 =.146) of the variance in logistics performance, implying that the remaining 85.4% is explained by factors not considered in this study. Of the two predictor variables in the results, the results show that supply chain integration hold more influence than IT adoption.

4.6 Mediation Analysis

The Mediation analysis was conducted using techniques based on regression analysis as stated by Kumari & Yadav, (2018). Testing for mediation was also done using the Sobel (1982) Mediator Test. Barron and Kenny (1986) posit that a mediator variable is a variable that explains the relationship between a predictor variable and a criterion variable. Mediators tell us how or why something works. The mediator is considered an intervening variable which explains the relationship between a predictor variable and a criterion variable. The following conditions must be met in the results to support mediation:

(i) The independent variable is shown to significantly influence the dependent variable in the first regression equation.

(ii) Independent variable is shown to significantly influence the mediator in the second regression equation.

(iii) Mediator must significantly influence the dependent variable in third equation. Here, the independent variable and mediator are entered as predictors.

Full mediation is present when the independent variable no longer influences the dependent variable after the mediator has been controlled and all of the above conditions are met. Partial mediation occurs when the independent variable's influence on the dependent variable is reduced after the mediator is controlled.

The first model assesses if there is a significant effect of IT adoption on logistics Performance, the second model establishes whether there is a significant effect of IT adoption (independent) on supply chain integration (mediator), then the last model assesses whether there is a significant effect of Supply chain integration (mediator) on logistics performance (dependent variable).

The formulae for the Sobel test equation is shown below:

z-value = $a*b$/SQRT ($b^2*s_a^2 + a^2*s_b^2$).

Where:

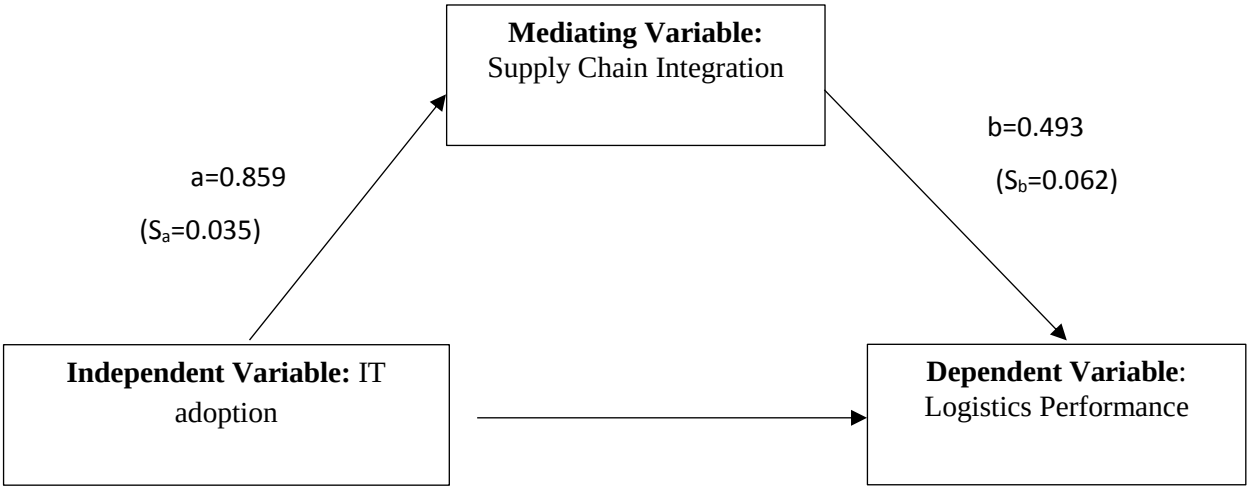
a= the unstandardized beta value for the regression model between IT adoption and supply chain integration

b= the unstandardized beta value for the regression model between supply chain integration and logistics performance.

S_a= the Standard error for the regression model between IT adoption and supply chain integration

S_b= the standard error for the regression model between supply chain integration and logistics performance.

Figure 3: Medgraph for mediating effect of supply chain integration on the relationship between IT adoption and logistics performance in Uganda



The respective values are shown below:

a= 0.859, b= 0.050, S_a= 0.035, S_b= 0.045

The results of the equation are:

Table 14
Mediation Test Results

Parameter	**Value**
Sobel Test Statistic	7.56449992
Std Error	0.05598348
p-value	0

Source: primary data

As seen in table 21, the p-value is less than 0.01. The results therefore indicate that in the logistics companies which are subject of this study, supply chain integration does fully mediate the relationship between IT adoption and logistics performance.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the discussions, conclusions, recommendations and areas for further research. The discussions are guided by the objectives of the study and the findings in chapter four.

5.1 Discussion of the Study Findings

5.1.1 The relationship between IT adoption and supply chain integration

The study reveals that there is a significant correlation between IT adoption and supply chain integration. This is supported by the regression results which show that IT adoption significantly predicts supply chain integration. Based on the findings, a positive change in IT adoption is associated with a positive change in supply chain integration. This means that improvement in IT adoption with regards to perceived usefulness and perceived ease of use leads to improvement in internal and external supply chain integration especially with regards to information sharing, cooperation, collaboration and supply chain coordination. Logistics firms that adopt IT are capable of sharing logistics information in real time across the supply chain which enhances coordination and cooperation across the supply chain.

In logistics firms where IT is perceived as useful in accomplishing tasks, there is likely to be better improved internal integration. Logistics firms that perceive IT as a useful tool for saving time and accomplishing tasks effectively tend to integrate internally through extensively utilizing cross-functional work teams for managing day-to-day logistics operations. The results imply that perceived ease of using IT tools leads to external integration with suppliers and customers in the logistics firm's supply chain. An IT software which is easy to learn, requires less training and user friendly is likely to be perceived as easy to use by a logistics firm and this encourages the use of such a software for exchanging

information, and aiding the distribution, transportation and warehousing operations in the logistics network. The findings are supported by Ruiz-Torres et al. (2018) who affirm that continued exchange of relevant logistics related information enables logistics service providers to better understand the needs of their customers and how to meet the needs.

Logistics firms in Uganda use information technologies tools like ASYCUDA World, Electronic Cargo Tracking System (ECTS), Electronic Fiscal Receipting and Invoicing Solutions (EFRIS), and Enterprise Resource Planning (ERP) for customs declaration, tracking of cargo, and e-invoicing respectively. Consequently, these IT tools have fostered integration of stakeholders across the supply chain. For instance, ECTS helps Uganda Revenue Authority (URA), exporters, the importers and clearing agents to track the movement of cargo on transit. With EFRIS, once a logistics firm initiates a transaction using any of EFRIS's component, the system automatically transmits the details of the transaction to URA in real and generates e-receipts and e-invoices which the clearing firm can transmit to the customer.

Other information technologies that have been adopted in Uganda's logistics industry is the use of Radio Frequency Identification Device (RFID) system, Global Positioning System (GPS), cloud-based systems, and online databases have fostered horizontal and vertical integration in the supply chain. DHL, one of the big players in the Uganda's logistics industry uses DHL Express Customer, an online database which allows customers to track their cargo as it is being shipped. Such systems have resulted into integration of the databases of logistics firms and that of their customers, importers, exporters, and other stakeholders like URA. Logistics firms in Uganda use the WhatsApp application for creating a WhatsApp group with their customers and suppliers for purpose of quickening exchange of information, sustaining a working relationship, and maintain customer or supplier database. Customers use the WhatsApp to give feedback about the services provided by the logistics firm, inquire

about the destination where their cargo has reached, send or receive documents, and place orders with the logistics firm. Indeed, the COVID-19 pandemic has cemented information technology as a key priority for logistics firms in exchanging information with partners in their supply network.

In this study, the first hypothesis (***H1***) that states that IT adoption and supply chain integration in Uganda are significantly associated, as expected is supported. These findings are in agreement with Mathu (2019) who argued that the adoption of information technology speeds internal alignment of firms and cooperation with external partners. These findings are also supported by Liviu (2015) who emphasized that firms can realize best performance when IT investments are aligned with internal capabilities and organizational processes with the organization strategy.

5.1.2 The relationship between IT adoption and logistics performance

The findings reveal a positive and significant relationship between IT adoption and logistics performance. Consistent with these findings, the regression results indicate that IT adoption significantly predicts logistics performance. Therefore, the second hypothesis (***H1***) that states that IT adoption positively relates to logistics performance in Uganda, is supported. This means that a positive change in the perceived usefulness and perceived ease of use is associated with a positive change in logistics performance. In other words, increased productivity, ease of doing job, ease of use, convenience, simplicity of operations, and improved speed of work associated with using IT tools results into increased efficiency, effectiveness and differentiation in the delivery of logistics services hence better logistics performance. These findings are supported by the previous works of Yvanovic & Colvic (2017) who argued that information technologies permit interconnection with all supply chain partners which boost logistics performance arising flow efficient management of all logistics processes.

The findings imply that the perceived usefulness of an IT enhances its use in facilitating logistics operations hence improved logistics efficiency. An IT system that is regarded as simple to use tends to be highly used for logistics operations like exchanging logistics related information including placing orders hence increase in the order processing time and the percentage of orders shipped to customers. According to Jovanovic & Colovic (2017), timely access of accurate information increases logistics efficiency through enhancing on-line tracking, and facilitating prompt response to changes and risk that manifest in the focal firm's supply chain.

Based on the study findings, it is implied that perceived ease of use of IT systems encourage its adoption in a firm which boost effectiveness in the delivery of logistics services. The use of IT in logistics service delivery increases logistics effectiveness through reducing transport, inventory and warehousing costs for products. Prior to advancement in technology, customers could order for goods from abroad and simply wait for their goods to arrive in Mombasa. However, emergency of technologies like Electronic Cargo Tracking Systems (ECTS), GPS, and RFID, customers are able to track their own goods from the originating country or point of dispatch to the final destination, with real-time information provided at every stage for making the necessary logistics decisions. The ECTS allows the tracking of cargo regionally in East African. EDI allows clients to search for transport carriers or other logistics providers online in less than five minutes.

The study findings are supported by the previous works of Ahimbisibwe et al. (2016) which alludes that technology innovations like Electronic Data Interchange (EDI) when adopted enhance the flexibility of logistics firms to address the special and abnormal requests and events of such firms. The findings also support the research statement that logistics

performance of companies is dependent on the satisfaction derived by customers and the level of use of information technology applications (Mehmeti et al., 2016).

5.1.3 The relationship between supply chain integration and logistics performance

The study findings reveal a significant positive relationship between supply chain integration and logistics performance. These results are in line with the regression analysis results that reveal that supply chain integration significantly predicts logistics performance of logistics firms in Uganda. Therefore, third hypothesis (***H3)*** which states that supply chain integration positively relates to logistics performance in Uganda, is supported by this study. This means that a unit improvement in supply chain integration will lead to improvement in logistics performance of logistics firms. These findings imply that improvement in supply chain integration with respect to cooperation, coordination and information sharing with partners across the supply chain will lead to improvement in the logistics performance of logistics firms.

A logistics firm that integrates information flows among purchasing, inventory management, sales and distribution within its internal supply chain is capable of keeping sufficient finished goods, forecasting the demand for its products and services, and minimizing the total inventory turns hence improved logistics differentiation. These findings are consistent with the works of Hendjani & Saei (2020) who revealed that internal integration facilitates better demand forecasting as a result of receiving more accurate information relating to the end users' demand. External integration exhibited by smooth flow of information and material between customers' firms and the logistics firms boosts logistics efficiency by increasing the percentage of orders shipped to customers from the primary location designated to serve customers. These findings are consistent with Hendjani & Saei (2020) who acknowledged that external integration with improves with suppliers, customers, employers and other partners which results into better decision making and quality service provision.

The findings imply that increased integration of suppliers in a logistic firm's supply chain boosts logistics differentiation. In other words, external supply chain integration involving establishing long-term relations with suppliers and a high degree of joint planning involving suppliers helps a logistics firm to deliver damage free products to its customers and to keep sufficient finished goods inventory. These findings are consistent with previous scholars such as Rai et al. (2006) and Wu et al. (2006) who noted that supply chain integration boosts logistics performance of the firms through improving forecasts, synchronizing production and delivery processes, coordinating inventory-related decisions, and shortening invoice payable and receivable cycle time.

The Uganda Clearing and Freight Forwarding Association (UCIFA), a member-owned institution of over 200 companies licensed by URA and Uganda Freight and Forwarders Association, an umbrella association of logistics companies in Uganda have played a critical role in creating working synergies among logistics firms in Uganda which results into delivery of logistics services in the most efficient and cost-effective manner. UCIFA is an intermediary between customs and importers plus exporters with the main focus of facilitating import and export operations. These professional associations have promoted sharing of information, collaboration, cooperation and partnership amongst logistics firms, customers and suppliers in delivery of logistics service hence increased efficiency and effectiveness in the provision of logistics services.

The relationship between supply chain integration and logistics performance is supported by Zilani et al. (2019) who posit that higher levels of integration across the focal firm's supply chain guarantees improvement in the firm's supply chain through increased awareness of customer needs, quick information exchange and quick customer response time. The results agree with previous research work done by Kirono et al. (2019) who revealed that

collaborating parties that share information across their supply chain can build good capabilities which can achieve optimal logistics performance.

5.1.4 Mediating effect of supply chain integration on IT adoption and logistics performance

Besides the direct effect, this study established the indirect effect hypothesis through the intervening variable. The fourth hypothesis (***H4)*** which states that supply chain integration mediates the relationship between IT adoption and logistics performance in Uganda, is supported by the study findings. Consequently, supply chain integration mediates the relationship between IT adoption and logistics performance of logistics firms in Uganda. These findings agree with Schrauf & Berttram (2016) who reveal that today's supply chain network heavily depends on key information technologies which enable integrated planning, logistics visibility, autonomous logistics, smart procurement, smart warehousing, spare part management and advanced analytics.

As goods are transported say from China, a tracking number is shared with stakeholders which allows the transport company to share information about the status of goods being transported with customers on an hour basis or on real-time. There has been a changing trend where logistics firms procure and share the cargo tracking system like RFID with their clients. This allows both the logistics firm and its clients to track their cargo packages in real-time at the comfort of their homes or at the work place. There has been an increase in collaboration and information sharing on matters related to logistics documentation, tracking of cargo, feedback on logistics services between logistics firms, and their customers, and suppliers especially those concerned as key. These collaboration and information exchange have been propelled through the advancement in technology such as use of social media platforms like WhatsApp, Facebook, and twitter. The social media platform, for instance, are used by most clearing firms for receiving real time complaints from customers and alerts

relating to the danger posed onto the cargo and thereafter real time solutions are provided hence improved performance of logistics activities. According to Ruiz-Torres et al. (2018) relevant and continuous information flow enables logistics service providers to have a better understanding of logistics risks and how to address such risks early hence better logistics performance.

These study findings support previous research results, stating that IT tools like EDI enable transfer of information and structured data between for example manufacturers and logistics service providers, thus leading to lower costs incurred by all players (Mehmeti et al., 2016). The study findings are consistent with Hou (2019) who argued that IT enhances suppliers, manufacturers, distributors, and customers in a supply chain network to share information thus reducing the overall cost of doing business.

5.2 Conclusions

The findings show that both supply chain integration and IT adoption are significant predictors of logistics performance of logistics firms in Uganda. This implies that for logistics firms in Uganda to boost their logistics performance, they need to put emphasis in both supply chain integration and IT adoption. Logistics firm in Uganda need to adopt and keep at pace with the recent technologies used in logistics such as ECTS, sensors, RFID, GPS, Internet of Things (IoT) among others if they are to remain competitive in the delivery of logistics services to clients.

The findings further reveal that IT adoption is associated with supply chain integration which in turn also influences logistics performance. This therefore partly explains the poor performance of logistics firms in Uganda where they showed inefficiency, ineffectiveness and poor differentiation in that it can be attributed to low levels of IT adoption and poor supply chain integration.

5.3 Recommendations

Based on the study findings, the following need to be done in order to improve the logistics performance of logistics firms;

1. Logistics firm in Uganda should ensure supply chain integration across their supply chain. Focal logistics firms need to integrate their operations with that of key supplier, customers, distributors, transport system and customs authorities. This will enable them to share information on real time.

2. Logistics firms need to keep at pace with the developments in logistics technology and how they affect the logistics industry. Managers working for logistics firms need to ensure that their logistics firms do research, benchmark and adopt recent technologies in undertaking their businesses. Such technologies include sensor technology, cloud-based technology, augmented warehouses among others.

3. Logistics firms need to set aside dedicated resources to enable them invest in IT infrastructure and have it integrated with its key customers and suppliers. Logistics firms need to integrate existing platforms with that of key suppliers, customers, distribution centers, and the transport system.

4. Focal logistics firms should take advantage of social media platform by having it integrated in their IT system so as to increase end-to-end visibility in the focal firm's supply chain.

5.4 Limitations of the study

Non-response of research participants is very common in studies and a strong limitation to acquisition of data. According to Holbrook et al. (2008), non-response is mostly a result of failure to professionally contact the respondent, or simply non-cooperation of the part of the respondent. Non-response reduces the response rate and the reliability of findings. In this

study, the researcher faced difficulty in collecting data from logistics services providers. However, the researcher designed the questionnaire to concentrate on less sensitive information that could easily be provided by employees of these firms at all levels.

Some respondents feared to fill the questionnaire with the thinking that the researcher could be a spy from a competitor firm. The researcher solved this challenge by explaining to the respondents that the intention of the study was purely for academic purpose and that the findings would be kept confidential. In an attempt to build confidence of the respondents to answer the questionnaire, the researcher also obtained an introduction letter from the University which clearly stated that the purpose of the study was purely academic and confidential in nature.

The researcher used closed ended self-administered questionnaires for obtaining primary data. This, however, limited the amount of primary data that were obtained.

The study was affected by the COVID-19 pandemic and directive of government for entities and individuals to observe the Standard Operating Procedures (SOPs). Entities were required to retain only 30% of the essential workers in the workplace while 70% work virtually at home. This increased the workload of the staff who remained working physically in the organization and these staff were too busy to answer the questionnaire. Some staff did not want to touch the hardcopy of the questionnaire. The researcher tried to address these challenges by sending for some respondent's questionnaires electronically via email. Most respondents who received the questionnaires via email were able to answer and send the filled questionnaire to the researcher's email for further processing.

The study used the measurement scales adapted from previous research studies. Therefore, the limitations that were rooted in them also affected this study.

Given the limitations on funding and the time frame within which the study was supposed to be completed, it was not possible to study IT adoption, supply chain integration and logistics performance of firms across all sectors of the economy such as manufacturing. This makes it difficult to generalize the study findings in all sectors, particularly in firms engaged in manufacturing.

5.5 Area of Further Research

In order to explore the generalization of the current research findings, there is need for future research to establish the relationship between IT adoption, supply chain integration and logistics performance in other sectors such as manufacturing.

Future research could consider using case based or longitudinal data to study the association between IT adoption, supply chain integration and logistics performance of logistics firms.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

Dear Respondents,

As partial fulfillment of the requirements for award of Master of Science of Procurement and Supply Chain Management of Makerere University, am conducting a study on **Information technology adoption, Supply Chain Integration and Logistics Performance: A Case of Logistics Firms in Uganda.** I request you to spare a few minutes of your busy schedules to fill this questionnaire to enable me accomplish this task. Your honest and sincere responses are highly appreciated and will be treated with utmost confidentiality. For more information, contact me on 0774450608/0705812855. I thank you for your cooperation.

SECTION A: BACKGROUND INFORMATION (Please tick the appropriate answer represented by the number below it)

1. Gender of respondent

Male	Female
1	2

2. Age of respondent

21-30 years	31-40 years	41-50 years	51-60 years
1	2	3	4

3. Highest academic qualification of the respondent

Certificate	Diploma	Degree	Masters	Professional	Others (specify)……
1	2	3	4	5	6

4. Position held in the firm

Transport / Logistics Assistant	Transport/ Logistics Officer	Marketing Officer	Pump Attendant	Others (specify)…….
1	2	3	4	5

5. Number of years served in the firm

Less than 2 years	2-5 years	6 – 10 years	Over 10 years
1	2	3	4

6. Number of employees serving in the firm

Less than 10	Between 10 to 25	Between 25 to50	Over 50

1	2	3	4

7. Period of existence of the firm

Less than 5 years	5-10years	11-15 years	16-20 years	Over 20 years
1	2	3	4	5

8. Which of the following best describes the nature of activities carried out by your firm?

Freight logistics	Customs clearance	Transport	Shipping	Inland Container Depot (ICD)	Warehouse operations	Others, specify …….....
1	2	3	4	5	6	7

SECTION B: LOGISTICS PERFORMANCE

This section shows the alternative responses and the number assigned representing each response. The responses are presented in the Likert scale ranging from; 5 - strongly agree, 4 - agree, 3 – somehow agree, 2 – disagree, and 1- strongly disagree. Please evaluate the statement by ticking in the box the number that best suits your response.

Logistics Efficiency: For the following items, please rate your business unit's performance on logistics activities for the previous fiscal year.						
LPE1	We have experienced an increase in the percentage of orders shipped to our customers from the primary location designated to serve them	1	2	3	4	5
LPE2	The percentage of order items found whenever the picking operation is performed in our company has kept increasing	1	2	3	4	5
LPE3	The percentage of orders shipped on time keep increasing	1	2	3	4	5
LPE4	The percentage of shipments requiring expediting keep increasing	1	2	3	4	5
LPE5	Our organization is credited for reliable delivery performance	1	2	3	4	5
LPE6	The time in days between order receipt and order delivery is minimal	1	2	3	4	5
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.						
LPEV1	We made more sales/ revenue	1	2	3	4	5
LPEV2	The transportation costs for our products reduced	1	2	3	4	5
LPEV3	The warehousing/ storage costs for our products reduced	1	2	3	4	5
LPEV4	We incurred less inventory costs	1	2	3	4	5
LPEV5	We incurred less costs in our overall logistics operations	1	2	3	4	5
Logistics Differentiation: For the following items, please rate your business unit's						

performance on logistics activities in comparison to your major competitors. If you are associated with a company that does not consist of business units or divisions, please answer the following based on your company.						
LPD1	Over the past year, our overall logistics performance is well above industry average	1	2	3	4	5
LPD2	In general, our logistics performance is excellent	1	2	3	4	5
LPD3	We are outstanding at performing our logistics activities	1	2	3	4	5
LPD4	We deliver damage free products to our customers	1	2	3	4	5
LPD5	We keep sufficient finished goods inventory	1	2	3	4	5
LPD6	We are accurate at forecasting the demand for products	1	2	3	4	5
LPD7	The time between order receipt and the delivery of products/ services to our customers is close to zero as possible	1	2	3	4	5
LPD8	We ensure minimal time on backorder	1	2	3	4	5
LPD9	We minimize total inventory turns	1	2	3	4	5
LPD10	We make on-time delivery to our customers	1	2	3	4	5

(Adapted from the works of Fugate et al, 2010; Bobbitt, 2004).

SECTION C: INFORMATION TECHNOLOGY (IT) ADOPTION

This section shows the alternative responses and the number assigned representing each response. The responses are presented in the Likert scale ranging from; 5 - strongly agree, 4 - agree, 3 – somehow agree, 2 – disagree, and 1- strongly disagree. Please evaluate the statement by ticking in the box the number that best suits your response.

	Perceived usefulness (Perception of the user that using an IT system will boost the user's performance).	**1**	**2**	**3**	**4**	**5**
IPU1	My job would be difficult to perform without an IT system.	1	2	3	4	5
IPU2	Using IT system gives me greater control over my work.	1	2	3	4	5
IPU3	Using IT system improves my job performance.	1	2	3	4	5
IPU4	The IT system addresses my job-related needs.	1	2	3	4	5
IPU5	Using IT system saves me time.	1	2	3	4	5
IPU6	IT system enables me to accomplish tasks more quickly.	1	2	3	4	5
IPU7	IT system supports critical aspects of my job.	1	2	3	4	5
IPU8	Using IT system allows me to accomplish more work than would otherwise be possible.	1	2	3	4	5
IPU9	Using IT system reduces the time I spend on unproductive activities.	1	2	3	4	5
IPU10	Using IT system enhances my effectiveness on the job	1	2	3	4	5
IPU11	Using IT system improves the quality of the work I do.	1	2	3	4	5
IPU12	Using IT system increases my productivity	1	2	3	4	5
IPU13	Using IT system makes it easier to do my job	1	2	3	4	5

IPU14	Overall, I find the IT system useful in my job.	1	2	3	4	5
	Perceived Ease of Use (perception of the user of an IT system on how easy the IT innovation is to learn and to use)	**1**	**2**	**3**	**4**	**5**
IPE1	It is easy to use IT software	1	2	3	4	5
IPE2	Using IT does not require a lot of training	1	2	3	4	5
IPE3	Learning to use IT is easy for us	1	2	3	4	5
IPE4	Simplicity involved in using IT encourages us to use the system	1	2	3	4	5
IPE5	IT is user friendly	1	2	3	4	5
IPE6	IT services are easily accessible by employees in this firm	1	2	3	4	5
IPE7	We have a positive attitude towards using IT	1	2	3	4	5
IPE8	IT enhances our interaction with customs stations	1	2	3	4	5
IPE9	We find it easy to do what we want to do with IT	1	2	3	4	5
IPE10	We find IT use to be flexible to interact with	1	2	3	4	5
IPE11	We find it easy to become skillful at using IT	1	2	3	4	5
IPE12	Overall, we find IT system easy to use	1	2	3	4	5

(Adapted from the works of Davis, 1989; Ahimbisibwe et al., 2016)

SECTION D: SUPPLY CHAIN INTEGRATION

This section shows the alternative responses and the number assigned representing each response. The responses are presented in the Likert scale ranging from; 5 - strongly agree, 4 - agree, 3 – somehow agree, 2 – disagree, and 1- strongly disagree. Please evaluate the statement by ticking in the box the number that best suits your response.

	Internal Integration	**1**	**2**	**3**	**4**	**5**
SCI1	We extensively utilize cross-functional work teams for managing day-to-day logistics operations	1	2	3	4	5
SCI2	We have extensively redesigned work routines and processes over the past three years	1	2	3	4	5
SCI3	The orientation of my firm has shifted from managing functions to managing processes	1	2	3	4	5
SCI4	We effectively share operational information between departments	1	2	3	4	5
SCI5	There is a high level of responsiveness within our company to meet other departments needs	1	2	3	4	5
SCI6	We work in teams, with members from a variety of areas to introduce new products	1	2	3	4	5
SCI7	The functions in our firm cooperate to solve conflicts that arise between them	1	2	3	4	5
SCI8	Our firm’s functions coordinate their activities	1	2	3	4	5
SCI9	Our firm’s functions work interactively with each other	1	2	3	4	5
SCI10	Our firm has an integrated system across functional areas	1	2	3	4	5

	under company's control					
SCI11	Information flows among purchasing, inventory management, sales, and distribution departments within our firm.	1	2	3	4	5
	External Integration	**1**	**2**	**3**	**4**	**5**
	Customers					
SCEC1	Our inter-organizational logistic activities are closely coordinated with customers	1	2	3	4	5
SCEC2	Our logistics activities are well integrated with the logistics activities of our customers	1	2	3	4	5
SCEC3	We have a seamless integration of logistics activities with our key customers	1	2	3	4	5
SCEC4	Our logistics integration is characterized by excellent distribution, transportation and/or warehousing facilities	1	2	3	4	5
SCEC5	The inbound and outbound distribution of goods with our customers is well integrated	1	2	3	4	5
SCEC6	Information and materials flow smoothly between our customers firms and us	1	2	3	4	5
SCEC7	Our customers give us feedback on our quality and deliver performance	1	2	3	4	5
SCEC8	Our customers are actively involved in our service design process	1	2	3	4	5
SCEC9	The firm works as a partner with our customers	1	2	3	4	5
SCEC10	There is a high degree of joint planning and forecasting with major customers to anticipate demand visibility	1	2	3	4	5
	Suppliers					
SCES1	Our company maintains cooperative relationships with its suppliers	1	2	3	4	5
SCES2	The company helps its suppliers to improve their quality	1	2	3	4	5
SCES3	The company maintains close communications with suppliers about quality considerations and design changes	1	2	3	4	5
SCES4	Our suppliers are actively involved in our new product/service development process	1	2	3	4	5
SCES5	The firm strives to establish long-term relationships with suppliers	1	2	3	4	5
SCES6	The firm actively engages suppliers in our quality improvement efforts	1	2	3	4	5
SCES7	The firm has a high degree of joint planning to obtain rapid response ordering process (inbound) with suppliers	1	2	3	4	5

(Adapted from the works of Cao et al., 2015; Wong et al., 2011; Flynn et al., 2010; Rodrigues et al., 2004; Gimenez, 2006; Paulraj & Chen, 2007)

Thank you for cooperation

APPENDIX 2: SAMPLE SIZE DETERMINATION TABLE

Table showing Sample size(s) required for the Given Population Sizes (N)

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2600	335
15	14	110	86	290	165	850	265	2800	338
20	19	120	92	300	169	900	269	3000	341
25	24	130	97	320	175	950	274	3500	346
30	28	140	103	340	181	1000	278	4000	351
35	32	150	108	360	186	1100	285	4500	354
40	36	160	113	380	191	1200	291	5000	357
45	40	170	118	400	196	1300	297	6000	361
50	44	180	123	420	201	1400	302	7000	364
55	48	190	127	440	205	1500	306	8000	368
60	52	200	132	460	210	1600	310	9000	370
65	56	210	136	480	214	1700	313	10000	375
70	59	220	140	500	217	1800	317	15000	377
75	63	230	144	550	226	1900	320	20000	379
80	66	240	148	600	234	2000	322	30000	380
85	70	250	152	650	242	2200	322	40000	381
90	73	260	155	700	248	2400	327	50000	382
95	76	270	159	750	254	2600	331	75000	384

Source: Adopted from Krejcie & Morgan (1970).

A LIST OF 230 THIRD PARTY LOGISTICS FIRMS IN UGANDA:

1.	A & G LOGISTICS LIMITED	1000055115
2.	ALACA CLEARING AND FORWARDING LIMITED	1000098109
3.	3D FORWARDERS UGANDA LIMITED	1013639896
4.	A.O. CONSULTANTS (U) LTD	1000394477
5.	A.S UNITED INVESTMENTS LIMITED	1000085268
6.	ABA CONSTRUCTION COMPANY LIMITED	1010783208
7.	ABILITIES LIMITED	1007088485
8.	ABUNDANCE LOGISTICS LIMITED	1008291934
9.	ACCELER GLOBAL LOGISTICS UGANDA LIMITED	1000061201
10.	ACCESS PORTS SERVICES SMC LIMITED	1012318235
11.	ACCURATE HOLDINGS LIMITED	1010590437
12.	ACE FORWARDERS LIMITED	1000056565
13.	ACOLINE (U) LIMITED	1000051622
14.	ADAS ENTERPRISES (U) LIMITED	1002665506
15.	ADIEKO LIMITED	1009099951
16.	AFRIASIA GLOBAL LOGISTICS LTD	1013779859
17.	AFRO-FREIGHT CLEARING & FORWARDING CO LIMITED	1000061584
18.	AGRINE CONSULTS LTD	1007071087
19.	AGS FRASERS INTERNATIONAL REMOVALS UGANDA LIMITED	1000042719
20.	AKA CLEARING AND FORWARDING (U) LIMITED	1000048515
21.	AL JIBAL SABAA UGANDA LIMITED	1013284331
22.	B AND E INVESTMENTS UGANDA LIMITED	1000579340
23.	B AND P CLEARING AND FORWARDING SERVICES U LIMITED	1013807544
24.	B.T.S. CLEARING AND FORWARDING LIMITED	1000058246
25.	BAGGIO INTERNATIONAL LIMITED	1015109308
26.	BAGMATT INVESTMENTS LIMITED	1007540895
27.	BAHARI FORWARDERS UGANDA LIMITED	1000927311
28.	BAJ INVESTMENTS LIMITED	1000071574
29.	BAMIL GLOBAL LOGISTICS (U) LTD	1001767200
30.	BANGARUYE CLEARING AND FORWARDING COMPANY LIMITED	1007349550
31.	BANMA SEVICES INTERNATIONAL LIMITED	1014099507
32.	CHASIL COMPANY LIMITED	1001134860
33.	CHEER LOGISTICS LTD	1015404547
34.	CHICK WAYS UGANDA LTD	1000187318
35.	CHOICE INTERNATIONAL FORWARDING (UGANDA) CO. LIMITED	1007074898
36.	CHRISSFREIGHT (U) LIMITED	1000057887
37.	CHRONICLE LOGISTICS UGANDA LTD	1015897483
38.	DEKIM LOGISTICS UGANDA LIMITED	1015615779
39.	DELTA FORWARDERS (U) LIMITED	1000060728
40.	DELTA HANDLING SERVICES LTD	1010049550
41.	DELUXE INVESTMENTS CO LIMITED	1000061391
42.	EPA COURIERS AND TAXATION SERVICES LIMITED	1000305658
43.	EPITOME ENTERPRISES LIMITED	1000037976
44.	EQUATOR CLEARING AND FORWARDING AGENCY LIMITED	1000089721
45.	ESL UGANDA LIMITED	1010287538
46.	ESSENCE CLEARING AND FORWARDING SMC LTD	1015920846
47.	EXCEL FORWARDERS AND TRANSPORTERS (U) LIMITED	1000055916

48. EXCEL FREIGHT CONSULT LIMITED	1000044352
49. EXECUTIVE CARGO LIMITED	1000088644
50. EXEL SAFETY (U) LIMITED	1002164092
51. EXPRESS MOVERS LIMITED	1000058436
52. FARMLIVE TECHNO U LIMITED	1013695673
53. FAST FORWARDING & SHIPPING CO LTD	1000062261
54. FASTLINE ENTERPRISES LTD	1015683776
55. FEXMON LOGISTICS LTD	1015833508
56. GRALUM LOGISTICS COMPANY LIMITED	1009594903
57. GRANN AND SHEM LIMITED	1012857151
58. GREEN FREIGHT SERVICES LIMITED	1002318750
59. GRESSLAND INTERNATIONAL (GIL) LIMITED	1013992821
60. GRIDLINE LOGISTICS LIMITED	1008018943
61. GRULAND LOGISTICS LIMITED	1015926217
62. GULF BADR GROUP(UGANDA)LIMITED	1000135266
63. HAKS INVESTMENT LIMITED	1000022073
64. HALNA HOLDINGS LIMITED	1011187308
65. HARBOURSPEED (U) LIMITED	1000043665
66. HARDLINE INTERNATIONAL LTD	1000057794
67. HARIS MOTORS (U) Limited	1000037189
68. HAVEN CARGO U LTD	1014970315
69. HEEBA FREIGHT LOGISTIC INTERNATIONAL LIMITED	1010505481
70. HEJAK INVESTMENTS LTD	1014481069
71. HICO PROCUREMENT AND LOGISTICS LIMITED	1010877298
72. HWAB UGANDA LIMITED	1015483124
73. ICEMARK-AFRICA LIMITED	1000027075
74. IH GRAND LOGISTICS LIMITED	1015443409
75. JOWKAN ENTERPRISES UGANDA LIMITED	1014492716
76. JT CARGO AND GENERAL COMPANY LIMITED	1009594161
77. JUSSAC (U) LIMITED	1000058550
78. JUTRADE GENERAL AGENCIES LIMITED	1000108013
79. K.K. FREIGHTERS (U) LIMITED	1000057801
80. K.R.N ENTERPRISES LIMITED	1000061249
81. KAB CARGO LOGISTICS UGANDA LIMITED	1008770879
82. KABANA AGENCIES LIMITED	1008423709
83. KACH-AP GLOBAL FORWARDERS LTD	1009740503
84. LORDSWELL LOGISTICS LIMITED	1014079496
85. LOWANSET ENTERPRISES LIMITED	1009007625
86. LOZA FORWARDERS LIMITED	1001270256
87. LUKAASA INVESTMENTS	1010003846
88. LUMBAR UGANDA LIMITED	1013555275
89. LUTOR UGANDA LIMITED	1007250123
90. LUTUFIYA ENTERPRISES LIMITED	1001100223
91. MAAB LOGISTICS UGANDA LIMITED	1015771528
92. MACKENZIE MARITIME (U) LIMITED	1007864409
93. MACRO TRADE LOGISTICS LIMITED	1009604023
94. MAGELLAN LOGISTICS UGANDA LIMITED	1000322994
95. MULTIPLE FORWARDERS (U) LIMITED	1000062934
96. MULTIPLE FREIGHT SOLUTIONS LIMITED	1000036616
97. NYANGE CARGO LOGISTICS LTD	1015518289

98.	NYOZI UGANDA LIMITED	1007585491
99.	O AND B EVENTS LIMITED	1010073527
100.	ONE FOR ALL CLEARING AGENCY LTD	1013832512
101.	PSJ CLEARING & FORWARDING CO. LIMITED	1015876785
102.	PURA INTERNATIONAL LIMITED	1007951229
103.	PUYANG HOLDINGS LTD	1000061218
104.	QUANTUM EXPRESS LOGISTICS LIMITED	1000552204
105.	R I DISTRIBUTORS LIMITED	1007086780
106.	R.O 2010 LOGISTICS LTD	1013292674
107.	RAJEM CLEARING AND FORWARDING UGANDA LIMITED	1009946271
108.	RAKA AGENCIES LIMITED	1000054663
109.	SPEDAG INTERFREIGHT UGANDA LIMITED	1000059399
110.	SPEEDLINE (U) LIMITED	1000464393
111.	SPEEDLINE CARGO LIMITED	1000045819
112.	STARGATE ONE AGENCIES LIMITED	1015211241
113.	STARLINES LOGISTICS SMC LIMITED	1014052529
114.	STEEL AND TUBE INDUSTRIES LIMITED	1000060842
115.	TRIPPLE JS LOGISTICS LIMITED	1012461581
116.	TRITY LOGISTICS LIMITED	1013992776
117.	TROPICAL CLEARING AND FORWARDING COMPANY LIMITED	1000025953
118.	UPSTREAM LIMITED	1000055909
119.	UPSTREAM LOGISTICS UGANDA LIMITED	1008129202
120.	URIAH SMITH LOGISTICS LIMITED	1015749829
121.	VC PEREGRINE LOGISTICS LTD	1015763875
122.	VENUS INTERLINES LTD	1015654586
123.	VENUS LOGISTICS LIMITED	1010864250
124.	ZAHAATI FREIGHT CARGO LIMITED	1000064073
125.	ZAWEDDE INVESTMENTS (U) LTD	1009617589
126.	ZION FREIGHT FORWARDERS LIMITED	1012736474
128	WILTA CARGO SERVICES LIMITED	1000066303
129	WINNER SHIELD LTD	1015763951
130	WORLD EVOLUTION BUSINESS SYSTEM AND LOGISTICS LTD	1014039992
131	TRANS EAST FORWARDING LIMITED	1000594304
132	TRANS WORLD PACKERS & MOVERS (U) LTD	1000184339
133	TRANSCARGO MASTERS INTERNATIONAL LIMITED	1002282166
134	TRANSIT WINDOWS LIMITED	1000094692
135	TRANSZONE INTERNATIONAL UGANDA LTD	1015674956
136	TREE LIFE CONCERN LIMITED	1013935270
167	TRI FRONTIER LOGISTICS LTD	1000257110
138	TRIBUS-ESTRELLA LOGISTICS-SMS LTD	1015677476
139	TRIBUTE LOGISTICS LIMITED	1015079642
140	TRIM LOGISTICS LIMITED	1014290970
141	SEGTEX LOGISTICS COMPANY LIMITED	1015817912
142	SEVEN DAYS CLEARING AND FORWARDERS LIMITED	1009591589
143	SHAFA CLEARERS AND FORWARDERS LIMITED	1002440252
144	SHANGHAI GREENROAD INTERNATIONAL LOGISTICS CO. LTD	1007739490
145	SHIFT CARGO SERVICES LIMITED	1000060742
146	SHIPAX AFRICA LTD	1015670883
147	SIB GENERAL SUPPLIES (U) LIMITED	1000124655

148	SINO TRANS LOGISTICS UGANDA LTD	1008132457
149	SKY LIGHT INTERNATIONAL (U) LIMITED	1000064943
150	SKYWIDE LOGISTICS LIMITED	1015564421
151	R.O 2010 LOGISTICS LTD	1013292674
152	RAJEM CLEARING AND FORWARDING UGANDA LIMITED	1009946271
153	RAKA AGENCIES LIMITED	1000054663
154	RAMLINKS FREIGHT FORWARDERS LIMITED	1007004361
155	RAPID KATE SERVICES (U) LTD	1000062751
156	REAL LOGISTICS SOLUTIONS LIMITED	1009061465
157	REALTIME GLOBAL CARGO HANDLERS UGANDA LIMITED	1013230042
158	REHMAN INTERNATIONAL LIMITED	1000020347
159	RELIABLE CARGO CENTRE (RCC) LIMITED	1000060735
160	RHO LOGISTICS AND FREIGHT FORWARDER LTD	1015827177
161	PAMOJA AFRICA LOGISTIC SOLUTIONS LIMITED	1010955751
162	PAN AFRICAN CARRIERS (U) LTD.	1000028663
163	PAN AFRIQUE FORWARDERS LIMITED	1000043451
164	PANEL CARGO AGENCIES LIMITED	1008152568
165	NAGOSA FREIGHT SOLUTIONS LIMITED	1008258595
166	NAKA AFRICAN LOGISTICS LIMITED	1015831492
167	NAKAWA DATA CENTRE SMC LIMITED	1013142804
168	NAWA MULTI-SERVICES LIMITED	1001581871
169	NDUGU ONSPOT LOGISTICS UGANDA LIMITED	1013324684
170	NEW AFRICA CARGO FREIGHTERS LTD	1000288647
171	NEW HOPE LOGISTICS (U) - SMC LTD	1013926540
172	MEISERFREIGHT FORWARDERS U LIMITED	1000339781
173	MELAND LOGISTICS LIMITED	1015652080
174	MERCY LOGISTICS LIMITED	1001415801
175	MESO COM LIMTED	1003179126
176	MIDLAND FREIGHT SERVICES LIMITED	1000057680
177	MIKOVA CLEARING AND FORWARDING UGANDA LIMITED	1006975520
178	MONSOON LOGISTICS LTD	1015643371
179	MORD FORWARDERS (U) LIMITED	1000382982
180	LUMBAR UGANDA LIMITED	1013555275
181	LUTOR UGANDA LIMITED	1007250123
182	LUTUFIYA ENTERPRISES LIMITED	1001100223
183	MAAB LOGISTICS UGANDA LIMITED	1015771528
184	MACKENZIE MARITIME (U) LIMITED	1007864409
185	MACRO TRADE LOGISTICS LIMITED	1009604023
186	MAGELLAN LOGISTICS UGANDA LIMITED	1000322994
187	MAINA SPEEDY (U) LIMITED	1000061270
188	MALISU APOLLO INVESTMENTS LIMITED	1000059865
189	KELIM INTERNATIONAL LIMITED	1000058481
190	KENFIELDS LOGISTICS LIMITED	1014018814
191	KENFREIGHT UGANDA LIMITED	1000028991
192	KENLLOYD LOGISTICS (U) LTD	1000045788
193	KHERI GROUP LIMITED	1015661207
194	KINGSKLASS GLOBAL INVESTMENTS LTD	1014024489
195	KLB INVESTMENTS INTERNATIONAL LIMITED	1007332290
196	KOB FREIGHT LINKS (U) LTD	1000036951
197	JOLIMU LOGISTICS UGANDA LIMITED	1012922783

198	JOPE FORWARDERS (U) LTD.	1000057711
199	JOWKAN ENTERPRISES UGANDA LIMITED	1014492716
200	JT CARGO AND GENERAL COMPANY LIMITED	1009594161
201	JUSSAC (U) LIMITED	1000058550
202	JUTRADE GENERAL AGENCIES LIMITED	1000108013
203	K.K. FREIGHTERS (U) LIMITED	1000057801
204	ISS GLOBAL FREIGHT FORWARDING COMPANY UGANDA SMC LIMITED	1013430473
205	J & P GENERAL AGENCIES (U) LIMITED	1000063096
206	J.I.T. FORWARDERS LTD.	1000062820
207	J.J. & B FREIGHTERS LIMITED	1000059606
208	J.M. FREIGHT SERVICES LIMITED	1000059827
209	J.W. INTERSERVICES LIMITED	1000290273
210	JAFFER FREIGHTERS LIMITED	1000055892
211	JAMBO ROSES LTD	1000030900
212	JAMORI CLEARING AND FORWARDING UGANDA LTD	1015550244
213	FREIGHT CONCEPT (U) LIMITED	1008046869
214	FREIGHT GURUS (U) LIMITED	1000035484
215	FREIGHT IN TIME (U) LIMITED	1000066462
216	FREIGHT KARGO MASTERS U LIMITED	1000242287
217	FREIGHT LOGISTICS SYSTEMS LIMITED	1000057856
218	FREIGHT SHIFTERS INTERNATIONAL LIMITED	1014026084
219	FRENO FREIGHTERS (U) LTD.	1000060642
220	FRERICH FORWARDERS (U) LIMITED	1006861077
221	FRESH HANDLING LIMITED	1000028932
222	FRONT INVESTIMENTS INTERNATIONAL LIMITED	1000077715
223	FRONT LINK INVESTMENTS LTD	1000061546
224	DESLER LOGISTICS (U) LTD	1000399372
225	DHACLAR UGANDA LIMITED	1007419452
226	DHL GLOBAL FORWARDING (UGANDA)LIMITED	1000030399
227	DHL INTERNATIONAL (U) LTD	1000028656
228	DIAMOND SHIPPING SERVICES LIMITED	1000035722
229	DIFAM FREIGHT FORWARDERS (U) LIMITED	1000098413
230	DJS INVESTMENTS LIMITED	1008940046