THE IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON LOGISTICS PERFORMANCE: A CASE OF CARGO TRANSPORTATION COMPANIES IN DAR-ES-SALAAM REGION, TANZANIA

THE IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON LOGISTICS PERFORMANCE: A CASE OF CARGO TRANSPORTATION COMPANIES IN DAR-ES-SALAAM REGION, TANZANIA

By

Thobias Kyomo

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CERTIFICATION

We, the undersigned, certify that we have read and hereby recommend for acceptance by the Mzumbe University, a dissertation entitled **"The Impact of Information and communication Technology on Logistics Performance: A case of Cargo Transportation Companies in Dar-es-salaam Region, Tanzania",** in partial/fulfillment of the requirements for award of the degree of Master of Science in Procurement and Supply Chain Management of Mzumbe University.

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Accepted for the Board of School of Business

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DECLARATION AND COPYRIGHT

I, **Thobias Kyomo,** declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature; _____

Date; _____

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DEDICATION

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LIST OF ABREVIATIONS AND ACRONYMS.

CTC	-	Cargo transportation companies
E- BUSINESS	-	Electronic Business
ECTS	-	Electronic cargo tracking system
EDI	-	Electronic data interchange
ERP	-	Enterprise resource planning
FA	-	Factor analysis
FIFO	-	Firs in first out
FMS	-	Fleet management services
GPS	-	Global positioning system
ICT	-	Information and communication technology
ISS	-	Information support system
KMO	-	Kaiser-Meyer-Olkin
LIS	-	Logistics integration system
LP	-	logistics performance
Msc. PSCM	-	Masters of social science in procurement and supply chain management.
RBV	-	Resource based view
RFID	-	Radio frequency identity
SAT	-	System approach theory
SPSS	-	Statistical package for social science
VMI	-	Vendor managed inventory

ABSTRACT

The aim of this study was to determine the Impact of information and communication technology on logistics performance of cargo transportation companies. A review of the literature shows that there is little empirical literature studies conducted on the impact of information and communication and communication technology on logistics performance of cargo transportation companies. This study aimed at filling the empirical gap by investigating the impact of information and communication technology on logistics performance. The study used descriptive research design and was conducted at ten (10) logistics companies located in Dar-es-salaam and sample of 105 employees was drawn from a targeted population of 350. Questionnaire and interview were used as data collection method. Data analysis was done using both quantitative and qualitative methods, for quantitative data (SPSS v 20) was used running the quantitative analysis technique. Hypotheses were tested using numerous data analysis technique which involved exploratory factor analysis (Kaiser- Meyer- Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity), regression analysis (simple linear regression) and correlation analysis (Pearson correlation), while qualitative data were analyzed though content analysis technique. After the analysis results were presented in tables and figures for interpretation. The study found that information flow, fleet management system, inventory management system and logistics integration system have a close relationship with logistics performance of cargo transportation companies. The study recommends the owner and Managers of Cargo transportation companies to adopt information and communication technology in their day to day logistics activities so as to improve the overall performance of logistics and get competitive advantage in the market.

Keywords: Information flow, fleet management system, inventory management system, logistics integration system and logistics performance

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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Introduction

The chapter introduces the study through six section including Background of the study, statement of the problem, Research objectives, research questions, significance of the study and scope of the study.

1.2 Background of the study

Information and communication technologies as tools that individual can use to share information, distribute information and gathering information so as to communicate with one another or in groups via the use of hardware devices such as computer and interconnected networks (Gunasekaran *et al*. (2017).It involves the use of devices cellular phones, television, radio, Computer hardware, software and internet for exchanging information(Vanpoucke *et al.* 2017).

Logistics. Is the process that involves planning and implementation of the effective transportation and storage of products from the point of origin to the point of consumption.(Wilson *et al*., 2015).The concept of logistics originated from military in 19th century and was based on supply of troops, equipment and supplies to where they are needed (Bhandari 2014).

Logistics performance is an essential indicator of how well logistics perform its operations to fulfill its goals and objectives(Lee et al. 2016). Researchers and practitioners have shown great attention in measuring the performance of logistics. According to Ayantoyinbo (2015) he proposed four categories for measuring performance in logistics these are Timely delivery, customer satisfaction, cost and efficiency. These categories were also used to measure logistics performance of agribusiness firms in Malaysia (Zawawi *et al*. 2014)

Rapid changes in information and communication technology simplify effective communication which is useful in ensuring that there is good relationship between the parties, Further more ICTs assist to speed up operation in supply chain, support the increase of supply chain agility, attain greater efficiency in supply chain operations and ensure timely delivery of product and services to customer if applied appropriately (Ashenbaum & Maltz,2017).

Modern logistics and supply chain of cargo transportation companies are very complex in nature since it involves different risks during the operations. Also it comprises with participation of different stakeholders such as manufacturers, distributors, wholesalers, customers, and regulatory agencies (Ashenbaum & Maltz., 2017). Despite being one of the fastest growing sectors in South African economy. ICT and logistics performance in Tanzania is not well studied (Ghasemi *et al*.2017; Mlimbila &Mbamba 2018).

In Transportation sector decisions upon inventory levels are dictated based on the need to meet performance. Cost factor is among the critical criteria used by Cargo transportation companies in determining the amount of inventory to keep in a given period (Wilson *et al.* 2015). According to the study conducted by *(*Kaliani Sundram *et al*. 2016) on factors affecting the success of inventory control in Transportation companies he found that poor adoption of information technology has led to inefficiency in inventory management hence increase the costs of operation.

A study conducted by Franceschetti (2015) on the factors affecting distribution performance of cargo Transportation companies; The findings shows that fleet management systems and financial capacity have greatest influence on distribution performance. In logistics sector the influence of fleet management system has strong evident in high clock speed through the use of advances technologies in supporting logistics operations (Hu *et al.* 2015)

According to (Jimenez-Jimenez *et al*. 2018; Muerza *et al*.,2017) it is impossible to access important business information in this competitive business environment

without using latest information technology. Information and communication technologies allows a company and stakeholders such as suppliers and customers to have effective communication, sharing of information openly and regularly and later increase sharing of knowledge and having broader understanding of various business issues which are which are complex in nature through information exchange (Sundram *et al*. 2018). Therefore high use of ICTs between a company, suppliers, distributors and customers will bring to high levels of connectivity, which in return will stimulate integration of logistics activities.

Due to the importance of Logistics operations in improving organizational performance. Many successful companies especially in developed countries have long acknowledged the important role played by logistics in adding value of their day to day operations. Hence they decide to adopt information and communication technology so as to automate logistics activities for the sake of controlling logistics operations easily and reducing costs of the operations (Kembro & Selviaridis, 2015). Logistics operations of cargo transportation companies are very complex in nature and extremely answerable to ensure that the right consignments reaches the right customer at the right time and in the right condition (Ayantoyinbo.,2015)

1.3 Statement of the Problem

Information and communication technology in managing logistics operations is relatively a new concept it allows online information flow, Fleet management system, Inventory management system and logistics integration system through the whole operation chain to become realistic timely and cost effective(Hayaloğlu 2015).

Information flow plays an important role in logistics hence enable the company to gain competitive advantage (Mlimbila & Mbamba 2018). Sharing and management of information in helps to enhance logistics operations (Oyebamiji 2018). The use of modern ICT improves information accuracy within the logistics operations. Sufficient information flow in logistics is one of an important aspects in improving entire performance of the company.

In reference to the study of (Hu *et al*. 2015) on the impact of fleet management system on logistics performance, they found that fleet management system has a significant influence towards logistics performance. Companies must adopt fleet management systems so as to improve overall performance of the organization(Oyebamiji, 2018).

The study conducted by (Ogbo & Ukpere, 2014) on the impact of effective inventory control system on organization performance, their findings indicated that inventory control system has a significance influence to the organization performance. Companies have to adopt inventory (Goyal *et al.* 2016)

Logistics integration system has strongly influence logistics performance of cargo transportation companies, through the use of Enterprise resources planning and Electronic data interchange (Ashenbaum & Malt., 2017). Logistics integration system reduces coordination costs and enhance efficiency through the use of information systems (Lee et *al.*,2016). Information flow is an area of logistics management that particularly warrants close study, since information flow in the

logistics operations is very useful for improving coordination among the logistics and supply chain partners (Cragg & McNamara, 2018).

Due to the importance of information and communication technology on logistics performance many companies have decided to adopt ICT to improve daily logistics operations, gaining competitive advantage in the market and quick response to customer orders(Gacuru & Kabare., 2015).

Despite of the benefits of information and communication technology on logistics performance yet, there are few studies conducted on ICT and logistics performance (El-Berishy *et al.,* 2013;Rashidi & Cullinane., 2019;Rashidi & Cullinane., 2019). Therefore this study intends to fill this gap by examining the influence of ICT on logistics performance.

1.4 Objectives of the Study

1.4.1 General objective

To determine the Impact of information technology on Logistics performance in Dar-es-salaam.

1.4.2 Specific objectives

i. To determine the influence of information flow on the performance of logistics in Dar-es-salaam.
ii. To determine the influence of fleet management system on logistics performance in Dar-es-salaam.
iii. To determine the influence of Inventory management system on logistics performance in Dar-es-salaam.
iv. To determine the influence of logistics integration system on logistics performance in Dar-es-salaam.

1.5 Research questions

i. How does information flow influence logistics performance companies in Dar-es-salaam?
ii. How does fleet management system influences logistics performance in Dar-es-salaam?
iii. To examine the influence of Inventory management system on logistics performance in Dar-es-salaam?
iv. How does logistics integration system influence logistics performance in Dar-es-salaam?

1.6 Significance of the study

The researcher expect that this study will be beneficial to the following groups.

1.6.1 Owners and managers of logistics companies

The resultsof the study will be essential for owners and bosses of logistics companies in Dar-es-Salaam by expanding their knowledge on how they can use information technology as chief aspect to improve business performance. Also the study will enable managers to understand the impact of information technology on company's performance therefore they will be in a good position to make strategic decision regarding the use of information technology and improving the level of business performance.

1.6.2 Government

The results of this study will be valuable to the government through policy makers since it will reveal the importance of Information technology use in improving service delivery to customers hereafter the government will be able to make good strategic decision regarding information technology infrastructure inside the nation and take initiatives to boost information technology infrastructures by attracting investors in the county. By doing so the government will be able to stimulate economic growth by using information technology on various sector of the economy.

1.6.3 Academicians

The findings of this study will be important to academician since it made a foundation for upcoming research and knowledge on how logistics companies can efficiently use ICT to increase the level of performance. This study will also add more knowledge and understanding regarding ICT and business performance.

1.7 Rationale/Justification of the study

This study helps to know the impact of ICT on performance of logistics companies, is there any inspiration for logistics companies to use information technology in performing their routine activities, this can be due to the fact that information technology can help logistics companies to track their cargo in transit and ensure security of the cargo which will ensure timely delivery of products to customer, Reduce cost and time of doing logistics operations so as to ensure customer satisfaction.

1.8 Limitations of the study

Though the objectives of this study were accomplished successfully, but the researcher faced the following limitations during the study.
Many companies involved in this study feared that their information are going to be exposed to their rivals because of confidentiality privacy policies. The researcher played a great role to convince and promise the companies that the information obtained will be highly confidential and not to worry at all. This inspired the respondents to provide honestly answers.

Another limitation encountered by the researcher was poor cooperation during data collection exercise. Gathering the needed information was a challenge since some of the respondents didn’t show enough cooperation and they were denying to provide the information and thus some questions went unanswered. Some respondents were scared to be mistreated by their managers and other respondents said that they did not have time and this affected the accurateness of the result. The researcher fixes

this challenge by giving the respondents more time to fill out the questionnaires and making close follow-ups.

Some of the respondents involved lack enough experience in the study area, so they were unable to provide proper information about the area of study. The researcher fix this challenge by giving respondents more time to consult their managers so that they can give proper and honest answers.

1.9 Organization of the study

The study is organized into the following chapters; Chapter one introduces the setting of the study whereby the Background of the problem, Statement of the problem, Objectives of the study, Research questions, significance of the study, Rationale/justification of the study and limitation of the study. Chapter two of this study provides definition of key terms, and review of related literature on the impact of information and communication technology on logistics performance covering aspects such as theoretical framework, empirical review and conceptual framework and Research gap. Chapter three looks at the methodology that was used to accomplish this study it comprises research design, Area of the study, Sampling technique, data collection methods and Methods of data analysis. Chapter four deals with data analysis and presentation of the findings. Chapter five deals with discussion of the findings. Chapter six concludes the study and provides recommendations for future study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covers theoretical settings and empirical framework that guide the study. The theories guiding this study are covered under theoretical review section, whereas the contribution of past researcher and their findings are in empirical review section. Hence both sections give the studies conceptual framework exhibiting how the variables were operationalized.

2.2 Definition of key terms

This study seeks to comprehend the Impact of ICT on the performance of logistics companies. From the chief objectives of this study there are there key terminologies that need to be understood widely. These terminologies are information technology, logistics, and logistics performance.

2.2.1 Information technology

Information and communication technology is basically a term which involves any communication application or communicating device such as cellular phones, television, radio, Computer hardware and software and satellite systems it also involves numerous application such as wireless communication and video conferencing (Gunasekaran *et al.,* 2017). Information and communication technology can also involve all those electronic technology devices which are capable of accepting data such as voice, videos, graphics and text for processing to produce information that are helpful for supporting decision making. (Vanpoucke *et al.*, 2017)

2.2.2 Logistics

Is the process that involves planning and implementation of the effective transportation and storage of products/goods from where they are produced (point of origin) to the point of consumption. The main objective of logistics is to encounter client's requirement at the desired time at minimal cost as possible (Wilson *et al*., 2015). Logistics involves two main function these are warehousing and transportation, Warehousing this an action of keeping product in the warehouse ready to be moved to customers while Transportation management put much emphasis on planning, optimizing and executing the use of automobile to transport products between storerooms, retail locations and clients (Lee *et al*., 2016). Several firms specialized in logistics are offering their services to manufacturer, wholesaler, retailers with a large need to transport products.

2.2.3 Logistics performance

In this study, Logistics performance is observed as the capability of logistics to perform its operations at optimal level in terms of quick response to customer orders or timely delivery, customer satisfaction, sales increase (Wilson *et al.*, 2015). Logistics managers have a great task to improve logistics operations to enhance customer satisfaction while at the same time minimizing the costs of operations (Taghva & Foomani, 2015). For the purpose of this study logistics performance was measured by three aspects which are Timely delivery, customer satisfaction and efficiency.

Table 2.1 Application of information and communication technology (ICTs) in different parts of logistics

Activities	Information technology application areas	Advantages
Warehousing	**Warehouse management** ❖ Receiving products ❖ Identifying products ❖ Shipping products to storage ❖ Select product ❖ Transport consignments	❖ Decrease paperwork ❖ Time saving in locating inventory ❖ Increasing safety and security of products ❖ Real time dispatch of goods ❖ Consignment consolidation
Transportation	**Fleet management** ❖ Automobile tracking ❖ Driver management ❖ Managing speed ❖ Managing Fuel ❖ Route management	❖ Decrease in insurance costs ❖ Increased client satisfaction ❖ Decrease in unnecessary overtime ❖ Recovery of stolen vehicle
Custom clearance	❖ Documentation ❖ Duty payment ❖ Inspection	❖ Increase client satisfaction ❖ Paperwork reduction during clearance ❖ Decrease administrative costs
Cargo management	❖ Consignment security ❖ Container leasing ❖ Consignment loading and offloading	❖ Enhanced shipment security ❖ Real time cargo tracking ❖ Consignment documentation

2.3 Theoretical review

2.3.1 System approach theory

This is the theory which describes how companies can share information within their logistics system. Through the use of this system shipping companies are able to use their website to log in and trace the exact position of the consignment. Haulers have automated their shipping activities whereby consignment are tracked while on board vessel this allows logistics companies to anticipate the arrival time of the consignment and make preparation for receiving and storage of the consignment. This information is similarly delivered on the clients to keep them updated. Through sharing information among the parties delays in logistics are reduced and lead time met thus improving customer satisfaction.

According to Oyebamiji (2018) the capability of information technology adoption in managing the flow of information, supporting decision making and assisting operational process and system can be measured by scrutinizing how information technology has an impact on logistics performance. Vanpoucke *et al.*, (2017) showed that the information technology (IT) and information sharing aptitude have a straight effect on supply chain integration of the logistics system. Instantaneous sharing of information delivers electronic links that support communication and cooperation between the supply chain partners. Managers can get information quickly as a result of information technology integration which helps in properly allocating and utilizing available resources for improving effectiveness and efficiency of day to day logistics operations hence leads to improvement in decision making process. Currently information technology is an important tool that helps companies to examine business information so as to support management decision making process in conducting their daily business activities (Valmohammadi *et al.*, 2017)

2.3.2 Resources based view (RBV)

Resource based theory (RBV) theory suggest that companies can only outperform their rivals by developing competences and resources that are valuable, rare, difficult to copy and which cannot be substituted easily (Yang &Lirn, 2017). The companies functioning according to resource based view (RBV) frequently ascertain opportunities for creating new market positions. The resource based view concept was established on the assumption that the competitive advantage depends on the company's, competencies, which involves both intangible and tangible resources (Barney, 1996). Intangible resources these are assets that are not physical in nature, intangible resources simply involve all benefits the company can obtain from its functions and processes for instance goodwill, Brand name, trademarks, copyrights and organizational culture. While tangible resources these are assets that are physical in nature they include such as vehicle, equipment, inventory and funds.

The main focus of resource based view is to put emphasis to the company to have resources and capabilities that will help to create competitive advantage in a particular industry or market (Barney, 1996). Marketing orientation is, in turn related to inserting operant resources and resource integration which aimed at value co-creation. The value co-creation additional produces value constellations which serve as a key driver for innovation (Verma & Jayasimha, 2014). In the perspective of supply chain this leads to channel integration and is positively related to supply chain performance(Kumar *et al.*, 2017). All in all adoption of resource based view theory in a supply chain network aims to improve logistics performance and make best strategy framework for example Supply chain integration that includes all intangible and tangible resources such as technology, information, cooperation and relationship management.

2.4 Empirical Literature Review

This section of literature review gives discussions on evidence-based literature about the impact of ICT on logistics performance. It consists of discussions on variables that make up the model for this study. Some related studies are highlighted below.

Oyebamiji (2018) investigated on ICT and its effect on performance of logistics firms in Nigeria. His result revealed that information technology has a positive and significance influence on logistics performance. Wilson *et al.* (2015) conducted their study on the effect of ICT on performance of logistics firms in Nairobi Kenya to understand its significant impact on their day to day operations so as to ensure their growth and profitability. Data was collected from ten (10) logistics firms in Nairobi country. Data analysis was done with an assistance of statistical package for social science (SPSS) and the results shows that there is a strong relationship between information technology and performance of logistics companies in Nairobi County.

Karimi & Namusonge (2014) conducted the study to determine the role of ICT on warehouse management in Kenya. The researcher employed descriptive research design taking Jomo Kenyatta university of Agriculture and technology as case for

this study. The target population was 930 and sample size of 50. The sampling technique used was stratified random sampling and data collection was done by the use of questionnaire and informal interviews. The result shows that ICT has positively influence warehouse management.

Bhandari, (2014) examine the impact of information technology on logistics and supply chain management. The author mostly emphases on secondary data for collecting data relating to several technology used in logistics and supply chain management. The author concludes that technology is an important tool to enhance supply chain competitiveness and performance by improving the overall effectiveness and efficiency of logistics system. Similarly (Choy *et al*. 2014) examine the ICT on performance of logistics industry. The study employs questionnaire survey to study the impact of information technology on performance of logistics industry. Data was analyzed with the help of SPSS and the result showed that there is a strong relationship between information technology and performance of logistics industry. Another study conducted by Zawawi *et al.* (2014) on ICT, logistics performance and moderating effect of firm size in Malaysia. The study indicates that information technology is a high priority for Malaysian logistics firms. ICT proficiencies are also observed as remarkably critical for integration of logistics services provided by logistics firms.

Aziz *et al.* (2018)conducted the study on the impact of Enterprise resource planning systems on Supply chain management practices in Egypt by conducting a survey on 216 Egyptian managers, the result obtained show the importance of supply chain management and Enterprise resource planning (ERP) systems adoption as well as expose their positive impact on competitive advantage hence enhancing organizational performance in Egyptian companies.

Nevertheless the results of (Ayantoyinbo 2015; Ashenbaum & Maltz, 2017) are conflicting the past studies, their studies reveal that information and communication technology had no moderate effects on logistics performance. However (Jimenez-

Jimenez *et al*. 2018) argue that increasing spending on information technology in supply chain process does not automatically result into higher company performance.

2.5 Review of the variables

2.5.1 The influence of information flow on logistics performance

Information flow is one of an essential component of the supply chain (Arora *et al.* 2016). The need to share information among various partners of supply chain is absolutely of supreme importance. Information helps to provide a link between various stages of supply chain, permitting them to coordinate their actions and bring about many of the benefit of maximizing profitability in the supply chain (Jonsson & Myrelid, 2016). The use of information and communication technology is crucial to integrate supply chain activates for better results. Effective information flow among actors of supply chain needs appropriate information to be transmitted from the point of origin to point of use (Taghva & Foomani, 2015).

2.5.1.1 Information sharing

The aptitude of ICT adoption in handling the flow of information enabling the company to run its logistics operation effectively and support decision making process, this can be measured by scrutinizing how information technology has an effect on logistics performance (Delmonteil & Rancourt, 2017). Cragg & McNamara, (2018) noted that information technology and information sharing proficiencies have a straight impact on logistics systems and supply chain integration. The advantage of instantaneous information sharing offers electronic links that helps to support communication and cooperation alongside the supply chain, thus information can be easily attained by directors for optimum allocating and utilizing existing resources for improving the efficacy of day to day logistics operations. According Mlimbila & Mbamba, (2018) in long run information system helps to make analysis of business information so as to assist the management to make strategic decision across a comprehensive range of business activities(Jede & Teuteberg, 2015). Automation of supply chain activities has also enable sooth flow of information which simplifies

links between suppliers, employees, forwarders, transporters and customers. Information technology support information exchange through the entire supply chain to reduce time and costs of operations (Jede & Teuteberg, 2015).

2.5.1.2 Accurate information

Accurate information is vital for the performance of logistics and supply chain since it provides the basis for decision making by supply chain managers (Tatoglu *et al.* 2016). Information technology comprises of the tools used to gain awareness of the information, analyze this information and execute on it to increase the performance of the supply chain (Samadi & Kassou 2016). Information technology provides the tools to collect information and analyze information so as to make best supply chain decision (Salam, 2017)

The use of ICT system for collecting and analyzing information can have an important impact on overall performance of the company (Mzoughi *et al.* 2008). Accessibility and analysis of accurate information will enhance effective decision making which is essential for success of supply chain (Valmohammadi *et al.* 2017). To support effective supply chain decision information must be accurate, easily accessible, timely manner and must be shared among supply chain partners(Lee *et al.* 2016).

H1a There is a positive relationship between information sharing and logistics performance of cargo transportation companies.

H1b There is a positive relationship between information accuracy and logistics performance of cargo transportation companies

2.5.2 The influence of fleet management system on logistics performance

Fleet management system is the application of technologies, tools and practices that support the company to maintain optimum use of their vehicles and fuel so as to reduce cost of logistics operations. Fleet management system involve the use of GPS tracking software and database information software, currently advances in fleet management system enable the company to obtain more control over drivers and car,

Prevent delay on deliveries, save fuel consumption, decrease road accidents, prevent unofficial use of vehicles. Automation of fleet management activities allows information sharing between partners of the supply chain. (Vivaldini *et al.* 2015)

2.5.2.1 Cargo tracking

The use of ICT has facilitated logistics companies to track cargo and simplify fleet management process (Gunasekaran *et al.* 2017). Truckers have decided to install the electronic cargo tracking system (ECTS) which helps to increase security for both consignment and fleet, it also provide real time information on location of vehicle and condition of the cargo(Wilson *et al.* 2015). The electronic cargo tracking system (ECTS) is currently implemented by many customs authorities around the world so as to mitigate risks such as vehicle theft, Tax loss, and improving regulatory compliance.

The use of modern information technology for instance Radio frequency identification (RFID) and Barcodes which assist to get more accurate information of the product. RFID is the technology that allows an object to be wireless identified using data transmitted via radio waves for the purpose of automatically identifying and tracking tags attached to objects. One of the key advantages of using RFID is that information exchange between tags and reader is quickly, automatic and does not need direct contact (Ayantoyinbo 2015). Therefore this will permit easily access to more accurate inventory information (Goyal *et al.* 2016).

2.5.2.2 Route planning and scheduling

Routing is the practice of creating the best effective route at each stop for the purpose of minimizing the distance or travelling time (Franceschetti., 2015). With the help of ICTs fleet managers can easily choose the best and effective route so as to minimize the time and costs of logistics operation (Jede & Teuteberg, 2015). According to Hu *et al.*, (2015) fleet managers are accountable to ensure there are enough vehicles within the fleet so as to ensure smooth operations of routine activities. This necessitates buying new vehicles if required as a result intensification of the load or

to change the vehicle that requires serious maintenance. An automobile schedule is an arrangement of pick up or delivery points which comprising of arrival and leaving times with the view of reducing costs of operations. According to Hu *et al.*(2015) fleet managers are accountable for making decision on which path to use and which vehicles to assign to identified paths. He also found that effective fleet management is a tool for competitive advantage.

H2a There is a positive relationship between cargo tracking and logistics performance of cargo transportation companies.

H2b There is a positive relationship between route planning and scheduling and logistics performance of cargo transportation companies

2.5.3 The influence of inventory management system on logistics performance

Inventory management system comprise of technology including hardware and software, processes and procedures that manage the monitoring and maintenance of inventories (Goyal *et al.* (2016). Those inventories can be such as raw material, company properties and finished goods which are ready to be sent to merchants or final customers. Currently inventory control system depends on Radio frequency identification (RFID) and barcode which assist to automate identification of products. The study conducted at Wal-Mart showed that Radio frequency identity (RFID) helps to reduce stock out by 30% for goods sold per day (Kosasi *et al.*, 2014)

An inventory management system provides a platform for the automation of order fulfillment process. This system comprised with the list of orders expected to be received and then reminds warehouse staff to pick required products then arrange for packaging and shipment of the consignment. An inventory management system helps to manage inflow and outflow of materials to an organization so as to reduce time and cost of operations. Previously logistics was seen as activity that adds cost to an organization but currently with the use of ICT in logistics is viewed as a likely source of competitive advantage. A study conducted by Chang, (2015) shows that costs associated with logistics cannot be controlled without controlling process and activities and this can be done easily through adoption of information technology.

2.5.3.1 Vendor managed inventory

Is the business ideal where the purchaser of the product provides information to a vendor of that product and the vendor take full obligation for keeping an agreed inventory of the material, typically at the purchaser's consumption location (Vanpoucke *et al.*, 2017). Many new supply chain management initiatives for instance vendor managed inventory greatly depend on the automation of the flow of materials and finished products along with flow of information through the organization (Sundram *et al.*, 2018) . Many organization strive to improve supply chain by sharing information to match demand and supply through demand forecasting, short term production planning, long term production planning and capacity planning (Cragg & McNamara, 2018).

2.5.3.2 Barcoding

Barcoding is an arrangement of parallel lines of different thickness with space in between. This technological innovation enables automatic identification of a particular product, it also allows data to be collected quickly and correctly from all aspects of company's operations. Bar codes contain information such as company name, country code, product detail, material content and date of manufacture (Wilson *et al*., 2015)

Logistics companies and almost every other type of business are currently using bar codes to substitute keyboard data entry. In the warehouse when the products enter through a conveyor, they are scanned by a scanner fixed beside the conveyor or hand held bar code scanner (Lee *et al.*, 2016). The information interpreted by the bar code scanner is proximately recorded in the central computer which supports real time update of inventory records (Oyebamiji 2018). Bar coding helps to simplify the identification in-process and finished products during the production process.

Also various batches at different stages of production can tracked easily. In the distribution process barcodes aids in identifying and tracking the transportation of finished products to the clients. According to Arora *et al.* (2016)bar codes have

various advantages which will help to stimulate and enable significant changes within several businesses supply chains.

According to Wilson *et al.,* (2015) Bar codes similarly provide many advantages that are important to business performance such as labour savings by removing manual bar code scanning, theft reduction, efficient recording of inventories, cost minimization, increasing efficiency through unnecessary handling of materials and on time replenishment of products at the distribution center. The use of bar codes helps to simplify supply chain integration and makes it more efficient, bar codes are important identification tool which helps to track goods and significantly reducing human error.

H3a There is a positive relationship between vendor managed inventory and logistics performance of cargo transportation companies.

H3b There is a positive relationship between barcodes system and logistics performance of cargo transportation companies

2.5.4 The influence of logistic integration system on logistics performance

The automation of logistics process has made simple to track consignment from supplier, forwarder, transporter and lastly to the final consumer premises. This helps to provide quick update to customer therefore improving efficiency and customer services (Chang., 2015). Due to the growth of electronic logistics services, transparency in logistics have been enhanced which leads to logistics qualities (Oyebamiji, 2018).

Logistics integration plays significant role in accomplishing the company's objectives. The integration and synchronization of activities with suppliers and understanding the needs of customer will results in superior benefit for companies (Bhakoo *et al.,*2015). According to Lee *et al.* (2016) Supply chain management is straight associated with relationship management, which comprises both wholesalers and clients. Customer relationship management and strategic supplier partnership are

key components in supply chain management practices which will result to information sharing among supply chain partners(Lin, 2017)

2.5.4.1 Enterprise resource planning

This is the process whereby the company manages and integrates the vital part of its business. Enterprise resource planning software assist businesses to implement resource planning effectively through integrating its activities required to run a business into single system (Hwang & Min 2015). The integration of logistics activities with other functional areas of organization helps a company to understand value adding activities so as to gain competitive advantage (Ashenbaum & Maltz, 2017). Also integrating logistics activities plays a vital role in reducing operational cost while improving customer service. The literature shows that companies that plan to integrate logistics activities to be a strategic function are likely to improve the overall performance of an organization (Lee *et al.* 2016).

2.5.4.2 Electronic data interchange

This is the process which encompass electronic exchange of business information using a standardized format, electronic data interchange technology enable the business to transfer business documents from one computer to another (Kembro & Selviaridis, 2015). Through the use of EDI business documents such as purchase orders and invoice can automatically be sent from one company to another company. According to Oettmeier & Hofmann (2016) EDI has positively enhanced the proper flow of information among the organizations. This is very crucial for logistics sector to enhance real time transfer of documents in the supply chain, reduce transaction cost due to paperless process and Reduction in lead time.

H4a There is a positive relationship between enterprise resource planning and logistics performance of cargo transportation companies.

H4b There is a positive relationship between electronic data interchange and logistics performance of cargo transportation companies.

2.6 Logistics performance (LP)

Logistics Performance is an organized way of determining the efficiency and effectiveness of logistics operations (Fuchs *et al.*, 2018). Logistics performance is perceived as an essential indication of how well logistics strategy accomplishes its purposes and objectives (Cragg & McNamara, 2018).

For any business to be prosperous and gaining competitive advantage than its rivals in the market it needs to have a strategic fit. A strategic fit of the business means that is the ability of the company to ensure competitive strategies are supporting the logistics strategies (Kembro & Selviaridis, 2015).

According to Bhandari, (2014) who conducted study on the influence of mobile phone technology on performance of freight distribution. The result found that Timely delivery, customer satisfaction and efficiency are the main common effect of logistics performance. Though, the best and common logistics and supply chain performance indicators involves cost, quality, timely delivery (Responsiveness) and customer satisfaction(Jede & Teuteberg, 2015).

For the purpose of this study the researcher used Timely delivery, customer satisfaction and efficiency to measure logistics performance.

2.6.1 Timely delivery

Refers to the ability of an organization to deliver products or services to its customers on timely manner (Kembro & Selviaridis, 2015). According Arora *et al.* (2016) efficient and effective integration of logistics activities plays significant role to ensure value creation in supply chain. The increasing awareness among logistics companies that faster delivery of products to customers is a source of competitive advantage has been influential in improvement of logistics from tradition function to strategic function (Taghva & Foomani, 2015).

2.6.2 Customer satisfaction

The use of ICT on logistics performance enable the company to share necessary information with its potential customers, also customers are able to track their consignments on transit and knowing exactly position of their shipments and delivery time for their products or services (Ashenbaum & Maltz 2017). This will enable to reduce delay on deliveries and reduce unnecessary costs of logistics operations. The company can also respond quickly to customer orders which will lead to customer satisfaction and will enable the company to gain competitive advantage in the market (Vanpoucke *et al.*, 2017)

2.6.3 Efficiency

ICT usage in logistics helps to ensure collaboration among the actors of logistics and supply chain (Wilson *et al.,* 2015). This will allow the company to utilize effectively its resource so as to meet demand of its customers. Vlachos (2014) noted that better logistics performance resulted from integrating logistics activities will enable the company to reduce complexity in logistics process which in turn will reduce the overall costs of logistics (Shee *et al*. 2018). Also efficiency in logistics concern with how information can be exchanged well between the actors of logistics and supply chain so as to ensure effective operations of logistics activities (Valmohammadi *et al.*, 2017)

2.7 Research gap

Reviewed literature revealed several research gaps including lack of local studies conducted on logistics performance of cargo transportation regardless of the noted increase of cargo transportation companies and shortage of studies conducted on the Influence of ICT on performance of logistics activities.

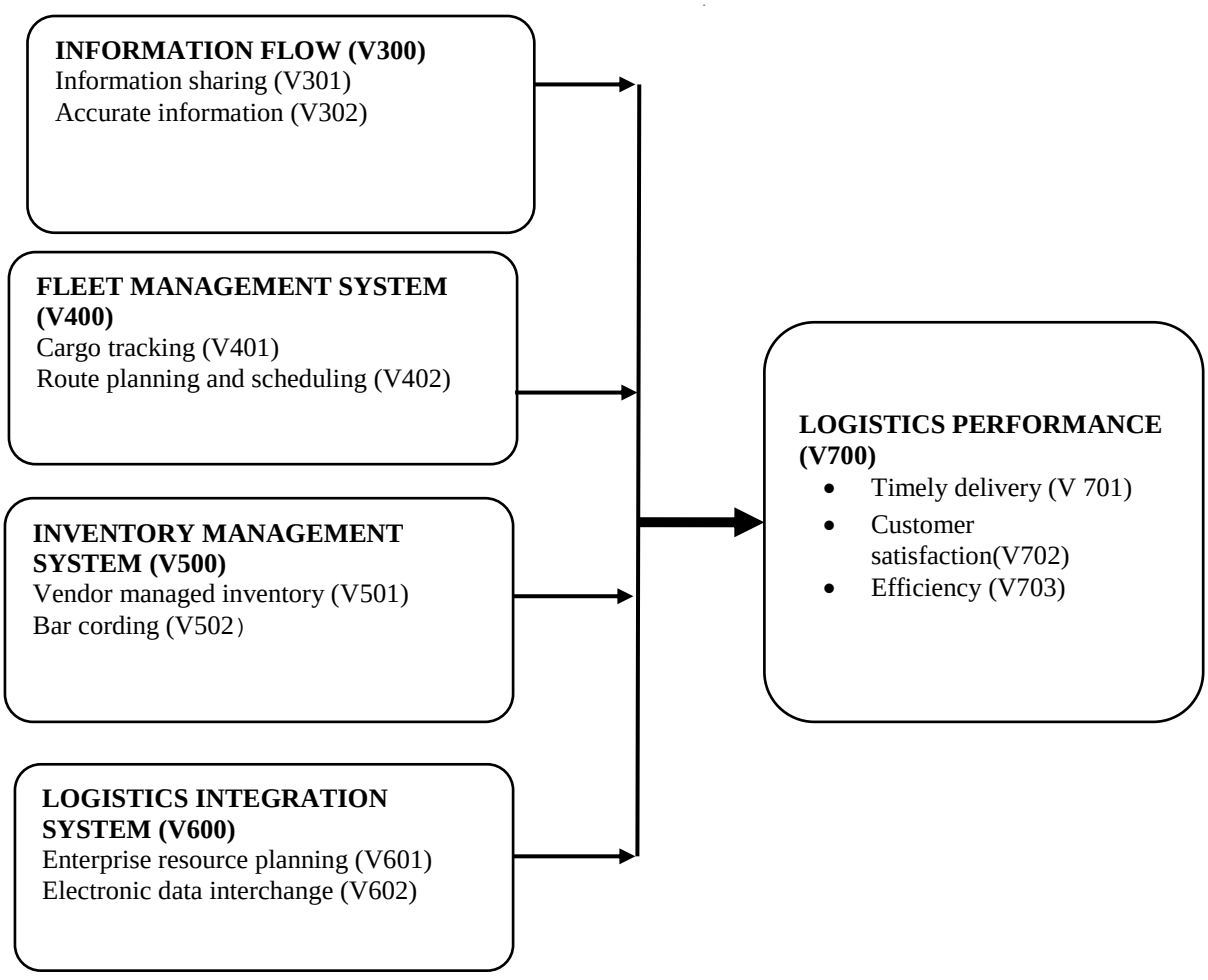
2.8 Conceptual Framework

This section presents the impact of ICT on logistics performance from which the analysis of the study will be made. Dependent variable of the study logistics performance which is influenced by Independent variables; Information flow, Fleet management system, Inventory management system and logistics integration system

Figure 2.1: Conceptual Framework

Independent variable **Dependent variable**

Information and communication technology



Source: Researcher, 2019

The hypotheses were grouped into four blocks, as shown below;

H1: Information flow is likely to have a positive relation with logistics performance of cargo transportation companies.

H2: Fleet management system is likely to have a positive relation with logistics performance of cargo transportation companies.

H3: Inventory management system is likely to have a positive relation with logistics performance of cargo transportation companies.

H4: Logistics integration system is likely to have a positive relation with logistics performance of cargo transportation companies.

CHAPTER THREE

RESEACH METHODOLOGY

3.1 Introduction

This chapter of the study presents the methodology and procedures that were employed in conducting this study. It basically reflects the research design, study area, study population, unity of analysis, sample size, sampling techniques, type of data, sources of data, methods of data collection and data reliability and validity.
Research methodology is a systematic method of solving a research problem. It involves precise techniques that can be used by a researcher to identify, select, process and finally analyze data about the topic. Through research methodology we study different steps that are commonly accepted by the researcher in learning his research problem alongside with the reason behind the environment (Saunders *et al*., 2009)

3.2 Research design

The nature of this study is descriptive research design, descriptive survey design is a technique for gathering data concerned with explaining relationship amongst variables (Saunders *et al*. 2009). Therefore this tactic was suitable for this study, as the researcher anticipated to gather in depth information through descriptions and is beneficial for identifying variables and hypothetical constructs. The design was considered suitable since the chief interest was to explore the possible association and define how the use of ICT influences performance of logistics companies in Dar-es-Salaam.

3.3 Study area

The study was conducted at ten Transport and logistics companies which are found in Dar-es-salaam city. Dar-es-salaam region was chosen due to various reasons first there are many logistics companies in the region due to the presence of Dar-es-

salaam port. Secondly Dar-es-salaam is one of the fastest growing cities in Tanzania and Africa, hence most of the ICT advancement and logistics practices are expected to expand its operations in this region.

3.4 The target population

According to Saunders *et al.* (2009).Population also means the bigger group from which sample is booked. The targeted population for this study was Managers, accountants personnel, Human resources staffs, ICT staffs, Marketing personnel, procurement staff, and Transportation personnel. The total population was three hundred fifty (350) from ten logistics companies where by 44 from Azania logistic company, 34 from A.K.Transport. Co. Limited, 34 from Adonai logistics limited, 34 from Bollore transport and logistics Tanzania, 34 from Bravo logistics Tanzania limited, 34 from Expo freight services limited, 34 from Jambo freight limited, 34 for Raphael logistics Tanzania limited, 34 for Simba logistics and lastly 34 for Usangu Logistics Company.

3.5 Sample size

According to Saunders *et al.* (2009) sample is number of items that were selected from which data were collected. The size of the sample must be optimum, this is due to the fact that the optimal sample size is the one which satisfies important requirement such as flexibility, reliability, representativeness and efficiency (Kothari, 2004). A researcher used 30% (105) of the entire target population (350 employees) as a sample for the study. According to the study of Mugenda & Mugenda, 2008) (a thirty percent (30%) of the entire population is said to be appropriate for sample size.

Nevertheless, Mugenda & Mugenda in (2008) proposed that a size of the sample has to be huge enough so as to replicate salient characteristics of the entire population to an adequate level and for the purpose of avoiding sampling errors.
The sample size used by the researcher was 105 samples from total target population of 350 elements. Table 3.1 displays distribution of samples.

Table 3.1 Sample size

Department	Target population	Percent	Sample size
Azania logistics company	44	30%	15
A.K transport. Co. Ltd	34	30%	10
Adonai Logistics Limited	34	30%	10
Bollore Transport & logistics Tanzania	34	30%	10
Bravo logistics Tanzania	34	30%	10
Expo freight service limited	34	30%	10
Jambo freight limited	34	30%	10
Raphael logistics Tanzania limited	34	30%	10
Simba logistics	34	30%	10
Usangu Logistics Company.	34	30%	10
Total	**350**		**105**

Source: Researcher 2019

3.6 Sampling technique

For the purpose of this study the researcher employed both methods probability sampling method and non-probability sampling method for sample selection. Random sampling method, Stratified sampling technique and purposive sampling technique was drawn by the researcher to the selected transportation and logistics companies. The researcher employed random sampling technique together with stratified sampling to acquire the number of employees from several departments so as to extract the needed information. Also the researcher used Purposive or judgmental technique to select respondents who were believed to have adequate knowledge, well experienced and skilled enough to provide exactly the required information (Kothari, 2004).

3.7 Source of data

Both primary and secondary data were gathered by the researcher so as to support findings of the study

3.7.1 Primary data

Primary data refers to those data that are collected by the researcher for the first time to commence a certain research project. Throughout the gathering of primary data

researcher can apply different methods such as questionnaire, interview or the use of structured interview (Saunders *et al.*, 2009).

For the aim of this research, Primary data were gathered mostly through the use of both questionnaire and interview that were directed to different respondents in order to get required information.

3.7.2 Secondary data

Secondary data refers to those data which have been previously gathered and can be retrieved by other researchers. Secondary data involves journal articles, published books, information gathered by government divisions and internet search engines. Secondary data offers many benefits to the researcher such as cost and time saving, more fast to find them than primary data and they can be available where primary data can't be accessed whatever (Saunders *et al.*, 2009)

For the aim of this study appropriate source such as Published books, published journal articles, search engine such as Google scholar and online publications are going to be used.

3.8 Methods of Data collection

Data collection can be well-defined as an organized method for gathering and computing information from different sources so as to get precise picture of an area of interest. Precise data collection is useful for keeping the truthfulness of the research, making business decisions and for quality assurance purpose (Saunders *et al.* 2009)

3.8.1 Questionnaire

Is a research instrument comprising of list of survey questions asked to respondents with the aim of extracting precise information (Kothari, 2004). Questionnaire is an efficient technique for gathering information from a huge sample before analyzing quantitative data. Questionnaire allows large area coverage with low cost and minimum effort to the researcher. Questionnaire is believed to be the best method of

data collection because it doesn't want identification by names of the respondents (Kothari, 2004).

For the purpose of this research questionnaire was used to collect the needed data. Whereby questions were coded according to the nature of the variable (as shown at the conceptual framework in chapter two), then the expected respondents were needed to read, comprehend and fill the question items based on Likert scale.

3.8.2 Interview

Is a method of data gathering which encompasses verbal conversation between interviewer and interviewee with the intention of gathering appropriate information for the purpose of research (Saunders *et al.* 2009). This way of gathering data enable the participant to express himself or herself based on his or her experience.

For the aim of this study face to face interview method was used so as to get more detailed information about the impact of ICT on logistics performance. The researcher interviewed thirty (30) experienced managers from different departments so as to get appropriate answers that helped to supplement information that were acquired through the use of questionnaire. Also interview enable the researcher to gain control and make sure that the questions asked were properly replied.

3.9 Response Rate

The study was based on the Impact of ICT on logistics performance, a case of cargo transportation companies in Dar-es-Salaam. From the target population of 350 respondents, the researcher draws a sample of 105 from a thirty percent rule (30%) to represent the entire population. The researcher dispersed 105 questionnaires which were filled by respondents and returned to researcher for analysis. The researcher personally gave questionnaires to the respondent and waited for respondents to fill the questionnaire and took them back after they were fully filled. The response rate shows a readiness of the respondents to participate in the research study (Creswell and Creswell, 2017)

3.10 Data Reliability and validity

3.10.1 Reliability

According to Saunders *et al.,* (2009)Data reliability is the degree to which research method produce stable and consistent results. In this study reliability was measured by considering the Cronbach's alpha coefficients. The common rule of using Cronbach's is that the value of Cronbach's beyond 0.7 is deliberated reliable for the study while less than 0.6 is deliberated unreliable.

3.10.2 Validity

According to Saunders *et al.,* (2009) validity can be well defined as a the amount to which the research study measure what it expects to measure. The researcher ensured validity of the study by deliberating all the important comments provided by the supervisor and other professionals. Also by making sure that the objectives of the research are linking properly with result observed.

3.11 Data analysis

The collected data were edited, coded and summarized with the help of Advanced Statistical Package for social science (SPSS) version 20, the questionnaire items were filled in statistical package for social science (SPSS) data template using specified codes and names. Data analysis was done using the following technique. Both approaches (qualitative and quantitative) were used, whereby Descriptive analysis, factor analysis, Regression technique and Correlation techniques used to analyze quantitative data while qualitative data were subjected to content analysis.

Associations amongst the variables of this study will be statistically treated using multivariate regression analysis. According to this study we will use statistical technique given that the study's model has more than one variable and also the relationship existing on these variables are assumed to be linear relationship.

From the regression model the following regression equation is derived:

Y= $\beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \Sigma$

Whereby: $\beta 0$ is the regression intercept; $\beta 1$-$\beta 4$ is the regression coefficients; Y is the dependent variable (logistics performance); X1 is the information flow; X2 is Fleet management systems; X3 is inventory management system and X4 is Logistics integration system. The researcher will use the SPSS to code, enter and compute the measurements of the multiple regressions for the study.

3.12 Data Presentation

The analyzed data were presented through the use of frequency and percentage tables. This helped the researcher to summarize data and give a clear meaning.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.1 Introduction

In this chapter the collected data were analyzed and presented based on the specific objectives of the study, which were to determine the effect of information flow on logistics performance, determine the effect of fleet management systems on logistics performance, determine the influence of inventory management system on logistics performance and to determine the effect of logistics integration system on logistics performance.

4.2 Background information

The researcher considered several background information important for this study, the information including Gender, Age, Education level, Respondent's department, working experience, Number of employee, and Respondents position.

4.2.1 Gender of Respondents

The result from Respondent's gender showed in Table 4.1 below indicating that 69 (65.7%) of respondents are males and 36 (34.3%) are females. This implies that males respond positively on filling the questionnaire than females as shown in the in table 4.1.

Table 4.1 Respondents' gender

		Frequency	percent
valid	Male	69	65.7
	Female	36	34.3
	Total	**105**	**100.0**

Source: Field data (2019)

4.2.2 Respondents' Age

Table 4.2 below displays the result of respondent's age based on their category. The results indicates that amongst all the respondents only 16 (15.2%) were aged between 18-25 years, 28 (26.7%) were aged between 26-33years, 22 (21%) were aged 34-41 years, 25 (23.8%) were aged 42-49 and 14 (13.3%) were aged 50years and above. Thus, many respondents viewed by the study have the age between 26-33 years with the contribution of 28 respondents, 42-49 years with contribution of 25 respondents and 34-41 years with the contribution of 22 respondents. This indicates that majority of employees in Logistics companies are aged between 26-49 years, therefore they can deliver the anticipated service in efficiency and effective way due to adult age effect.

Table 4.2 Respondents' age

		Frequency	Percent
Valid	18-25 years	16	15.2
	26-33 years	28	26.7
	34-41 years	22	21.0
	42-49 years	25	23.8
	50 and Above	14	13.3
	Total	**105**	**100.0**

Source: Field data (2019)

4.2.3 Education Qualification

Table 4.3 presents the results of respondents' Education qualification. The results in the table below displays that most of the respondents have Diplomas with the contribution of 45 out of 105 respondents equals to 42.9% followed by Bachelor degrees with a contribution of 30(28.6%), certificate level with contribution of 17(16.2%), Masters level has contributed 12 (11.4%), Doctorate or PhD level with the lowest contribution of 1(1%) of all respondents. This indicates that the preferred and acceptable level of education in Logistics companies is Diploma as most of respondents fall on that category. It also showed that Logistics companies have a strong base of qualified employees.

Table 4.3 Education level

		Frequency	percent
Valid	Doctorate	1	1.0
	Masters	12	11.4
	Bachelor degree	30	28.6
	Diploma	45	42.9
	Certificate	17	16.2
	Total	**105**	**100.0**

Source: Field data (2019)

4.2.4 Respondents Department

Table 4.4 below displays the number of respondents from each department Administration department with 6 respondents equals to 5.7%finance department with 14 (13.3%) respondents, human resources department with 14 (13.3%) respondents, information technology department with 14 (13.3%) respondents, marketing department with 14(13.3%) respondents, procurement department with 14 (13.3%) respondents, Warehouse department with 14 (13.3%) respondents and Transportation department with 15 (14.3%)respondents. This indicates that each department has its own importance in influencing Logistics performance of Cargo transportation companies.

Table 4.4 Distribution of Respondents in position

		Frequency	Percent
Valid	Administration	6	5.7
	Finance department	14	13.3
	Human resource department	14	13.3
	Information technology department	14	13.3
	Marketing department	14	13.3
	Procurement department	14	13.3
	Transportation department	14	13.3
	Warehouse department	15	14.3
	Total	**105**	**100.0**

Source: Field data (2019)

4.2.5 Working experience

Table 4.5 indicates that the highest level of working experience ranges from 7-10 years with the contribution of 70 out of 105 which is equivalent to 66.7% followed

by respondents below 3 years of working experience with the contribution of 18 (17.1%). Lastly the lowest level of respondents with working experience 3-6 years have the contribution of 17 (16.2%) out of 105 respondents. This shows that employees with working experience from 7 to 10 years have better knowledge and understanding concerns with the impact of ICT on logistics performance of cargo transportation companies, therefore most of the respondents have ability to perform well logistics activities and operations.

Table 4.5 Working experience

		Frequency	Percent
Valid	Below 3 years	18	17.1
	3- 6 years	17	16.2
	7- 10 years	70	66.7
	Total	**105**	**100.0**

Source: Field data (2019)

4.2.6 Number of employees in the Company

The result from table 4.6 shows number of employees where by 9.5% had the number of employees between 51-100 and 90.5% showed that they had employees above one hundred (100). This implies that most of the companies had indicated they had above 100 employees.

Table 4.6 Number of employees

		Frequency	Percent
Valid	51- 100	10	9.5
	Above 100	95	90.5
	Total	**105**	**100.0**

Source: Field data (2019)

4.3 Data analysis for variables of the study

As presented in chapter one, the main objective of this study was to determine the impact of ICT on logistics performance of cargo transportation companies. Quantitative data were analyzed with the help of SPSS V.20 while qualitative data were analyzed by using content analysis technique. By starting with quantitative data the researcher used Factor analysis, Regression analysis and correlation analysis.

The hypotheses were grouped into four blocks, as shown below;

H1: Information flow is likely to have a positive relation with logistics performance of cargo transportation companies.
H2: Fleet management system is likely to have a positive relation with logistics performance of cargo transportation companies.
H3: Inventory management system is likely to have a positive relation with logistics performance of cargo transportation companies.
H4: Logistics integration system is likely to have a positive relation with logistics performance of cargo transportation companies.

The researcher choose to use a Likert scale of five (5) points strong agree, Agree, Not sure, Disagree and strong disagree in reviewing the sample responses. Each respondent was asked to tick [√] the most appropriate answer to indicate the level of agreement or disagreement which best describe his or her opinion. The researcher opts to use Factor analysis technique, the extraction of data was done by using Principal Component Analysis (PCA). The researcher uses the Varimax as the rotation technique. The satisfactory loading cut off point as proposed in past studies is normally +0.500 (Musabila 2012; Pallant 2013). The researcher decides to use 0.500 as cut off points in determining the loading factors during this study.

4.3.1 Factor analysis for dependent variable (Logistics performance)

The dependent variable of this study was logistics performance in cargo transportation companies, three aspects namely; Timely delivery, Customer satisfaction and efficiency were used to measure logistics performance. For the aim of measuring dependent variable (logistics performance) the researcher uses Confirmatory factor analysis to test the validity of the variables used in this study. The factor analysis was undertaken so as to find out whether Timely delivery, Customer satisfaction and efficiency are directly associated with performance.

The researcher opts to use Kaiser-Meyer-Olkin Measure of sampling adequacy to prove appropriateness of data for factor analysis. Variables (701d, 702e, 703a and 703e) were removed due to poorly loading below the cut of points and therefore omitted. After dropping poor loading factors the result for KMO and Bartlett's test was .771 which is highly adequate value as presented in table 4.7below. Hence factor analysis is fitting because significance value (p = .000)

Tabl 4.7 Kaiser-Meyer-Olkin and Bartlett's Test for logistics performance

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.711
Bartlett's Test of Sphericity	Approx. Chi-Square	1069.575
	Df	105
	sig.	.000

Source: Field data (2019)

Table 4.8 below shows the results of rotated component matrix which display how the variables load in component 1, 2 and 3 after applying principal component analysis technique. The reliability was executed so as to determine the consistency of the results and the findings indicates that the value of Cronbach's Alpha are (0.835, 0.718 and 0.820) which is above 0.7 as displayed in table 4.8 below. It is suggested that the limits for Cronbach's Alpha measure is not acceptable when is under 0.60, moderate when is beyond 0.70 as well as very good if it is beyond 0.8 (Musabila, 2012)

Table 4.8 Rotated component matrix for Logistics performance.

	Component 1	2		Cronbach's Alpha	Computation
701a–product timely delivered	915				(701a + 701b + 701c + 701e)/4
701b–Delivery speed	839			.835	LP _Time delivery
701c – Accuracy delivery time	684				
701e – service time	532				
702a – Client satisfaction		727			(702a + 702c + 702b+702d)/4
702c – customer loyalty		720		.718	LP _customer satisfaction
702b – Client influence		674			
702d- Customer complaints		625			(703c+703b+703d)3
703c-Labour costs			869		LP_Efficiency
703b-Transport costs			818	820	
703d-Operation costs			809		

Source: Field data (2019)

4.3.2 Factor analysis for independent Variable

The independent variables of this study were information flow, Fleet management system, Inventory management system and Logistics integration system as they were discussed and presented in chapter one (Introduction) and Chapter two (literature review).

4.3.2.1 Influence of information flow on logistics performance.

The first independent variable of this study was Information flow and was supported by two sub-variables only which are Information sharing and Information accuracy as were discussed and presented in Chapter one and Two. By using factor analysis technique, the result of KMO and Bartlett's Test measure of sampling adequacy was .689 which is considered adequate and significance value (p value = .000) which is significantly acceptable, Chi-square = 229.358 and degree of freedom (df) was 45, hence it is considered suitable for further analysis.

Tabl 4.9 Kaiser-Meyer-Olkin and Bartlett's Test for Information flow

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.689
Bartlett's Test of Sphericity	Approx. Chi-Square	229.358
	df	45
	sig.	.000

Source: field data (2019)

With the aim of determine the loading aspects, the researcher opt to use .5 as a cut of point. By using Principal component analysis as a rotation and extraction method, poor loaded factors were dropped (301e, 302a, and 302c) as shown in table 5.0 below. Similarly the table display the result of Cranach's alpha are 0.786 and 0.793 which are beyond 0.700therefore agreeing with the suggestion presented by Musabila (2012) and Hair *et al*. (2006). The Cronbach's value of 0.786 and 0.793 fit very well for the study.

Table 4.10 Rotated component matrix for Information flow variable.

	Component		Cronbach's	Computation
	1	**2**	**Alpha**	
301c - Timely information	872			(301c + 301b + 301a + 301d)/4
301b-External info sharing	755		.786	INFO _sharing
301a -Internal info sharing	656			
301d – Info distortion	510			
302d – Logistics efficiency		824		(302d + 302e + 302b)/3
302e – Human error minimization		694	.793	INFO _accuracy
302b - Enough info system		630		

Source: Field data (2019)

4.3.2.2 The influence of fleet management system on logistics performance

The second independent variable of this study was a fleet management system which was supported by two sub-variables namely. Cargo tracking together with route planning and scheduling. The respondents were first asked to tick which fleet management service provided by their company and their result in table 4.11 below displays that 60 respondents which is equivalent to 57.1% choose automobile tracking 13 respondents (12.4%) select fuel management, 12 respondents (11.4%) choose driver management and 20 respondents (19.1%) select route planning and scheduling.

Table 4.11 Fleet management service offered by the company

Fleet management system	**Frequency**	**Percentage**
Automobile tracking	60	57.1%
Fuel management	13	12.4%
Driver management	12	11.4%
Route planning and scheduling	20	19.1%
Total	**105**	**100%**

Source: Field data (2019)

After that, the researcher employed factor analysis method to prepare data for further analysis technique. Through the use of factor analysis technique, the result of KMO and Bartlett's Test measure of sampling adequacy was .618 which is considered adequate and significance value (p value = .000) which is significantly acceptable, Chi-square = 368.765 and degree of freedom (df) was 45.

Table 4.12 Kaiser-Meyer-Olkin and Bartlett's Test for fleet management system

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.618
Bartlett's Test of Sphericity	Approx. Chi-Square	368.765
	df	45
	sig.	.000

Source: Field data (2019)

With the intention of determine the loading factors, the researcher opt to use .5 as a cut of point. By using Principal component analysis as a rotation and extraction method, poor loaded factors (401c, 401d and 402d) were dropped as displayed in table 4.13 below.

Table 4.13 Rotated component matrix for fleet management system variable

	Component 1	2	Cronbach's Alpha	Computation
401a – Sales increase	867			(401a + 401e + 401b)/3
401e – Theft minimization	789		.734	FMS _cargo tracking
401b –Cost reduction	752			
402c – Scheduling		898		(402c + 402b + 402a+402e)/4
402b – Routing		882	.812	FMS _Route p&s
402a – Transport planning		878		
402e-Improved planning		764		

Source: field data (2019)

The result in table 4.13displayed the Cronbach's Alpha values which 0.734 for Cargo tracking indicator and 0.812 for Route are planning and scheduling indicator. Hence the study coinciding with the study of Musabila.,(2012)and Hair *et al.*,(2006) that the Cronbach's Alpha fit well for the study.

4.3.2.3 The influence of inventory management system on logistics performance

The third independent variable of this study was Inventory management system and was supported by two sub-variables only which are Vendor managed inventory and Barcodes as were discussed and presented in Chapter one and two. By using factor analysis technique, the result of KMO and Bartlett's Test measure of sampling adequacy was .608 which is considered adequate and significance value (p value = .000) which is significantly acceptable, Chi-square = 167.513 and degree of freedom (df) was 45, hence it is considered suitable for further analysis.

Table 4.14 Kaiser-Meyer-Olkin and Bartlett's Test for Inventory management system

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.608
Bartlett's Test of Sphericity	Approx. Chi-Square	167.513
	df	45
	sig.	.000

Source: field data (2019)

With the intention of determine the loading factors, the researcher opt to use .5 as a cut of point. By using Principal component analysis as a rotation and extraction method, poor loaded factors were dropped (501c and 502b) as displayed in table 4.15 below

Table 4.15 Rotated component matrix for Inventory management system variable

	Component		Cronbach's	Computation
	1	**2**	**Alpha**	
501b – Lead time	821			(501b + 501d + 501e + 501a)/4
501d – Supplier relationship	701		.786	IMS _vendor managed inventory
501e –Operating costs	686			
501a – Optimum inventory	798			
502d – Improved operations		803		(502d + 502c + 502a+502e)/4
502c – Ease decision making		768	.745	IMS_Barcodes
502a – Inventory traceability		730		
502e-Improved security		864		

Source: Field data (2019)

Table 4.15above indicates that Variables with code number 501 which is Vendor managed inventory and 502 Barcodes fit well for this study because the value of Cronbach's Alpha is above 0.700. Vendor managed inventory with Cronbach's Alpha of 0.786 and Barcodes with Cronbach's Alpha of 0.745 which is an indicator that the two attribute fits very well for the study.

4.3.2.4 To determine the influence of logistics integration system on logistics performance of CTC

The fourth independent variable of this study was Logistics integration system and was supported by two sub-variables only which are Enterprise resource planning and Electronic data interchange as were discussed and presented in Chapter one and Two.

The researcher asked the respondents to tick the main logistics activities integrated in information system of their company so as to link them with other stakeholders. The result shows that 25 percent of the respondents which is equivalent to 23.8% chose Warehouse operations, while 60 respondents (57.1%) chose Transportation activities and 20 respondents (19.1%) chose custom clearance.

Table 4.16 Main logistics activities integrated

Logistics activities	Frequency	percent
Warehouse activities	25	23.8%
Transportation activities	60	57.1%
Custom clearance activities	20	19.0%
Total	**105**	**100**

Source: Field data (2019)

After that the researcher used factor analysis technique, the result of Kaiser-Meyer-Olkin(KMO) and Bartlett's Test measure of sampling adequacy was .806 which is considered adequate and significance value (p value = .000) which is significantly acceptable. Chi-square = 483.839 and degree of freedom (df) was 36, hence it is considered suitable for further analysis.

Table4.17 Kaiser-Meyer-Olkin and Bartlett's Test for Logistics integration system

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.806
Bartlett's Test of Sphericity	Approx. Chi-Square	483.839
	df	36
	sig.	.000

Source: field data (2019)

For the purpose of determine the loading factors, the researcher opt to use .5 as a cut of point. By using Principal component analysis as a rotation and extraction method, poor loaded factors (501c and 502b) were dropped as shown in table 5.6 below

Table 4.18 Rotated component matrix for Logistics integration system variable

	Component		Cronbach's	Computation
	1	**2**	**Alpha**	
601c –Stakeholders connectivity	831			(601c + 601e + 601a + 601d)/4
601e–Business process integration	823		.892	LIS _enterprise resource planning
601a –Stakeholders integration	768			
601d –Effective use of resources	713			
602c – Information exchange		906		(602c + 602d + 602b)/3
602d – Strategic decision		844	.912	LIS_electronic data interchange
602b – Stakeholders coordination		806		

Source: Field data (2019)

Table 4.18 above indicates that Variables code number 601 which is ERP and 602 EDI fit well for this study because the value of Cronbach's Alpha is greater than 0.700. ERP with Cronbach's Alpha of 0.892 and EDI with Cronbach's Alpha of 0.912 this is an indicator that two attributes fit very good for the study.

4.4 Regression analysis

After using factor analysis technique as one of the method for analyzing quantitative data, likewise the researcher employed multiple regression for analyzing and testing the associations among independent and dependent variables of the study. According to Pallant (2013), Multiple regression is a statistical method used envisage scores on a dependent variable from scores of number of independent variables. The researcher used multiple regression with the aim of testing and prove the hypothesis as was presented in previous chapter of the study.

4.4.1 The influence of information flow on logistics Performance of CTC

The effect of information flow on logistics performance of freight transporting companies was discussed into two attributes namely information sharing (301) and information accuracy (302). Multiple regression was chosen by the researcher to test

the association amongst information attributes and logistics performance of cargo transportation firms.

By using multiple regression analysis; the model summary describe the general contribution of the predictors (Information sharing and information accuracy) to the dependent variable (logistics performance) as shown in table 4.21

Table 4.19 Model summary for information flow and logistics performance

Model		R Square	Adjusted RSquare	Std. Error of the Estimate
1	**.651[a]**	.424	.413	.32315

Source: Field data (2019)

Using the value of R square the results indicates that logistics performance of cargo transportation companies is directly influenced by information sharing and information accuracy by 42.4% and adjusted R-square of (.413). The result in table 4.19 agreeing with the study of Ayantoyinbo, (2015) and Choy *et al.* (2014) that information sharing and information accuracy has the direct effect on the performance of logistics companies.

Table 4.20 ANOVA on the influence of information flow on logistics performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.854	2	3.927	37.605	.000[b]
	Residual	10.651	102	.104		
	Total	18.505	104			

a. Dependent Variable: Logistics performance
b. Predictors: (Constant), information accuracy, information sharing
Source: Field data (2019)

The model is significant at F=37.605 and p=0.000 indicating that information sharing and information accuracy have a significant association on logistics performance of cargo transportation companies.

Table 4.21 Multiple regression analysis for Information flow and logistics Performance

Hypothesis	Un-standardized coefficients		Standardized coefficients		
	B	Std error	Beta	t	sig
Constant	.329	.158		2.086	.039
INFO sharing H1a	.274	.082	.2743	.349	.001
INFO accuracy H1b	.552	.092	.4936	.030	.000

Source: Field data (2019)

Table 4.21 above indicates information sharing and information accuracy has positive significance relationship with logistics performance of cargo transportation companies, whereby information sharing influence logistics performance by significance value of .001 with the influence of beta value (β=.2743)and information accuracy influence logistics performance by .000 with beta value of ((β=.4936) . The result above are matching with the study of Oyebamiji, (2018) and Lee *et al*.,(2016).

4.4.2 The influence of fleet management on logistics performance

The researcher wants to identify the influence of FMS on logistics performance of cargo transportation companies. Fleet management was categorized into two attributes namely cargo tracking (401) and route planning and scheduling (402). The researcher uses multiple regressions to test the association between fleet management attributes and logistics performance of cargo transportation companies. The model summary below describes the overall influence of the predictors (Cargo tracking and route planning and scheduling) to the dependent variable (logistics performance) as shown in table 4.22.

Table 4.22 Model summary for fleet management system and logistics performance

ModelR	**R Square**	**AdjustedRSquare**	**Std. Error of the Estimate**
1 **.630[a]**	.397	.386	. .33065

Source: Field data (2019)

The result in table 4.22 Indicates the value of R square 39.7% and adjusted R square of .386. This implies that cargo tracking together with route planning and scheduling influence logistics performance of cargo transportation companies by 39.7%. Fleet management systems such as cargo tracking and route planning and scheduling aspects are likely to influence logistics performance of Cargo transportation companies.

Table 4.23 ANOVA on the influence of fleet management system on logistics performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.353	2	3.677	33.628	.000[b]
	Residual	11.152	102	.109		
	Total	18.505	104			

a. Dependent Variable: Logistics performance
b. Predictors: (Constant), Route planning and scheduling, cargo tracking
Source: Field data (2019)

The model is significant at F=33.628 and p=0.000 indicating that Cargo Tracking and Route planning and scheduling on has an association with logistics performance of cargo transportation companies.

Table 4.24 below shows the result that Cargo tracking together with route planning and scheduling as the independent sub-variables have positive and significant correlation with logistics performance of cargo transportation companies. Cargo tracking has significant value of .000 and Beta value (β = .522) while route planning and scheduling has significance value of .002. This implies that Cargo tracking together with route planning and scheduling has a significant association on logistics performance of cargo transportation companies.

Table 4.24 Multiple regression analysis for fleet management systems and logistics performance.

	Un-standardized Coefficients		Standardized coefficients		
Hypothesis	B	Std error	Beta	t	sig
Constant	.426	.1622		.632	.010
Cargo tracking H2a	.452	.068	.522	6.625	.000
Route p&sH2b	.244	.075	.257	3.261	.002

Source: Field data (2019)

Table 4.24 above indicates that cargo tracking has a positive relationship with logistics performance by significance value of .000 and beta value of (β=.552), route planning and scheduling have positive relationship with performance of logistics operations of cargo transportation companies with significance value of (β=.257) and therefore the results are coinciding with the study by (Hu *et al.*, 2015).

4.4.3 The influence of Inventory management system on logistics Performance of CTC

The effect of inventory management system on logistics performance of cargo transportation companies was discussed into two attributes namely vendor managed inventory (501) and barcodes (502). Multiple regression was adopted by the researcher for testing the relationship between inventory management attributes and logistics performance of cargo transportation firms.

By using multiple regression analysis; the model summary describe the general contribution of the predictors (vendor managed inventory and Barcodes) to the dependent variable (logistics performance) as displayed in table 4.25

Table 4.25 Model summary for inventory management system and logistics performance

ModelR		R Square	Adjusted RSquare	Std. Error of the Estimate
1	**.403[a]**	.162	.146	.38985

Source: Field data (2019)

Using the value of R square the results indicates that logistics performance of cargo transportation companies is directly influenced by vendor managed inventory and Barcodes by 16.2% and adjusted R-square of (.146). The result in table 4.25 corresponding with the study of (Wilson et al. 2015&Zawawi *et al.* 2014) that vendor managed inventory and Barcodes has the direct influence on the performance of logistics companies.

Table 4.26 ANOVA on the influence of inventory management system on logistics performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.003	2	1.502	9.880	.000[b]
	Residual	15.502	102	.152		
	Total	18.505	104			

Dependent Variable: Logistics performance
Predictors: (Constant), Barcodes, Vendor managed inventory
Source: Field data (2019)

The model is significant at F=9.880and p=0.000 indicating that there is a significant correlation among Vendor managed inventory and Barcodes on logistics performance of cargo transportation companies.

Table 4.27 Multiple regression analysis for inventory management systems and logistics performance

Model			Unstandardized Coefficients		Standardized Coefficients		
		Hypothesis	B	Std. Error	Beta	t	Sig.
1	(Constant)		.767	.209		3.670	.000
	VMI	H_{3a}	.296	.119	.257	2.481	.015
	Barcodes	H_{3b}	.293	.144	.210	2.028	.045

Source: Field data (2019)

Table 4.27 above indicates that Vendor managed inventory and Barcodes has positive significance relationship with logistics performance of cargo transportation companies, whereby vendor managed inventory influence logistics performance by significance value of .015 with beta value of （β=.257) and Barcodes influence logistics performance by .045 with beta value of （β=.210) .The result above are matching with the study of (Oyebamiji 2018:Mlimbila &Mbamba 2018).

4.4.4 The influence of logistics integration system on logistics Performance of CTC

The effect of logistics integration system on logistics performance of cargo transportation companies was discussed into two attributes namely Enterprise resource planning (601) and Electronic data interchange (602). Multiple regression was used by the researcher for testing the correlation amongst logistics integration system and logistics performance of cargo transportation firms.

Table 4.28 Model summary for logistics integration system on logistics Performance

ModelR		R Square	Adjusted RSquare	Std. Error of the Estimate
1	**.766[a]**	.587	.579	.27375

Source: Field data (2019)

The Model summary describes the overall contribution of the predictors (enterprise resource planning and electronic data interchange) to the dependent variable (logistics performance) in table 4.28 above. The result shows that the value of R square is 58.7%. This give indication that enterprise resource planning and electronic data interchange are direct linked with logistics performance of cargo transportation companies.

Table 4.29 ANOVA on the influence of logistics integration system on logistics performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.861	2	5.431	72.466	.000[b]
	Residual	7.644	102	.075		
	Total	18.505	104			

Dependent Logistics performance
Predictors: (Constant), Electronic data interchange, Enterprise resource planning
Source: Field data (2019)

The model is significant at F=72.466 and p=0.000 indicating that Electronic data interchange and Enterprise resources planning has a close association with logistics performance of cargo transportation companies.

Table 4.30 Multiple regression analysis for logistics integration system and logistics Performance

Model		Hypothesis	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
1	(Constant)		.553	.106		5.200	.000
	ERP	H_{4a}	.411	.090	.393	4.594	.000
	EDI	H_{4b}	.283	.054	.445	5.202	.000

Source: Field data (2019)

Table 4.30 above indicates that Enterprise resource planning and Electronic data interchange has positive significance relationship with logistics performance of cargo transportation companies, whereby Enterprise resource planning influence logistics performance by significance value of .000 with beta value of （β=.393) and Barcodes influence logistics performance by .000 with beta value of （β=.445). The result above are matching with the study of Lee *et al*., (2016).

4.5 Correlation analysis

Correlation analysis is a statistical tool used to describe the strength and direction of linear association between two or more variable (Pallant, 2013). According to (Hair *et al*. 2006), Correlation coefficient is a measure of linear relationship between two variables. The value of correlation coefficient always range between -1 and +1(Musabila 2012). A correlation coefficient of +1 value shows that variables are perfectly linked in a positive linear sense while a correlation coefficient of -1 indicates that variables are perfectly linked in a negative linear sense, and a correlation coefficient of 0 indicates that there is no linear correlation between the two variables (Ndeto *et al*., 2016).

4.5.1 Correlation between information flow and logistics performance

Firstly, the researcher wants to measure the relationship Information flow variable and logistics performance. Bivariate correlation technique was used by the researcher, and the result in table shows that there is a positive association amongst information sharing and logistics performance (Timely delivery, Customer satisfaction and Efficiency aspects) as displayed by Pearson correlation (r =0.367**) and a p-value of (p =0.000). Information sharing has shown positive relationship with customer satisfaction with a Pearson correlation (r =0.350**) and p-value of (p =0.000). Information sharing has also shown positive relationship with efficiency aspect with as displayed by Pearson correlation (r =0.450) and p-value of (p =0.000)

Information accuracy has shown positive relation with logistics performance in all aspects (Timely delivery, customer satisfaction and efficiency) as shown by Pearson correlation of (0.328**) and p-value of 0.001, for customer satisfaction aspects a Pearson correlation was (r =0.658**) and p-value of (p=0.000) and for efficiency aspects Pearson correlation was (r =0.551**) and p-value of (0.000). This indicates that information sharing and information accuracy has a relative relationship with logistics performance and therefore can speed up logistics performance in cargo transportation companies.

Table 4.31 Correlation analysis between information flow and logistics performance

		Timely delivery	Customer satisfaction	Efficiency	Information sharing	Information accuracy
Timely delivery	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	105				
Customer satisfaction	Pearson Correlation	.701**	1			
	Sig. (2-tailed)	.000				
	N	105	105			
Efficiency	Pearson Correlation	.328**	.624**	1		
	Sig. (2-tailed)	.001	.000			
	N	105	105	105		
information sharing	Pearson Correlation	.367**	.350**	.450**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	105	105	105	105	
information accuracy	Pearson Correlation	.328**	.658**	.551**	.395**	1
	Sig. (2-tailed)	.001	.000	.000	.000	
	N	105	105	105	105	105

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

Source: Field data (2019)

Additionally information sharing has a positive relationship with information accuracy by a Pearson correlation of (r =0.395**) and p-value of (p=0.000). This implies that sharing accuracy information has a positive relationship with logistics performance of cargo transportation companies.

.Also customer satisfaction has a positive relationship with timely delivery by a Pearson correlation of (r = 0.701**) and p-value of (p = 0.000). This implies that timely delivery enhance customer satisfaction meaning that both customer satisfaction and timely delivery has a positive association with logistics performance of cargo transportation companies.

4.5.2 Correlation between fleet management system and logistics performance

Secondly the researcher wants to comprehend the correlation amongst FMS and logistics performance. Result in table below indicates that there is a strong positive relationship between cargo tracking and logistics performance (timely delivery) shown by Pearson correlation of (r =0.643**) and p-value of p = (0.000). The researcher also discovered that there is a positive association amongst Cargo tracking

and logistics performance (customer satisfaction aspect) shown by Pearson correlation (r =0. 624**) and p-value of p= (0.000).

Route planning and scheduling has shown a positive relation with logistics performance at the aspects of (timely delivery and customer satisfaction) as shown by Pearson correlation of r = (0.435**) and p-value of p = (0.000). This indicates that cargo tracking and route planning and scheduling have positive correlation with logistics performance and can assist to increase performance of cargo transportation companies.

Table 4.32 Correlation between fleet management system and logistics performance

		Timely delivery	Customer satisfaction	Efficiency	cargo tracking	Route planning and scheduling
Timely delivery	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	105				
Customer satisfaction	Pearson Correlation	.701**	1			
	Sig. (2-tailed)	.000				
	N	105	105			
Efficiency	Pearson Correlation	.328**	.624**	1		
	Sig. (2-tailed)	.001	.000			
	N	105	105	105		
cargo tracking	Pearson Correlation	.643**	.624**	.182	1	
	Sig. (2-tailed)	.000	.000	.063		
	N	105	105	105	105	
Route planning and scheduling	Pearson Correlation	.435**	.344**	.142	.220	1
	Sig. (2-tailed)	.000	.000	.148	.024	
	N	105	105	105	105	105

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

4.5.3 Correlation between Inventory management system and logistics performance

Third, the researcher wants to know the relationship between inventory management system attributes (Vendor managed inventory and Barcodes) and logistics performance of cargo transportation companies. The researcher was not amazed to see there is relationship between vendor managed inventory and logistics performance (Timely delivery) by a Pearson correlation of (r = 0.306**)and p-value (p = 0.002), the result also shows that vendor managed inventory has a positive association with logistics performance (customer satisfaction) by a Pearson correlation of (r = 0.403**) and p-value of (p = 0.000), Furthermore the researcher discover that there is correlation amongst vendor managed inventory and performance of logistics operations (efficiency) by Pearson correlation of (r = 0.200**) and p-value of p-value (p = 0.041)

Barcodes has shown a positive relationship with logistics performance (customer satisfaction) by Pearson correlation of (r = 0.400**) and p- value of (p = 0.000), the result from the table also shows that barcodes has positive relationship with logistics performance (efficiency) by a Pearson correlation of (r = 0.317**) and p- value of (p = 0.001). This indicates that vendor managed inventory and barcodes has positive relationship with logistics performance of cargo transportation companies. Their result correspond with the study of Goyal *et al*., (2016) and (Karimi & Namusonge, 2014) which found that cost has direct impact against the decision of inventory level to hold.

Table 4.33 Correlation between Inventory management system and logistics performance

		Timely delivery	Customer satisfaction	Efficiency	Vendor managed inventory	Barcodes
Timely delivery	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	105				
Customer satisfaction	Pearson Correlation	.701**	1			
	Sig. (2-tailed)	.000				
	N	105	105			
Efficiency	Pearson Correlation	.328**	.624**	1		
	Sig. (2-tailed)	.001	.000			
	N	105	105	105		
Vendor managed inventory	Pearson Correlation	.306**	.403**	.200*	1	
	Sig. (2-tailed)	.002	.000	.041		
	N	105	105	105	105	
Barcodes	Pearson Correlation	.145	.400**	.317**	.484**	1
	Sig. (2-tailed)	.140	.000	.001	.000	
	N	105	105	105	105	105

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Source: Field data (2019)

4.5.4 Correlation between Logistics integration system and Logistics performance

Finally the researcher wants to understand the relationship between logistics integration system (Enterprise resource planning and electronic data interchange) and logistics performance of cargo transportation companies. The result in table below shows that there is a close correlation amongst enterprise resource planning and performance of logistics operations (timely delivery) by a Pearson correlation of (r = 0.739**) and p-value of (p = 0.000) of 105 respondents, the result also displays that there is positive association among enterprise resource planning and performance of logistics operations (customer satisfaction) with a Pearson correlation of (r = 0.572**)** and p-value of (p = 0.000). Also the result displays that there is a positive affiliation among Enterprise resource planning and performance of logistics

operations (efficiency) by a Pearson correlation of r = (0.4000**)** and p-value of (p = 0.000). This implies that proper planning on how to use company resources such as vehicles will have a positive correlation on performance of logistics operations at the cargo transportation firms.

Electronic data interchange has shown a positive association with logistics performance in all aspects (Timely delivery, customer satisfaction and efficiency) with a Pearson correlation of (r = 0.825**)** and p-value of (p = 0.000) for timely delivery, the result also shows there is a positive relationship with customer satisfaction with a Pearson of (r = 0.643**)**and p-value of (p = 0.000) and for efficiency aspect the Pearson correlation of (r = 0.287**)** and p-value of (p = 0.003). This implies that information exchange such as Market demand between the company and its stakeholders such as supplier and customer will enable the company to plan effectively the use of its resources so as to meet demand of its customer, which will accelerate Logistics performance of cargo transportation companies.

Table 4.34 Correlation between Logistics integration system and Logistics performance

		Timely delivery	Customer satisfaction	Efficiency	Enterprise resource planning	Electronic data interchange
Timely delivery	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	105				
Customer satisfaction	Pearson Correlation	.701**	1			
	Sig. (2-tailed)	.000				
	N	105	105			
Efficiency	Pearson Correlation	.328**	.624**	1		
	Sig. (2-tailed)	.001	.000			
	N	105	105	105		
Enterprise resource planning	Pearson Correlation	.739**	.572**	.400**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	105	105	105	105	
Electronic data interchange	Pearson Correlation	.825**	.643**	.287**	.669**	1
	Sig. (2-tailed)	.000	.000	.003	.000	
	N	105	105	105	105	105

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

Source: Field data (2019)

Additionally electronic data interchange has a positive association with enterprise resource planning by a Pearson correlation of (r = 0.669**) and p-value (p = 0.000). This implies that EDI together with ERP have positive impact on performance of logistics operations in cargo transportation companies.

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.1 Introduction

This chapter discusses the findings in the past chapter based on specific objectives of the study by linking concepts, theories and views of other researcher as discussed in chapter two. The study was based on four specific objectives (information flow, fleet management system, Inventory management system and logistics integration system) as stated and explained below.

5.2 To assess the influence of information flow on logistics performance of CTC

The first specific objective of this study was to evaluate the effect of information flow on logistics performance of cargo transportation companies. Information flow variable was supported by two sub-variable namely; information sharing (301) and information accuracy (302). After running factor analysis for two sub-variables few items were removed due to loading below cut off points or poor loading aspect.
Hence, the result in table 4.9 Chapter four shows that KMO of sampling Adequacy Was .689, Bartlett's Test of sphericity under Chi-square test was 229.358, degree of freedom of 45 and significance value of (p = .000) as shown in table 4.9

The researcher employed multiple regression to analyze quantitative data the results in table 4.19 shows that R-square has a value of 42.4%, this indicates that logistics performance of cargo transportation companies is influenced by both information sharing and information accuracy by 42.4%.
The result from Table 4.21 shows that information sharing and information accuracy has a significant positive correlation with performance of logistics operations in cargo transportation companies by significant values of .001 and .000 respectively. The Anova table 4.20 was significant at .000. The result above are agreeing with the study of Ayantoyinbo.,(2015) and Tatoglu *et al.,* (2016).

Under correlation technique using bivariate correlation technique the results in table 4.31shows that there is a positive association amongst information sharing and performance of logistics operations (Timely delivery, Customer satisfaction and Efficiency aspects) as displayed by Pearson correlation (r =0.367**) and a p-value of (p =0.000). Information sharing has shown positive affiliation with customer satisfaction with a Pearson correlation (r =0.350**) and p-value of (p =0.000). Information sharing has also shown positive correlation with efficiency aspect with as displayed by Pearson correlation (r =0.450**) and p-value of (p =0.000)

Information accuracy has shown positive relation with logistics performance in all aspects (Timely delivery, customer satisfaction and efficiency) as shown by Pearson correlation of (0.328**) and p-value of 0.001, for customer satisfaction aspects a Pearson correlation was (r =0.658**) and p-value of (p=0.000) and for efficiency aspects Pearson correlation was (r =0.551**) and p-value of (0.000).

The researcher interviewed respondents to provide their opinion on how information sharing improves business performance. Most of the respondents interviewed revealed that;

> *"Information sharing is very essential in performing our day to day logistics operations since it simplify communication among supply chain partners, improving resource utilization and reducing overall costs associated with logistics. By reducing all costs in logistics our company is able to improve efficiency of logistics activities."*

This support the study of Kembro & Selviaridis (2015) which revealed that when information is shared effectively among the actors of logistics and supply chain it will enhance the overall performance of logistics activities and improve the competitive position of the company.

Information accuracy was also found to be a contributor of logistics performance in cargo transportation companies 80% of the respondents who were asked to provide their opinion on how information accuracy is essential for logistics performance. Most of the respondents interviewed revealed that;

> *"Regardless of how much we share information with our trading partners and customers, information accuracy will still be the important aspect for better performance of logistics operations. Sharing accuracy information built trust between the company and*

our stakeholders which allows collaborative planning and resulting into joint demand forecast for the entire logistics and supply chain".

This support the study of Sundram *et al*. (2018) which revealed that information accuracy is very important on enhancing supply chain performance by allowing collaborative planning on how to utilize resources in supply chain operations.

5.3 To assess the influence of fleet management system on logistics performance of CTC

The second specific objective of this study was to assess the influence of Fleet management system on logistics performance of cargo transportation companies. Fleet management system variable was supported by two sub-variable namely; cargo tracking (401) together with route planning and scheduling (402). After running factor analysis for two sub-variables few items were removed due to loading below cut off points or poor loading aspect.

Hence, the result in table 4.12 Chapter four shows that KMO of sampling Adequacy was .618, Bartlett's Test of sphericity under Chi-square test was 368.765, degree of freedom of 45 and significance value of (p = .000) as shown in table 4.12.

After running factor analysis, multiple regression was also used by the researcher for testing the correlation between fleet management system and logistics performance. The results in table 4.22 shows that R-square has a value of 39.7%, this indicates that logistics performance of cargo transportation companies is influenced by both cargo tracking together with route planning and scheduling by 39.7%. This implies that cargo tracking together with route planning and scheduling influence logistics performance of cargo transportation companies.

The result from Table 4.24 shows that cargo tracking together with route planning and scheduling has an association with logistics performance of cargo transportation companies by significant values of .000 and .002 respectively. The Anova table was significant at .000.as shown in table 4.23.

The researcher also adopted correlation analysis in this study the results in table 4.32 indicates that there is a strong positive relationship between cargo tracking and

logistics performance (timely delivery) shown by Pearson correlation of (r =0.643**) and p-value of p = (0.000). The researcher also found that there is an association amongst Cargo tracking and performance of logistics operations (customer satisfaction aspect) shown by Pearson correlation (r =0. 624**) and p-value of p= (0.000). The result of the study relates with the presentation of Wilson et al. (2015) that fleet management systems are key attributes to logistics performance of cargo transportation companies.

Route planning and scheduling has shown a positive relation with logistics performance at the aspects of (timely delivery and customer satisfaction) as presented by Pearson correlation of r = (0.435**) and p-value of p = (0.000). This indicates that cargo tracking and route planning and scheduling have an association with logistics performance and can advance performance of logistics operations in cargo transportation companies. The result of this study are agreeing with the study of Gunasekaran et al., (2017) and Oyebamiji, (2018) that fleet management systems are essential for logistics performance of cargo transportation companies.

Through interview conducted by the researcher to the employees of cargo transportation companies to provide their understanding on how fleet management system improves logistics performance. Most of the respondents (employees) when asked that question replied that;

> *"Fleet management system enhanced logistics performance by offering timely tracking of both cargo and vehicle on transit, this enable our company to control the transportation process. By doing so we are able to reduce costs associated with theft and pilferage. Also fleet management systems enable our company to gaining visibility for incoming outgoing freight because we can see shipment progress hence reduction of delays. This improves customer satisfaction and enables our company to stay competitive in the market"*

This coinciding with the study of Hu *et al*., (2015) which revealed that fleet management system is one of the key factors to improve global logistics performance and enhancing customer satisfaction.

Route planning system was also found to be a contributor of logistics performance in cargo transportation companies most of the respondents who were asked to provide their opinion on how route planning system is vital for logistics performance. Most of the respondents interviewed revealed that;

> *"Route planning system helps to reduce the time to plan transport schedule, it also improve vehicle utilization, ensure efficient fuel usage, lowers transport mileage by choosing an economic route which in turn will reduce the overall costs of operations and increase profit of the company"*

This support the study of Franceschetti.,(2015) which revealed that fleet planning, routing and scheduling is essential for proper flow of materials and products in logistics and supply chain network since it will enhance the overall performance of logistics activities and improve the competitive position of the company in the market.

5.4 To examine the influence of inventory management system on logistics performance of CTC

The third specific objective of this study was to examine the effect of inventory management system on logistics performance of cargo transportation companies. Inventory management system variable was supported by two sub-variable namely; Vendor managed inventory (501) and Barcodes (502). After running factor analysis for two sub-variables few items were removed due to loading below cut off points or poor loading aspect.

After removing poor loading factors the result of KMO of sampling Adequacy was .608, Bartlett's Test of sphericity under Chi-square test was 167.513, degree of freedom of 45 and significance value of (p = .000) as shown in table 4.14.

The researcher also uses multiple regression for testing the relationship amongst Inventory management system and performance of logistics operations. The results in table 4.25 shows that R-square has a value of .162 which is equivalent to 16.2%, this indicates that logistics performance of cargo transportation companies is influenced by both vendor managed inventory and Barcodes by 16.2%. This implies

that Vendor managed inventory and Barcodes influence logistics performance of cargo transportation companies. The Anova table was significant at .000 as shown in table 4.26. The results of the study above are relating with the study of (Goyal *et al.*, 2016 & Karimi & Namusonge.,2014).

The researcher also adopted correlation analysis for testing the affiliation amongst Inventory management systems on performance of logistics operations. The result in table4.33displays that there is a close correlation amid enterprise resource planning and logistics performance (timely delivery) by a Pearson correlation of (r = 0.739**) and p-value of (p = 0.000) of 105 respondents, the result also shows that there is positive relationship between enterprise resource planning and logistics performance (customer satisfaction) with a Pearson correlation of (r = 0.572**)** and p-value of (p = 0.000). Also the result shows that there is correlation between Enterprise resource planning and logistics performance (efficiency) by a Pearson correlation of r = (0.400**)** and p-value of (p = 0.000).

Barcodes shows significant positive association with logistics performance (customer satisfaction) by Pearson correlation of (r = 0.400**) and p- value of (p = 0.000), the result also shows that barcodes has positive relationship with logistics performance (efficiency) by a Pearson correlation of (r = 0.317**) and p- value of (p = 0.001). This indicates that vendor managed inventory and barcodes has positive relationship with logistics performance of cargo transportation companies.
Their result obtained correspond with the study of Goyal *et al.*, (2016) and (Karimi & Namusonge, 2014) which found that cost has direct impact on the decision of inventory level to hold.

The researcher conducted an interview with the staffs of cargo transportation companies to get their opinion on how does the inventory management system supports business performance.

The respondents emphasized by saying that;

> *"Yes, with the help of inventory management devices such as Barcode scanner and inventory management software manual work together with human errors are highly reduced, it also enhanced security of our inventories hence our company is able to improve efficiency of the entire logistics operations"*

This coinciding with the study of Goyal *et al.*, (2016)which demonstrated that inventory management systems are essential for proper flow of materials and products in logistics and supply chain network since it will enhance the overall performance of logistics activities and improve the competitive position of the company

5.5 To assess the influence of logistics integration system on logistics performance of CTC

The fourth and last specific objective of this study was to assess the influence of logistics integration system on logistics performance of cargo transportation companies. Logistics integration system was coded as (v 600) and supported by two sub-factors namely Enterprise resource planning (601) and Electronic data interchange (602). After running factor analysis for two attributes few items were removed due to poor loading aspect.

The results of KMO and Bartlett's test after removing poor loading factor were shown in table 4.17 in chapter four. The table displayed that KMO Measure of sampling adequacy was .806 whereas Bartlett's test of sphericity with approx Chi-square with a contribution of 483.839 degree of freedom of 36 and significance value of (p = .000).The p-value of 0.000 for the chi-square statistics implies that the model fit well for the study of Nunnally,. (1978).

Multiple regression was also used by the researcher for testing the association amongst logistics integration system and performance of logistics operations. The results in table 4.28displays that R-square has a value of .587 which is equivalent to 58.7%, this indicates that logistics performance of cargo transportation companies is

influenced by both Enterprise resource planning and Electronic data interchange by 58.7%. This entails that Vendor managed inventory and Barcodes influence logistics performance of cargo transportation companies. The Anova table was significant at .000 as shown in table 4.29. The results are directly coinciding with the study of Lee *et al.,* (2016) and Gunasekaran *et al.*,(2017).

Finally the researcher uses correlation analysis to describe the affiliation amid two variables by using Pearson correlation method as proposed by Pallant.,(2013). The results in table 4.34 shows there is a close correlation among enterprise resource planning and performance of logistics operations (timely delivery) by a Pearson correlation of (r = 0.739**) and p-value of (p = 0.000) of 105 respondents, the result also shows that there is positive relationship between enterprise resource planning and logistics performance (customer satisfaction) with a Pearson correlation of (r = 0.572**)** and p-value of (p = 0.000). Moreover the result illustrates positive affiliation amid Enterprise resource planning and logistics performance (efficiency) by a Pearson correlation of r = (0.400**)** and p-value of (p = 0.000).

Electronic data interchange has shown a positive relationship with logistics performance in all aspects (Timely delivery, customer satisfaction and efficiency) with a Pearson correlation of (r = 0.825**)** and p-value of (p = 0.000) for timely delivery, the result also illustrates ca positive relationship with customer satisfaction with a Pearson of (r = 0.643**)** and p-value of (p = 0.000) and for efficiency aspect the Pearson correlation of (r = 0.287**)** and p-value of (p = 0.003).

This implies that information exchange such as Market demand between the company and its stakeholders such as supplier and customer will enable the company to plan effectively the use of its resources so as to meet demand of its customer, which will accelerate Logistics performance of cargo transportation companies.

The researcher interviewed respondents to provide their opinion on how electronic data interchanges enhance business performance. Most of the respondents interviewed revealed that;

> *"Yes electronic data interchange helps to enhance logistics operations by lowering communication expenses between the company and its business partners, furthermore the company can get information such as demand information faster which in turn will allow the company to plan effectively the use of its resources so as to meet demand of its customers"*

This coinciding with the study of Ayantoyinbo., (2015) which revealed that electronic data interchange is essential for information exchange among the actors in logistics and supply chain network since it will enhance the overall performance of logistics activities and improve the competitive position of the company.

CHAPTER SIX

CONCLUSIONS AND RECCOMENDATIONS

6.1 Introduction

This chapter discusses the conclusion, recommendations and proposes areas for further research. It starts with the conclusions, recommendations, and lastly the need for further research is given.

6.2 Conclusions

The study was aimed at determining the Impact of ICT on logistics performance; A case of cargo transportation companies in Dar-es-salaam. Four factors was adopted from several literatures and supported by theories and concepts discussed in past chapters. After reviewing various literatures, analyzing and discussing the findings, the study has tried to come up with the following conclusions as explained in the sections below.

6.2.1 Influence of Information flow on logistics performance of CTC.

Information flow variable was concluded that Information sharing and Accuracy information precise attributes that support logistics performance of cargo transportation companies. It has been observed that the use of modern ICT will enable the companies to share information with its stakeholders quickly and accurately. For the case of cargo transportation companies the use of modern computerized system has the high degree to improve logistics performance and therefore will enable Manufactures and customers to share information in efficiency manner.

6.2.2 Influence of Fleet management system on logistics performance of CTC

The fleet management system concluded that cargo tracking together with route planning and scheduling support logistics performance of cargo transportation

companies. It has been seen that the use of modern Information technology enable logistics companies to track cargo in transit so as to ensure security of both cargo and vehicle. Also the use of Decision support system for transportation routing and scheduling has been vital for logistics performance since it enable logistics companies to choose appropriate route so as to save time, Decrease cost and advance the overall efficiency of logistics operations.

6.2.3 Influence of Inventory management system on logistics performance of CTC

Inventory management system variable concluded that Vendor managed inventory and Barcodes are important attributes to logistics performance of cargo transportation companies. Therefore Cargo transportation companies have to make appropriate inventory decision based on critical decision that will govern long term basis.

6.2.4 Influence of Logistics integration system on logistics performance of CTC

Logistics integration system concluded that enterprise resource planning and electronic data interchange are vital for logistics performance of cargo transportation companies. The study revealed that information exchange between the company and its stakeholders such as suppliers and customer will enable the company to plan effectively the use of its resources.

Due to competitive pressure in logistics sector, many cargo transportation companies decided to adopt ICT so as to maintain competitive position in the market and improve performance of logistics operations through timely delivery, cost reduction and customer satisfaction. The result concluded that Information flow *–information sharing* and *information accuracy*, Fleet management-*cargo tracking* together with *route planning and scheduling*, Inventory management system-*Vendor managed inventory* and *barcodes* logistics integration system-*Enterprise resources planning* and *Electronic data interchange* are critical attributes that support the dependent variable (logistics performance).

6.3 Contribution of the Study

This study will give and provide new light and understandings to academicians in developing more concepts and model where little research has been conducted in logistics performance of cargo transportation companies. The researcher believes that this study will be useful practitioners in logistics sector to evaluate their performance and take critical correction measures and actions to improve the whole performance of logistics.

6.4 Study Implications

The findings of this study provide implications to the Owners and managers of logistics companies by providing them an understanding on how information and communication technology can be used to improve logistics performance of their companies so as to reduce costs of the operations while at the same time winning competitive position in the market.

6.5 Recommendations of the study

Based on research findings in chapter five. The researcher suggested the following recommendations to be taken into considerations in order to ensure logistics performance of cargo transportation companies.

To policy makers. Policies have great influence on performance of logistics sector, policy makers must acknowledge ICTs as an important tool for improving logistics performance of cargo transportation companies and enforcing the policies that that wants logistics companies to use ICTs in running their day to day logistics activities.

To the practitioners. This study will useful for practitioners. The practitioners are provided with some understandings concerning the use of ICT on logistics performance so as to have competitive advantage in the market.

6.6 Area for Further Research

This study was done on the Impact of ICT on logistics performance, whereby four factors with their sub-factors has a significance relationship with logistics performance. The researcher recommended that further research could focus on overall organization performance measures.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

I am THOBIAS KYOMO a student from Mzumbe University main Campus at Morogoro Region undertaking Master degree in Procurement and Supply Chain Management (Msc - PSCM).

The main objective of this study is to determine the influence of Information and communication Technology on logistics performance. The data provided on this paper will be confidential as the study is intended for academic purpose only.

SECTION A: GENERAL INFORMATION

The questions asked in this section will be used for classification purposes only. The information gathered will not be used in any other way and will be kept strictly confidential. Please Tick [√] the most appropriate alternative/s

1. What is the name of your company…….

2. What position do you hold in the company…….

3. Which department do you work for …….

   a) Procurement department[ ]
   b) Accounts department[ ]
   c) ICT department[ ]
   d) Marketing department[ ]
   e) Clearing and Forwarding [ ]
   f) Transportation department[ ]
   g) Sales department[ ]
   h) Human resources department[ ]
   i) Quality assurance department [ ]
   j) Warehouse department[ ]
   k) Administration [ ]

4. Please indicate your gender

MALE [ ] FEMALE [ ]

5. What is your marital status?

Single [ ] Married [ ]

6. Please indicate your age

18-25 [ ] 26-33 [ ] 34-41 [ ] 42-49 [ ] 50 and above [ ]

7. In what category does your organization fall?

Public [ ] private [ ] NGO's [ ] other level (specify) ……

8. For how long have you been working in this industry?

Below 3 years [ ] 3-6 years [ ] 7-10 years [ ]

9. How many workers does your company have?

1-10 [ ] 11-30 [ ] 31-50 [ ] 51-100 [ ] Above 100 [ ]

10. What is your education level?

Doctorate [ ] Masters [ ] Bachelor degree [ ] Diploma [ ] Certificate [ ] other level specify……

SECTION I: THE IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON PERFORMANCE OF LOGISTICS: A CASE OF CARGO TRANSPORTATION COMPANIES IN DAR-ES-SALAAM

SECTION A: Information flow

In this part the question asked reflect the aspect of information flow on logistics performance please put a tick mark [√] (to specify your level of agreement or disagreement which best describe your opinion

V 301	**Information sharing**	**Strong agree**	**Agree**	**Not sure**	**Disagree**	**Strong disagree**
301a	Our company practice internal information sharing					
301b	Our company practice external information sharing					
301c	Our company exchange timely information with its partners to achieve accurate demand					
301d	Information distortion is minimized throughout our logistics and supply chain.					
301e	Information exchange between the company and its trading partners is complete					
V 302	**Information accuracy**					
302a	Our company use advanced information system					
302b	Our company has enough information system					
302c	Employees are competent enough with the information system					
302d	Information system enhance efficiency of the logistics activities					
302e	Using information system, human errors are highly to be minimized and improve accuracy of the operations					

SECTION B: Fleet management systems

In this part the question asked reflect the aspect of Fleet management system on logistics performance please put a tick mark [√] (to specify your level of agreement or disagreement which best describe your opinion

1 What are the flee management services provided by your company.

a) Automobile trucking [ ]
b) Fuel management [ ]
c) Driver management [ ]
d) Root planning and schedule [ ]

V 401	**Cargo tracking**	**Strong agree**	**Agree**	**Not sure**	**Disagree**	**Strong disagree**
401a	The tracking system increases client's confidence resulting into increase in sales					
401b	Electronic cargo tracking system reduces costs hence high profits					
401c	Electronic cargo tracking system is more safe than manual management systems					
401d	The online tracking system can be interfered easily compare to manual tracking systems					
401e	Electronic cargo tracking system helps to minimize theft of both vehicle and cargo					
V 402	**Route planning and scheduling**					
402a	Our company uses decision support system for transportation planning					
402b	Our company uses decision support system for routing					
402c	Our company uses decision support system for scheduling					
402d	Our company uses decision support system for load optimization					
402e	Planning and shipping for goods has been improved with incorporation of information technology					

SECTION C: Inventory management system

In this part the question asked reflect the aspect of Inventory management system on logistics performance please put a tick mark [√] (to specify your level of agreement or disagreement which best describe your opinion

V 501	**Vendor managed inventory**	**Strong agree**	**Agree**	**Not sure**	**Disagree**	**Strong disagree**
501a	Optimal inventory level influence performance					
501 b	Reduced lead time influence performance					
501 c	Increased profitability influence performance					
501 d	Improved supplier relationship influence performance					
501 e	Reduced operating cost in logistics influences performance					
502	**Barcodes**					
502a	Ease traceability of inventory influence performance					
502b	Inventory accuracy influence performance					
502c	Ease decision making influence performance of logistics companies					
502d	Improved logistics operations influence performance					
502e	Use of barcodes in tracking stock items has enhanced Security hence influence performance					

SECTION D: Logistics integration system

In this part the question asked reflect the aspect of Logistics integration system on logistics performance please put a tick mark [√] (to specify your level of agreement or disagreement which best describe your opinion.

1 What are the main activities being integrated ……

a) Warehouse activities [ ]
b) Transportation activities [ ]
c) Custom clearance [ ]

V 601	**Enterprise resource planning**	**Strong agree**	**Agree**	**Not sure**	**Disagree**	**Strong disagree**
601a	Enterprise resource planning system has improved integration with company stakeholders					
601b	The use of enterprise resource planning systems has led to improved inventory accuracy					
601c	The use of enterprise resource planning system has improved connectivity with company stakeholders					
601d	Enterprise resources system enable the company to plan effectively the use of its resources					
601e	Enterprise resource planning system advances business performance by integrating variety of business process					
V 602	**Electronic data interchange**					
602a	Electronic data interchange enable the company to share information with other companies					
602b	The company has integrated its system to improve logistics operations					
602c	Electronic data interchange allows the company to make good decision concerning logistics operations					
602d	Electronic data interchange allow the company to enhance coordination with its stakeholders					

PART E: LOGISTICS PERFORMANCE

In this part the question asked reflect the aspect of Logistics performance please put a tick mark [√] (to indicate your level of agreement or disagreement which best describe your opinion

V 701	**Information and communication technology on logistics performance (Timely delivery)**	**Strong agree**	**Agree**	**Not sure**	**Disagree**	**Strong disagree**
701a	Information technology improves time delivery of products to our customer					
701b	Delivery speed has enhanced with the incorporation of information technology in logistics					
701c	Accuracy of delivery time has improved significantly with incorporation of information technology in logistics					
701d	Information technology has enhanced proper condition of delivered goods to our customer					
701e	The time to save one client has reduced significantly since the incorporation of information technology on customer service delivery					
V 702	**Information and communication technology on logistics performance (customer satisfaction)**					
702a	Clients are more satisfied with our service since incorporation of information technology in logistics					
702b	Our clients encourage other people to do business with our company					
702c	Our customers are more loyal to us than before					
702d	The number of Customer complaints has reduced significantly					
702e	Customer are more satisfied being served online than manually.					
V703	**Information and communication technology on logistics performance (Efficiency)**					

703a	Our company inventory cost has enhanced					
703b	Our company transport cost has improved					
703c	Our company labor cost has improved					
703d	Our company operational cost has improved					
703e	Our company has accurately knowledge on cost associated with logistics and control mechanism					

INTERVIEW GUIDE

1. How does information sharing helps to improve logistics performance?
2. Is accurate information necessary to improve logistics performance?
3. Does fleet management system improves logistics performance? If yes how?
4. How does route planning systems improves logistics performance?
5. Does inventory management system helps to improve logistics performance? If yes how?
6. Does electronic data interchange helps to improve logistics operations of your company?