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College of Business and Economics



**The Effect of Information and Communication Technologies on
Operational Performance of Logistics Management: The Case of
Ethiopian Shipping and Logistics Service Enterprise**

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Masters of Arts in Logistics and Supply Chain Management**

By

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Operational Performance of Logistics Management: The Case of
Ethiopian Shipping and Logistics Service Enterprise**

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DECLARATION

I, the undersigned, declare that, this study **“The Effect of Information and Communication Technologies on Operational Performance of Logistics Management: the case of Ethiopian Shipping and Logistics Service Enterprise”** is my original work and has not been presented for a degree in any other university, and that all sources of materials used for the study have beenduly acknowledged.

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Dedication:

I dedicate this Thesis to the Memory of My Father **Ato ABEBE AMTACHEW** and My Elder Brother **Ato ABEJE ABEBE**.

Contents	Page
Acknowledgement-----	I
Dedication-----	II
Table of Content-----	III
List of Tables-----	V
List of Figure-----	V
Acronyms-----	VI
Abstract-----	VII

Chapter One: Introduction

1.1 Background of the study-----	1
1.2 Study Area-----	2
1.3 Statement of the problem-----	4
1.4 Research Questions-----	5
1.5 Research Objective -----	6
1.5.1 General Objective -----	6
1.5.2 Specific Objectives -----	6
1.6 Significance of the study -----	6
1.7 Scope of the study-----	7
1.8 Limitation of the study-----	7
1.9 Operational Definition of terms-----	8
1.10 Organization of the paper -----	8

Chapter Two: Review of Related Literature

2.1 Theoretical Literature Review -----	9
2.1.1 Logistics Management-----	9
2.1.2 Information communication technologies-----	10
2.1.3 ICTs and Logistics management -----	11
2.1.4 ICT Factors-----	14
2.1.5 Logistics Performance-----	18
2.1.6 Barriers Related to ICT Practice-----	20
2.1.7 Models and Theories-----	22
2.2 Empirical Literature Review-----	25
2.3 Identified Research Gap-----	27
2.4 Conceptual framework-----	28

Chapter Three: Research Design and Methodology

3.1. Research Approach -----	30
3.2. Research Design-----	30
3.3. Population and Sample-----	30
3.3.1. Target Population-----	30
3.3.2. Sampling Technique & Sample size-----	31
3.3.3. Sources of Data & Data Collection Method-----	32
3.5 Data Analysis Methods-----	33
3.6 Ethical Considerations-----	34

Chapter Four: Data Presentation and Analysis

4.1 Validity and reliability-----	35
4.2 Response Rate-----	35
4.3 Descriptive Analysis-----	36
4.3.1 Respondents Demographics Data-----	36
4.3.2 Extent to which ICT is implemented in ESLSE-----	39
4.3.2.1 Extent of ICT Adoption in ESLSE-----	39
4.3.2.2 Extent of ICT Usage-----	41
4.3.2.3 Extent of Effectiveness of Utilizing ICT in ESLSE-----	44
4.3.3 Measures of Operational Performance of logistics-----	47
4.4 Correlation analysis-----	49
4.5 Regression Analysis-----	50
4.6 Challenges facing ICT in the Logistics Management Processes-----	53
4.7 Qualitative Analysis-----	55

Chapter Five: Summary, Conclusion and Recommendations

5.1 Summary of Major Findings-----	58
5.2 Conclusion of the Study-----	60
5.3 Recommendation-----	61

References-----63

Appendix I: Questionnaire

Appendix II: Interview Guideline

List of Tables

Page	
Table 4.1 Response Rate.....	36
Table 4.2 Gender of Respondents.....	36
Table 4.3 Age of Respondents.....	37
Table 4.4 Experience of Respondents in ESLSE.....	37
Table 4.5 Education Level of Respondents.....	38
Table 4.6 Respondents' Departments.....	38
Table 4.7 Respondents' Designation.....	38
Table 4.8 Perceived Utilization of ICT and Perceived Ease of Use.....	39
Table 4.9 Extent of Usage of ICT systems in Logistics Management in ESLSE.....	41
Table 4.10 Use of ICT in the logistics functions.....	43
Table 4.11 Perceived effectiveness of utilizing ICT in ESLSE.....	45
Table 4.12 Overall Extent of ICT Implementation.....	47
Table 4.13 Means of measures of operational performance of logistics.....	48
Table 4.14 Zero Order Correlations.....	49
Table 4.15 Model Summary.....	50
Table 4.16 Coefficients of the independent variables.....	51
Table 4.17 Analysis of Variance.....	52
Table 4.18 Challenges facing ICT in the Logistics Management Processes.....	53

List of Figure

Fig 2.1 Conceptual framework for the study -----	29
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Acronyms

ASYCUDA	Automated System for Customs Data
CTTS	Container Trucking and Trucing System
CRM	Customer Relation Management
DPOIS	Dry Port Operation Information System
EDI	Electronic Data Interchange
EOS	Electronic Ordering System
ERP	Enterprise Resource Planning
ESLSE	Ethiopian Shipping and Logistics Service Enterprise
GIS	Geographical Information System
GPS	Global Positioning System
ICT	Information Communication Technology
IT	Information Technology
LAN	Local Area Network
OTIF	On Time In Full deliveries
RBV	Resource based view
SES	Shipp Expert System
RFID	Radio Frequency Identification System
TAM	Technology Acceptance Model
TAM2	Technology Acceptance Model 2
TAM3	Technology Acceptance Model
TMS	Transportation Information System
TOS	Terminal Operating System
UTAUT	Unified Theory of Acceptance and Use of Technology
VAN	Value Added Network
WMS	Warehouse Management System

Abstract

The major objective of this study was to investigate the effect of ICT implementation on operational performance of logistics management in Ethiopian Shipping and Logistics Service Enterprise. This study employed a quantitative and qualitative approach (a mixed approach). The research design was used to determine the level of ICT implementation and its effect on operational performance of logistics management in ESLSE. This study used explanation study in order to answer questions concerning the current status of the subjects in study. The data for the study was collected from 217 staff of Ethiopian Shipping and Logistics Service Enterprise. Likert scaled questionnaire and interviews were used as instruments for data collection. A descriptive analysis was performed to estimate the level of ICT implementation and the person correlation used to estimate the relationship of information communication technology implementation to the operational performance of logistics management. The regression analysis was used to estimate the effect of ICT on operational performance of logistics management. From the results, the overall level of ICT adoption is fairly high, while the level of ICT usage is low. Based on its system quality, information quality, service quality, and usage the current practice of ICT has been effective at a high extent. There is a significant positive relationship between level of ICT adoption, level of ICT usage, level of ICT effectiveness and operational performance of logistics management in ESLSE. Besides, level of ICT usage and level of ICT effectiveness are significant predictors of the operational performance of logistics management in ESLSE. However, level of ICT adoption was found not to be a significant predictor of operational performance of logistics management in ESLSE. The policy-related barriers were considered the most important barriers to ICT implementation in ESLSE. Finally this study recommends that ESLSE needs to increase the level of ICT usage through advanced ICT tools and improve level of ICT effectiveness in order to improve efficiency and effectiveness of its logistics service because according to the findings they are significant predictors. The main future direction from a research point of view is that more detail similar studies should be done using more qualitative approach to provide in-depth understanding of effect of ICT and how it can improve operational performance of logistics management.

Key Words: *Information Communication Technology, ICT adoption, ICT Usage, ICT Effectiveness, Operational Performance of Logistics Management*

Chapter one: Introduction

1.1 Background of the study

Logistics management is integrated within the overall management of the company; it deals with the process of planning, operation and control of the movement and storage of goods, as well as services and the associated flow of information, with the purpose of managing the products from origin to delivery to the final consumer. Logistics is increasingly important for companies as it is a strategy for them, and it also is becoming an important factor to improve competition in a constantly changing market (Anaya, 2000).

So far logistics is a part of Supply Chain Management, concerned with management of the efficient flows of goods, service and related information from the point of origin to the point of consumption with aim of satisfying customers' requirements. Logistics management is responsible for coordinating and optimizing logistics activities such as transport management, materials handling, warehousing, inventory management, as well as integrate logistics operations with other functions including marketing, manufacturing, and finance (Douglas, Martha, and Janus 1998).

Information system and logistics chain are closely related since a good information management is essential for a logistics company to be truly integrated. ICT facilitate the management of interconnecting major information flows related to goods flows, among all actors involved in the service process. Logistics companies have been active in developing information systems. Nevertheless, the use of ICT is irregularly distributed among the various logistics companies.

The advanced information services are a great challenge particularly for small and medium-sized logistics service providers. They have more difficulties in setting up ICT applications due to reluctance to change and insufficient human and financial resources. Smaller logistics service providers often perceive ICT as an added cost involving company re-organization and skills development associated with technology investments.

The result is that such companies have underestimated the potential of ICT as a tool for increasing cost-efficiency and improving customer service simultaneously as suggested by many authors that have stressed the potential role of information technology as a competitive weapon with a potential to enhance the overall company logistics competence (Closs et al., 1997).

This means that the scope ICT can offer for underpinning basic services with value added supply chain services, has not been fully exploited by small and medium sized logistics companies.

Ethiopian Shipping and Logistics Service Enterprise (ESLSE) mainly provides dry port, freight forwarding, and shipping services for importers and exporters by performing customs and other formalities of cargoes. However, with regard to less performance of the enterprise, many challenges are raised in the previous budget year's performance evaluation and logistics users claimed that ICT is among those main on-going challenges with ESLSE. It still suffers from inefficiency and insecurity and it has found a challenge to grow and meet up with its responsibilities due to poor application of ICT. Thus, the provided background implies the importance of ICT impact on Operational Performance of Logistics Management of the enterprise and that was encouraging to conduct this study.

Therefore, the researcher has, thus, been inspired to conduct a study on the effects of information and communication technology on operational performance of logistics management in ESLSE to realize its significant impact on its operations.

1.2 Study Area

The Ethiopian Shipping and Logistics Services Enterprise (ESLSE for short) is the result of merging the former three public enterprises that have been operating separately in a rather similar and interdependent maritime sub-sector; namely, Ethiopian Shipping Lines S.C, Maritime and Transit Services Enterprise and Dry Port Enterprise.

This newly amalgamated enterprise came into being following the issuance of Regulation by the Council of Ministers (Regulation No. 255/2011), and is vested with the huge responsibility of rendering sea-transport & logistics services to the country's importers, exporters, and investors in a more effective and efficient way, by reducing transit time, cost and handoffs. Besides, a truck operating company named Comet Transport S.C has recently been transferred to ESLSE following a government decree issued in the mid of 2014. The ESLSE's standard logistics services related with shipping, freight forwarding and dry port activities.

These activities include transportation, storage, loading or unloading, shipping services, etc. creates spatial value and time value of the customer products. Spatial value is created by changing the

location of cargos from Djibouti port to inland or dry ports. By doing this, the enterprise met customers need to find their cargo on nearer locations, a new cargo value is created.

As a modern business logistics enterprise, ESLSE information communication technology department has three divisions and many employees with a variety of skills that include systems administration, database administration and information technology management. In line with this the ESLSE logistics services today is relatively better to use communications through both wireless voice communication and data transfer as part of the complete logistics services. Dry port operation information system, ship expert system and sea liner are also used in the enterprise. These technologies are critical in the current climate of digital tracking systems that provide an efficient and universal method of following a shipment through the supply chain until it reaches its destination.

Moreover, they help the business logistics activities of ESLSE to improve operational efficiency by making sure goods are transported correctly to their destinations. Logistics managers rely on information systems to manage and track materials, starting from when they are first loaded to when they are unloaded. If there might be a problem regarding to communication, ICT department within ESLSE tries to facilitate the management of interconnecting major information flows related to goods flows, among all actors involved in the service production process.

Especially within shipping activities, ICT department solutions are vital for tracking, tracing and securing the timely transport of each individual container. It has developed joint IT systems with key clients in order to provide a better service (and raise the switching costs). Moreover, on a day-to-day basis, the department deals with the electronic data processing functions of the enterprise, the maintenance and upgrading/updating of the enterprise's intranet, the support of all users, and the monitoring of the proper functioning of the internal and external communications. For these reason ICT is increasingly becoming a critical attribute in ESLSE's ability to manage an integrated logistics activities.

Over the last 50 years, ESLSE has rapidly grown and promoted the development of logistics system, which has successfully contributed to the country's rapid economic growth.

However, the current logistics system in ESLSE still has significant shortcomings regarding its efficiency, safety, and sustainability. One major challenge results from the lack of advanced ICT tool

solutions. Customers demand fast, reliable, customized, and cost-effective logistics processes more and more. The possibility to fulfill suchlike customer demands requires a high flexibility of ESLSE to adapt their services by exploit modern technological solutions of electronic business. But, this is not fully employed in ESLSE and it constraining the enterprise's logistics operation and therefore need to be resolved.

1.3 Statement of the problem

In today's highly competitive global market place, the pressure on organizations to find new ways of creating and delivering value to customers is growing stronger. ICT is today being applied in many organizations in a wide range especially in operations areas. It has provided new ways to store, process, distribute and exchange information both within companies, with customers and suppliers in the supply chain (Somuyiwa&Oyesiku, 2010). It is now commonly accepted that information and communication technologies provide many benefits to companies, including small and medium enterprises (SME), to make them more efficient, effective and competitive (Sarkis, et al, 2004).

Many logistics companies have implemented ICT in emerging supply chain trends in improving business performance. Considering the need for competitive advantage and global competition, many logistics firms are used the latest ICT solutions in their operations (Evangelista & Sweeney, 2006). As stated by Somuyiwa & Oyesiku (2010)well-developed logistics services using intelligent exchange of information increase the effectiveness and efficiency of logistics firms through automation, which increase their role in the economy. **It has provided new ways to store, process, distribute and exchange information both within companies, with customers and suppliers in the supply chain.**

Pietro Evangelista and Edward Sweeney (2003),has conducted a study on Technology Usage in the Supply Chain. This study was mainly focused on the use of ICT by logistics service providers, but the study did not examine the effect of ICT on logistics management. Cristina Martí Espinosa (2016) carried out a study on logistics processes and information communication technology and described the importance of ICT solutions to the processes of logistics activity. This study has left other ICT factors which need to give better information regarding to an obvious research gap on effects of ICT on logistics management.

Even though there are studies done by researchers on ICT andlogistics practices they do not give emphasis specifically for all main ICT factors like perceived utilization and perceived ease of use of

ICT (ICT adoption) and the effectiveness of current used ICT tools. This shows that the researches are highly focused on the importance of ICT solutions and ignored their **level of** effect on logistics management. In addition to that most of the researches were carried out in developed countries which have different economic, political, technology, social, legal and cultural status. As a result, it may be difficult to directly perceive and generalize that the same contribution of ICT usage on logistics management as well as challenges of ICT practices exists in Ethiopian Shipping and Logistics Management.

Over the past years, Ethiopian Shipping and Logistics Service Enterprise strived to implement various ICT applications in its logistics processes. However, there are many activities still manually done and this could be attributed to its ineffective and inefficient performance. According to the preliminary interview information collected from managers and employees, the main problems are the lack of synchronization between the physical and information flow, the redundancy in the information exchanges, high cost of operations, delay in decision making, cargo theft, a serious congestion in the dry ports, and problem related to the utilization of ICT solution.

Even if there are problems on logistics operation, there is no study made and this subject is not yet wholly explained nor deeply verified to assess the effect of ICT tools on operational performance of logistics management. It is not well known the contribution **as well as the level of** ICT implementation on the operational performance of the enterprise.

Due to the above empirical gap, operational problems and absence of related study in ESLSE, the study investigated the effect of ICT implementation on operational performance of logistics management in ESLSE.

1.4 Research Questions

The aim of the research was to study how the information and communication technology (ICT) influence in logistics processes of Ethiopian Shipping and Logistics Service Enterprise (ESLSE) and to know the effects they produce on it. The main question of the study is ‘what is the effect of ICT practice on operational performance of logistics management in ESLSE?’ The research questions answered were:

- What is the adoption level of ICT towards its existence in ESLSE?
- What is the level of ICT usage in ESLSE?

- What is the level of ICT effectiveness in ESLSE?
- What is the effect of ICT implementation on the operational performance of logistics management in ESLSE?
- What are the challenges faced in the implementation of ICT in ESLSE?

1.5 Research Objectives

In response to the above research questions, the associated research objectives are as follows.

1.5.1 General Objective of the research

The general objective of this study was investigating the effect of ICT implementation on operational performance of logistics management in Ethiopian Shipping and Logistics Service Enterprise.

1.5.2 Specific objectives of the research

In order to achieve the above general objective, the specific objectives of this study were:

- To determine the level of ICT adoption towards its existence in ESLSE
- To assess the level of ICT usage in ESLSE
- To identify the level of ICT usage effectiveness in ESLSE
- Determine the effect of ICT implementation on logistics operational performance in ESLSE.
- To identify the challenges of ESLSE in implementing of ICT system.

1.6 Significance of the study

The failure of many logistics companies has been attributed to operational performance inefficiency due to manual documentation process that is compounded with human errors, fraud and delays. This study consequently aims at accessing the effect of ICT implementation practice in ESLSE on operational performance of logistics management. ICT implementation encompasses several strategies used to accomplish the basic goal of delivering efficient and effective service in the most cost-effective and timely manner. The relationship between the on operational performance of logistics management and the ICT practice is, therefore, an important one.

In line with this idea, the finding of this study might be useful to the ESLSE, which is taken up as a case study, get ideas on the effects of ICT on operational performance of logistics management. And it helps the enterprise to identify the dimensions that need further improvement so as to benefit more from the implementation of ICT tools. The study also creates awareness about challenges facing ICT in the Logistics Management Processes of ESLSE in order to gaining better operational performance. Finally, it will also add to the existing body of knowledge to the academicians and will serve as the base for further study on how does ICT practice influence performance of logistics management. As a research, it goes to the university academics.

1.7 Scope of the study

The principal concern of this research is to examine the effect of the ICT implementation on operational performance of logistics management taking into considerations three factors including ICT adoption, level of ICT usage, and ICT effectiveness. In terms of logistics management performance, the study is delimited to operational, and the predictor also limited on information communication technology implementation rather than other resource managements.

The area of the study is limited to the case company i.e., Ethiopian Shipping and Logistics Service Enterprise. The study also limited to the current period of time over which ICT implementation affects the logistics management of the enterprise. It is geographically delimited at Addis Ababa City and Modjo in ESLSE offices and the time span of the research is 2019.

1.8 Limitation of the study

The main limitation of this study was that the unwillingness of some of the respondents to answer the questions in the questionnaires. This result in a challenge to collect the questionnaire distributed for samples, and it has taken many days to gather the questionnaires, because of unknown reasons. Despite the limitation mentioned, the data were collected by probing respondents through clarifying the aim of the research.

1.9 Operational Definition of Terms

- **Logistics:** the process of strategically managing the acquisition, movement and storage of materials, parts and finished inventory and related information flows through the organization

and its marketing channels in such a way that current and future profitability are maximized through the cost effective fulfillment of orders.

- **Technology-** the branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon such subjects as industrial arts, engineering, applied science, and pure science.
- **Information Technology:** the term IT means the use of inter-organizational systems that are used for information sharing and/or processing across organizational boundaries. Information Technology is implemented within an organization for improving the effectiveness and efficiency of that organization.
- **Information communications technology (ICT):** an essential infrastructural system for gathering, storing, retrieving, processing, analyzing and transmitting information and is the backbone of digitized firms and a platform for e-commerce. These include internet based technologies such as transport management systems, vendor managed inventory systems, enterprise resource planning systems, electronic payment systems, wireless networks, cell phones, and other communication mediums.

1.10 Organization of the paper

The study comprises five chapters. Chapter one contains the introduction part dealing with the background information to the study, statement of the problem, basic research questions, objectives of the study, significance of the study, scope of the study, limitation of the study as well as operational definition of terms. Chapter two discusses the review of literature about the subject matter. In chapter three the research methodologies including research approach, research design, population and sample, sources of data and data collection methods, data analysis method, reliability and validity and ethical consideration were presented. Chapter four presents data presentation and analysis of the study and finally, chapter five presents the summary of key data findings, conclusion drawn from the findings highlighted and recommendation made thereto.

Chapter Two: Review of Related Literature

This chapter reviews what other scholars have had to say about the effect of ICT on operational performance of logistics firms and the relationship between ICT and operations of logistics management. It also gives empirical review of the past research both globally, and internationally. The chapter also focuses on conceptual framework before concluding with the summary of literature review and research gaps.

2.1 Theoretical Literature Review

2.1.1 Logistics management

In order to understand how the software works for logistics, it is important to know about logistics management. Logistics involve the flow of things from its point of origin to the point of consumption usually general customers or businesses. The selection of vendors, transportation means, routes and delivery methods constitute an important part of logistical operations (Vindo, 2018).

Logistics is the supply of service or product to the demander or demanding unit at the right time, with the right quantity, in the right quality, with the right cost and at the right place. It is the process of strategically managing the acquisition, movement and storage of materials, parts and finished inventory and related information flows through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost effective fulfillment of orders (Christopher, 2005).

Logistics management is integrated within the overall management of the company; it deals with the process of planning, operation and control of the movement and storage of goods, as well as services and the associated flow of information, with the purpose of managing the products from origin to delivery to the final consumer. The American Council of Logistics Management defines Logistics as the process of planning, implementing and controlling the efficient, cost effective flow and storage of raw materials in processed inventory, finished goods and related information from point of origin to the point of consumption for the purpose of conforming to customer requirements (Frazelle, 2002).

The Council of Supply Chain Management in USA defines “logistics management” as “a kind of programming, implementing and controlling process dealing with the flow from the primitive

occurring point to the final consumption point and the storage efficiency as well as the cost benefit of raw material, half-finished product, finished product and related information, for the purpose of satisfying the customer's requirement" (Bowersox and Closs, 1996).

Logistics management can also be defined as the management of the movement of raw materials, work in progress, finished goods, resources, parts, funds and information across the supply chain in order to satisfy customer needs. It integrates functional activities like transportation, inventory management, warehousing, material management and packaging of goods. Due to the emergence of the concept of supply chain management, logistics management has attracted more and more attention. Logistics management has become a strategic factor that provides a unique competitive advantage (Christopher, 1993).

The logistics management activities typically include inbound, outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply, demand planning and management of third party logistics service providers (Frazelle, 2002). A logistics service provider is a provider of logistics services that performs all or part of a client company's logistics function (Delfmann et al., 2002).

2.1.2 Information Communication Technologies (ICTs)

Technology is one of the main sources of performance for a company (Patel & Pavitt, 1997). It would help companies to have better profitability by implementing technological innovation. Information and communication technology (ICT) is one of the most important and fast growing technological innovations that provide companies with a wide range of opportunities to improve efficiency and effectiveness and even gain competitive advantage (Porter & Millar, 2005).

Information & Communication Technology is essentially an umbrella term which encompasses any communication application or device such as radio, cellular phones, television, computer software and hardware, software satellite systems and so on in addition to their various applications such as wireless communication and video conferencing.

ICTs are all those electronic technologies that are capable of accepting data in forms such as texts, voice, graphics, or videos for processing to produce information for decision making. Kushwaha (2011) defines ICTs as technologies and tools that people use to share, distribute, and gather information to communicate with one another, one on one, or in groups, through the use of computers and interconnected networks.

At the basic level, ICT is concerned with storage, retrieval, manipulation, transmission and receipt of digital information. The developments in ICT provide the appropriate platform upon which innovative ideas, systems and services can be developed and implemented. ICT provides new solutions which trigger a range of new developments in business this boosting competitiveness, supporting business growth and creating jobs (Kushwaha, 2011).

2.1.3 ICTs and Logistics management

In Supply Chain Management, time and customer satisfaction are core and getting information on time is especially important. The use of ICT in supply chain and logistics management has attracted increasing attention of the business and academic world. Lee & Wang (2011) addressed the possibilities of reducing the bullwhip effect in supply chains through Internet based collaboration. Capgemini (2008) found that supply chain performance would be significantly increased if the members of the supply chain collaborated through Internet tools. Furthermore, ICT may further reduce existing wastes and inefficiencies along the supply chain through increasing real-time movement of shipment and operational control of logistics activities.

Logistics companies are now adopting Information Technology as a vital operational tool. Accurate and on-time information increases service level thus decreasing costs and lead time. Improvements in ICT infrastructure have enabled logistics companies to embrace opportunities to substitute paper based processes by electronic interchanges (Lysons& Farrington, 2006). This optimizes the flow of information within and across organizations taking full advantage of the diffusion and e-business software systems. Organizations that invested in logistics management software have produced good end results with noticeable improvements in process, operations, and delivery (Vinod, 2018).

However, the diffusion of ICT in managing supply chain processes is having a profound impact on supply chains. Increasing expenditure on ICT in the supply chain process does not automatically result in higher firm performance.

As a result, poor ICT resource management by one or more actors in the supply chain could have negative repercussions on the performance of the entire supply chain in terms of planning ability, customer service and costs (Lee &Wang, 2011).

The information technologies that are commonly used in logistics industry include electronic data interchange (EDI), the Internet, value added network (VAN), electronic ordering system (EOS), logistics information system, computer telephony integration, and enterprise information portals.

EDI is identified as inter-company computer-to-computer exchange of business documents in standard formats.

Most logistics firms have adopted this technology since the company often has to deal with a large number of goods and related information; they focus frequently on how to effectively process data collection and exchange (Lin & Lin, 2014).

Data acquisition technologies are the backbone of information technology. In manufacturing automation, data acquisition technology is the backbone in all phases of manufacturing, i.e. information detection, testing, supervision, equipment fault diagnosis, and management. Indeed, it may be said that data acquisition technology is the foundation of manufacturing and computer integrated manufacturing system (Hu, Du, & Yang, 2003).

The bar code system and radio frequency identification system (RFID) are acquisition technologies that can facilitate logistics data collection and exchange. These kinds of technologies play an important role in supporting logistics and supply chain processes because of their abilities to identify, trace and track information throughout the supply chain. Technological innovation has great potential for logistics, supply chain management and quick response systems (Zhu, Mukhopadhyay, & Kurata, 2012).

Warehousing plays an important role in a logistical system. The design of a **warehouse management system (WMS)** should address physical facility characteristics and product movement. The warehousing technologies that are commonly used in logistics industry include automated storage and retrieval system, automatic sorting system, computer-aided picking system, and thermostat warehouse. Previous researchers concurred that WMS is considered to be the tools necessary for supporting the warehouse and delivery processes in the logistics industry (Vijayaraman & Osyk, 2006).

The transportation technologies that are commonly used in logistics industry include transportation information system (**TMS**), global positioning system (GPS), geographical information system (GIS), radio-frequency communication system, and transportation data recorder. The transportation information system and geographical information system can help logistics managers planning, managing and controlling transportation issues.

The global positioning system, and radio-frequency communication system can track and guide drivers during the transportation of products. With regards to usage of transportation technologies

such as TMS, GPS and GIS, many researchers (Vieira et al., 2013) agreed that these technologies help logistics service providers to improve their logistics performance.

GPS is an application that can be used from any computer connected to the Internet or via mobile phone. According to Murphy and Wood (2008), global positioning system (GPS) has dramatically changed the ability of the businesses to manage the actual movements in the distribution system which enhances accountability among the drivers thereby improving speed to the market. The monitoring of the trucks makes the drivers more accountable on their trips. The trip reports also help managers with proper periodic analysis on performance.

A Terminal Operating System, or TOS, is a key part of the supply chain and primarily aims to control the movement and storage of various types of Cargo in and around a Container terminal or Port. The systems also enables to make better use of assets, labour and equipment, plan workload, and get up to the minute information which allows for more timely and cost-effective decision making (Lai, Qiang, & Zhao , 2008).

Terminal Operating Systems often utilize other technologies such as internet, EDI processing, mobile computers, wireless LANs and Radio-frequency identification (RFID) to efficiently monitor the flow of products in, out and around the terminal. Data is either batch synchronization with, or a real-time wireless transmission to a central database. The database can then provide useful reports about the status of goods, locations and machines in the terminal. The objective of a terminal operating system is to provide a set of computerized procedures to manage cargo, machines and people within the facility to enable a seamless link to efficiently and effectively manage the facility (Lai, Qiang, &Zhao , 2008).

ERP represents a kind of super system. With ERP system companies are able to integrate all functional units, standardize and manage information sharing within their entire departments and then extended it to suppliers and customers in order for suppliers to expedite the delivery of necessary raw materials and also in order for customers to place an order faster and smoother. It covers most of the core applications needed for logistics processes, including supply chain planning, customer relationship management, accounting, human resources and the integrated ERP systems can include warehouse management tools, (Matt, 2007).

2.1.4 ICT Factors

2.1.4.1 ICT Adoption

The process by which an organization adopts and implements technological innovations is influenced by the technological context, the organizational context and the environmental context (Tomatzky & Fleischer, 1990). Tomatzky & Fleischer (1990) go on to explain that, the technological context includes the Internet and external technologies that are relevant to the firm. Technologies may include both equipment as well as processes.

ICT adoption refers to the perceived usefulness and perceived ease of use (Davis 1989). ICT adoption basically involves use of computers to process information, provide storage of data, and retrieve data (Yusuf, 2005). Logistic service providers use ICT to deliver services to their customers. The use of ICT enhances quality of service which increases productivity, quick response and reliable services (Kashorda et al., 2007). The use of computerized data and data management system in clearing and forwarding companies, shipping lines, freight forwarders has greatly increased service quality over the years (Giannopoulos, 2004). The clearing processes have changed over the years from manual systems to computerized and this has increased their competitive advantage (Larson & Gammelgaard, 2001).

However, when firms introduce new ICT in their operations, it is sometimes followed by resistance by the employees or the users of the system. This could be due to lack of knowledge on how the system is operated. But where the users gain access on how to operate the system they welcome it with ease (Davis, 1989). In the Technology Acceptance Model (TAM), Davis (1989) described the two elements of ICT adoption as the perceived usefulness and perceived ease of use. The TAM suggests that when users are presented with new software package, perceived usefulness and perceived ease of use influence their decisions about how and when they will use the new software.

The benefits of the firm adopting ICT in its operation include; creation of employment opportunities, strengthening of industrial linkage, promotion of flexibility, reduced lead time, reduced complaints, increased customer satisfaction, increased output, and innovation (Harvie, & Lee, 2001).

To sustain business, firms need to be supported by modern technology (Moy & Lee, 2002). The clearing and forwarding firms require adopting a wide range of technological skills in order to help them operate in very different markets and social environment (Hallberg, 2000).

The firms need to accept and adopt new methods of technological development so as to improve service delivery (Venkatesh& Davis, 2000). When firms adopt ICT they are likely to gain potential to accelerate service delivery to their customers, reduce delays, provide services at less cost, motivate customers, and create economic viability (Al-Ansari, 2006). A firm achieves competitive advantage if it's able to provide service at a right time, at a less cost, but of the better quality (Atkinson, 1999).

The enhancement of customer service and increased productivity and process quality is dependent on IT adoption. Closs et al. (1997) and Piplani et al. (2004) suggest that the adoption of IT by third party logistics enables them to acquire specific knowledge and skills that is core to their business.

2.1.4.2 ICT Usage

ICT has triggered multiple waves of changes in the logistics service industry. New technology is reshaping the organization and structure of this industry as ICT impacts significantly on the operations of logistics companies. Christopher (2005) studied and found that logistics performance increase when the members of the supply chain collaborate using Internet tools.

The implementation of new ICT and complementary investments can lead to turnover growth. In other words, firms with high level of ICT usage are more likely to grow (Seddon, 2005). Several countries display impressive economic growth with the aid of ICT. Prior research concerning ICT and global economy growth demonstrates the contribution of ICT to output growth as being very remarkable for economies during the periods 1990-1995 and 1996-2000 (Bowers ox, 2009). The largest economic benefits of ICT are typically observed in countries with high levels of ICT diffusion. The Organization for Economic Co-operation and Development data shows that the United States, Canada, New Zealand, Australia, the Nordic countries and the Netherlands typically have the highest rates of diffusion of ICT (Bowers ox, 2009).

In some countries, notably the United States and Australia, there is evidence that sectors that have invested most in ICT, such as wholesale and retail trade, have experienced an increase in the overall efficiency of using labor and capital, or multi-factor productivity growth.

This could be because these sectors have received productivity gains from ICT use over and above the labor productivity gains they received from investment in ICT, for instance because of network effects (Bowers ox, 2009).

Accordingly, logistics companies are gradually shifting from an asset-based offer to a more process-oriented approach largely based on information management. Within this process, while large logistics companies are gaining substantial benefits from technology usage and implementation, the nature of changes resulting from ICT usage in small logistics service providers remains unclear. The largest economic benefits of ICT are typically observed in countries with high levels of ICT usage (Bowers ox, 2009).

The dimension of ICT usage includes the type and number ICT applications currently used in the company as well as the advancement of the system practiced and facilitating conditions. It also depends on identifying the most widely used communication tool in the company. The advancement of information systems enables logistics operators to reduce the manual effort in providing services and facilitating the timely information flow and enhanced quality control in service and decision making (Ally and Mbamba, 2009). IT advancement has increased customer demands in service delivery, customers requiring quick service delivery and short led time (Bowers ox, 2009).

2.1.4.3 ICT Effectiveness

ICT in the logistics management can help improve supply chain agility, power up operation, reduce cycle time, achieve higher efficiency and deliver products to customer on time if implemented correctly. ICT effectiveness within an organization improves the efficiency of both organizational needs and personal productivity. The increased efficiency from the ICT systems can have a favorable impact on an organization's effectiveness (DeLone& McLean, 2003).

An effective ICT implementation is one that meets the needs (i.e. the goals or strategy) of an organization within which it is used, as well as relevant needs of other key stakeholders related to, but external from, that organization. Effective integrating new technology into existing operations can help a lot in increasing customer service, reduce costs, and streamline supply chains. The new technology must fit into existing policies, practices and people and use to it full power (Essays, UK, 2018).

Numerous studies have only used one or two of the six dimensions to measure ICT effectiveness. For instance, Remenyi and Money (1991) used user-satisfaction, which is based on the gap between users' beliefs of what is important and their perceptions of what is delivered by the IS department, as a surrogate for IT effectiveness. In a research study by Chang and King (2005), ICT effectiveness is measured by systems performance, information effectiveness, and service performance.

It therefore involves the application of and ability to use hard ware, software, and network to enhance information flow and facilitate decisions. According to (DeLone& McLean, 2003), the following interrelated dimensions are used to reflect information system success: ICT systems quality, ICT service quality, and information quality.

Many researchers have identified service quality as an important factor of information system effectiveness. In the IT service context, frequent communication between users and their IT unit helps the IT unit to understand the business needs of users and to become familiar with the channel through which the knowledge is exchanged (Kettinger& Lee, 1995). When users evaluate the quality of delivered IT services, their appraisal is based on the information cues received from the delivered IT product/solutions and from the IT service providers (Kettinger& Lee, 1994).

Information quality is the quality of the information that the systems produces. It is a measure of the value which the information provides to the user of that information. Accuracy can be seen as just one element of information quality. The information that is input into a data base is presumed to be perfect as well as accurate. The information that is accessed is deemed reliable (DeLone& McLean, 2003).

A database design that is accurate and reliable will help achieve the development of new business ideas as well as promoting the organizational goals. Completeness is another attribute of high quality information. Partial information may as well be incomplete information because it is only a small part of the picture. Completeness is as necessary as accuracy when inputting data into a database. Consistency is a key when entering information into a database (Wang, R. & Strong, D., 1996).

According to Wang, R. & Strong, D., (1996), uniqueness is the other component of high quality information. In order to add value to any organization, information must be unique and distinctive. The other important aspect of information is timeliness. New and current data is more valuable to organizations than old outdated information. Especially now, in this era of high technological advances, out-of-date information can keep a company from achieving their goals or from surviving in a competitive arena. The information does not necessarily need to be out of date to have effect; it just needs to not be the most current. Real-time information is an element of timeliness (Wang, R. & Strong, D., 1996).

2.1.5 Logistics Performance

Performance measurement in logistics is essential for effectively managing logistics operations in globally competitive business environment. The pre-requisite for such performance measurement is, determining key performance indicators that will have a direct impact on logistics performance in terms of productivity and competitiveness (Gunasekaran and Kobu 2007).

Mentzer and Konrad (1991) defined logistics performance as effectiveness and efficiency in performing logistics activities. Logistics performance is associated with efficient and reliable operations, which imply overall cost efficiency and long-term customer relationships. The field of logistics and management associate efficiency with how well a relevant action is performed. A firm thus becomes efficient if it achieves result with minimal resources. Eliasson and Samuelson (1991) who studied performance measurement in the public sector define efficiency as a relation between output and input that is normally expressed in terms of financial value, although it also can be expressed in non-financial terms. Efficiency is how well the organization is running its operations and the extent to which the greatest benefit can be obtained from a given amount of resources or doing things right. Effectiveness is defined as the level of goal completion.

In today's dynamic marketplace, the logistics performance of Logistics Service Provider is crucial as the effect of logistics performance is not only on the logistics providers but it also for their customers. In other words, if the logistics performance is fall under negative impact, stakeholders in the same supply chain may suffer with negative impacts caused by the inefficient of logistics performance (Wilding & Juriado, 2004).

Mentzer, Flint, and Kent (1999) highlighted that logistics performance as one of the important factors driving the choice of third-party logistics providers. Therefore, logistics performance measurement plays a vital role in today's business management. Various indicators and attributes of logistics performance have been discussed in terms of different aspects or purposes. As suggested by Aramyan, Oude Lansink, van der Vorst, and van Kooten (2007) there are four categories or clusters of indicators namely efficiency (seeks to measure how resources are used), flexibility (the ability of the respond to changes in the environment and exceptional customer orders), responsiveness (what the customer wants in the shortest amount of time) and quality (represents the particular characteristics of the product supply chain).

Other scholars such as Fugate, Mentzer, and Stank (2010) proposed logistics efficiency, logistics effectiveness and logistics differentiation as dimensions for logistics performance. They used logistics performance as a second-order formative construct. In their study, results indicated that logistics performance positively impacts organizational performance.

International Logistics Performance Index measures countries trade logistics performance, by using a comprehensive measure of the efficiency of countries logistics on international trade. The index is very important to find national logistics challenges for improvement and exploit opportunities for growth. The LPI consist of six indicators: customs and border management, infrastructure, services quality, timeliness, international shipments, and tracking and tracing (Arvis et al. 2014).

According to Pioto et al. (2012), performance of a logistics firm refers to improved marketing, financial, and operational efficiencies. They add that the above definition closely links performance to three key concepts i.e. efficiency, effectiveness, and flexibility of third party logistics firms in performing their duties. Benjamin, Thomas, Hazen, & Terry, (2008) indicate that efficiency is a measure of productivity in which what has been accomplished is measured against what is possible to accomplish. Effectiveness is the degree to which business objectives are being achieved within specified time to adapt to changing environment. Any firm that succeeds on the above three concepts automatically achieves good performance in the industry.

Logistics performance of a company is dependent on low inventories, delivery quality and delivery time etc. In line with this one of the main logistical goals in many service level agreements is achieving on time in full deliveries (OTIF). The key components of OTIF delivery include delivery with: complete quantities ordered, exactly to customer's requested date and time, no delivery problems (shortage, damage) and correct and complete delivery documentation (Rushton et al, 2010). On time complete delivery conforming to order specification is one of the competitive dimensions used by companies (Harrison and Hoek, 2014).

According to Lai et al. (2008), logistics service quality relates to a firm's ability to provide the fast and reliable delivery of products and services, maintain superior order accuracy, and respond to customer inquiries, complaints, and claims in a prompt manner. Miller (2005) found that logistics service quality significantly improved customer satisfaction. Lai et al. (2008) argues that efficiency, effectiveness, and flexibility are the components which if achieved, automatically translate into quality services and good performance of a firm.

Technology enables service firms to improve service efficiency and effectiveness. According to Lalonde, (1994), IT is one of the productive tools that enhance competence while decreasing the cost among clearing firms, thus increasing on their profitability. IT increases operational competitiveness, flexibility and productivity of logistics (Zaryab, 2012). IT automates the basic operational process of a logistics service provider thus improving of the efficiency of the firm, (Piplani, Pokhararel, & Tan, 2004).

The high IT spend of logistics providers is usually triggered by specific requests from customers who are aware that increased logistics performance is a result of IT adoption and will benefit the logistics performance of entire supply chain (Capgemini, 2007). Turnover in logistics firms may be partially explained on the basis of their technology advancement (Norek, & Langley, 2007). Wang et al. (1996) successfully links logistics firms' financial performance to IT advantages and IT involvement. He ascertained that logistics firms that had introduced IT enabled innovations were likely to experience sales growth and an increased market share.

Lai et al. (2008), suggest that successful IT system has great potential to induce efficiency, effectiveness and flexibility of logistics firms. According to Zaryab (2012) using advanced IT in the supply chain enables clearing firms to timely and effectively responds to customer's needs and requirements thus meeting customer expectations. It also reduces the lead time of orders and improves service level of enterprises.

According to Lai et al. (2008), IT effectiveness enables information flow and facilitates quick decision making required in business transactions. It contributes to a firm's competitive advantage by providing cost leadership and product differentiation (Lai et al., 2008). All this translates into improved effectiveness of the logistics firms.

2.1.6 Barriers Related to ICT Practice

The positive role of ICT in improving the overall performance, visibility and communication between logistics actors has been recognized by many stakeholders, but there also exist many barriers to the practice of ICT which vary from company to company, especially between small and large enterprises (Pokharel, 2005). Based on the literature review, several factors inhibiting ICT practice are identified according to their area of impact which can be classified into three categories: user-related, technology-related, and policy related barriers (Komoda, 2009).

The user-related barriers include economic, operational, managerial barriers and relate to the company's environment. **Management capability has a large impact** on how companies perceive the adoption of ICT. Traditionally, the size of the company plays a crucial role in the level of ICT implementation where small and medium size enterprises are more likely to have constraints on financial, human resources and ICT expertise leading to a greater probability of not being able to “afford” appropriate solutions compared to larger enterprises (Kuan et al, 2001). This could lead to a loss of confidence and reduce the overall use of ICT applications in their daily operations and management (Pokharel, 2005).

The economic and financial factors are another constraint, including large investment requirements, the implementation costs, managing and maintenance costs, as well as the unfavorable financial conditions of relevant companies (Evangelista and Sweeney, 2006).

Operation-related barriers are include human capital issues such as difficulty in employing qualified personnel, lack of ICT specialists, and personnel skill shortage to operate new applications, as well as insufficient ICT oriented training and educational activities. In particular, due to the scarcity of high skilled workers and specialists and the limited career advancement prospects (Kuan et al., 2001). **Management capability has a large impact on how companies perceive the adoption of ICT.**

The technology-related barriers relate to the technological constraints that prevent operators making full utilization of ICT applications, including the issues such as interoperability of systems, ICT integration, standardization, security and data protection (Discwise, 2012). Due to the unique characteristics of multimodal transport involving different modes of transport and various related actors into one coherent transport system, the technology-related barriers mainly stem from the series of difficulties arising from the need for interaction among various related actors, as well as the differences in the way each actor operates (Promit, 2009). The issue related to a lack of homogenous ICT standards has an impact on the development of systems for the entire multimodal transport chain and for unimodal operations (Evangelista and Sweeney, 2006). Therefore integrating customer and partner applications is also considered as a significant barrier to ICT adoption (Pokharel, 2005).

The policy-related barriers relate to the coordination and harmonization of different policy levels which could prove to be an effective enabler for facilitating some new technologies or methods implemented through specific regulation. Tsamboulas et al. (2007) assessed the potential effects of related policies on intermodal transport from the European perspective, and indicate that policies

should be designed to improve productivity and efficiency of intermodal transport through technological and organizational enhancement.

Due to the nature of multimodal transport that mainly deals with international freight transport, it is likely that each country will have their own policies which could have an impact on ICT adoption. Komoda (2009) pose different barriers with aspects related to policy including different safety and security standards or regulations between transport modes as well as countries; different legal frameworks according to cargo category; different administrative procedures and standards between countries; and insufficient harmonization of national and European policies.

2.1.7 Models and Theories

A number of theories have proposed to explain acceptance of new technologies and intention to use. These included, but were not restricted to, the Theory of Diffusion of Innovations the Technology Acceptance Model, Final version of Technology Acceptance Model, Technology Acceptance Model 2 (TAM2), Technology Acceptance Model 3 (TAM3), Unified Theory of Acceptance and Use of Technology, The Transaction Cost Economics theory, and the Resource Based View Theory.

Diffusion of innovations is a theory that seeks to explain how, why, and at what rate new ideas and technology spread. Diffusion of innovations is a theory profound by Everett Rogers that seeks to explain how, why, and at what rate new ideas and technology spread. Rogers argues that diffusion is the process by which an innovation is communicated over time among the participants in a social system. For Rogers (1995), adoption is a decision of full use of an innovation as the best course of action available and rejection is a decision “not to adopt an innovation.

Rogers (1995) proposed that the theory of ‘**diffusion of innovation**’ was to establish the foundation for conducting research on innovation acceptance and adoption. The theory explicates the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 1995). The Rogers’ (1995) diffusion of innovation theory explained that the innovation and adoption happen several stages including understanding, persuasion, and decision.

Technology Acceptance Model (TAM) was introduced by Fred Davis in 1989. This model is based on the failure of the enormous majority of IT systems and related technologies due primarily to the lack of user acceptance and hence the importance of studying the user behavior towards these systems and applications.

TAM is specifically tailored for modeling users' acceptance of information systems or technologies. The goal of Davis' (1989) TAM is to explain the general determinants of computer acceptance that lead to explaining users' behavior across a broad range of end-user computing technologies and user populations. The basic TAM model included and tested two specific beliefs: Perceived Usefulness and Perceived Ease of Use. Perceived Usefulness is defined as the potential user's subjective likelihood that the use of a certain system (e.g: single platform E-payment System) will improve his/her action and Perceived Ease of Use refers to the degree to which the potential user expects the target system to be effortless (Davis, 1989).

The final version of Technology Acceptance Model was formed by Venkatesh and Davis (1996) after the main finding of both perceived usefulness and perceived ease of use were found to have a direct influence on behavior intention, thus eliminating the need for the attitude construct.

TAM2 theorizes that users' mental assessment of the match between important goals at work and the consequences of performing job tasks using the system serves as a basis for forming perceptions regarding the usefulness of the system (Venkatesh and Davis, 2000). The results revealed that TAM 2 performed well in both voluntary and mandatory environment.

Venkatesh and Bala (2008) combined TAM2 (Venkatesh& Davis, 2000) and the model of the determinants of perceived ease of use (Venkatesh, 2000), and developed an integrated model of technology acceptance known as TAM3. The authors developed the TAM3 using the four different types including the individual differences, system characteristics, social influence, and facilitating conditions which are determinants of perceived usefulness and perceived ease of use. In TAM3 research model, the perceived ease of use to perceived usefulness, computer anxiety to perceived ease of use and perceived ease of use to behavioral intention were moderated by experiences. The TAM3 research model was tested in real-world settings of IT implementations.

The Unified Theory of Acceptance and Use of Technology (UTAUT) model is based on studies of eight prominent models in IS adoption research. The model has been empirically examined and found to outperform the eight individual models, including the Technology Acceptance Model (TAM). Venkatesh, Morris, Davis and Davis (2003) studied from the previous models/theories and formed Unified Theory of Acceptance and Use of Technology.

The theory explains the intentions for using information technology and also the subsequent usage behavior. The theory holds four constructs: performance expectancy, effort expectancy, social influence, and the facilitating conditions.

- Performance expectancy - “the degree to which an individual believes that using the system will help him or her to attain gains in job performance”;
 - Effort expectancy - “the degree of ease associated with the use of the system”;
 - Social influence - “the degree to which an individual perceives that it is important others believe that he or she should use the new system”;
 - Facilitating conditions - “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system”.
- (Venkatesh et al., 2003)

The UTAUT suggests that four core constructs (performance expectancy, effort expectancy, social influence and facilitating conditions) are direct determinants of behavioural intention and ultimately behaviour, and that these constructs are in turn moderated by gender, age, experience, and voluntariness of use (Venkatesh et al., 2003). It is argued that by examining the presence of each of these constructs in a “real world” environment, researchers and practitioners will be able to assess an individual’s intention to use a specific system, thus allowing for the identification of the key influences on acceptance in any given context. The intentions are the driving force in the implementation while the behaviour is what is formed out of the outcome. As for the social context, Venkatesh et al. (2003) validation tests found that social influence was not significant in voluntary contexts.

The Transaction Cost Economics (TCE) theory argues that the use of ICT will lead to reduced transaction costs associated with the management of transactions and by efficient coordination (Alchian&Demsetz, 1972). Explicitly recognizing the costs of coordination among economic entities in markets, TCE stresses that a firm’s central task is to coordinate transactions efficiently (Williamson, 1981).

ICT can lower coordination costs, and in supply chain contexts, digitally enabled integration capability can substantially improve transactional efficiencies through increased information sharing and communications capabilities, resulting in improved supply chain performance (Zhu & Kraemer, 2005). Furthermore, as argued by (Bayo-Moriones et al, 2013), ICT resources impact on communication improvement; this includes internal and external communication and coordination of activities and this enables a faster and more efficient use of information both within the firm and with external agents, such as customers and suppliers.

The Resource based view (RBV) theory attempts to explain how technology creates value (Zhu & Kraemer 2005). The RBV theory attributes improvement in firm performance to valuable resources or resource bundles. ICT adoption is aimed at process improvement primarily cost reduction and revenue generation. Such improvements, seen from the RBV, stem from resource synergy along the supply chain (Barney, 1991).

Effective SCM aims to synchronize supply, production, and delivery. For this to happen, firms need to leverage the connectivity of the Internet to create an inter-firm digital platform, enabling real-time information sharing, and improving coordination of allocated resources across the supply chain (Lee et al, 1997). The digital platform helps establish connections among separate resources owned by supply chain partners, thus translating them into bundles of coexisting resources responsive to each other (Zhu & Kraemer, 2005).

To sum up, The TAM, TAM2, TAM3 and UTAUT have been used over the years by various researchers to explain the adoption technology systems. TAM model developed by Davis is the most used framework in predicting information technology adoption (Paul, John and Pierre, 2003). Lee and Jun (2007) argued that TAM should be able to analyze factors affecting adoption intentions beyond perceptions of convenience and usefulness. Though TAM had received much support (Yang, 2005), it focused on the effects of perceptions of the technology's usefulness and convenience on adoption intentions (Lai and Zainal, 2015). Thus, it is favorable for the use of determining the novelty technology like the single platform E-payment System.

As reviewed above, TAM attempts to help researchers and practitioners to distinguish why a particular technology or system may be acceptable or unacceptable and take up suitable measures by explanation besides providing prediction. Even though TAM has been tested widely with different samples in different situations and proved to be valid and reliable model explaining information system acceptance and use (Venkatesh, V., & Davis, F. D., 1996). Therefore, TAM is taken as the ground theory for this research.

2.2 Empirical Literature Review

A large number of prior studies have addressed the information systems issue in the logistics or supply chain fields. These issues included the willingness to adopt, the outcomes of adoption, and the criteria for adoption (Saxe, 2018). Furthermore usage of information systems tends to enhance competitiveness (Panayides, 2017).

According to Boschian et al. (2009) ICT has a huge potential for efficient, effective and reliable real-time management and operations of multimodal freight transport.

Bradi et al (2008) believe that obtaining high efficiency and effectiveness in organizations requires investment in information technology components such as internet, office automation and management information system. The works of Parsons (1983) pointed out the importance of the ICT, in the determination of the firms' competitive advantage. According to him this is due to the potential that ICT seem to have on lower cost and better services that could be offered. Langley (1986) also demonstrates that the ICT are important to logistics, since they make available the right information, at the right time and at the right place. This popular logistical paradigm, which most often refers to physical goods, is shown to have equal relevance in the management of information.

Regarding to effect of information systems usage on logistical shipping and trucking costs, Christopher (2005) studied and found that logistics performance increase when the members of the supply chain collaborate using Internet tools. Moreover, the study showed that poor information systems resource management has repercussions for the performance of the entire supply chain, leading to increased management costs.

Olugbode et al. (2008) conducted a case study that investigated the impact of the adoption of new information systems on the company operation. Observation and interviews were used to collect the requisite data. The study revealed that the adoption of new information systems has led to different achievements in the company. The achievement appeared in company operational practices and business systems, which have reduced company operating costs. Almost all other studies found the same outcome (Mithas and Rust 2016, Carr, 2016, Popa et al., 2016).

Ahimbisibwe et al. (2016) study results indicate that IT adoption influence the performance of the third party logistic providers because according to the findings it is significant predictors. The research concluded that IT adoption was a better significant predictor of the performance of third party logistics providers. On the other side, Pietro et al (2012) indicated that less developed providers have a more limited appreciation of the role of technology in achieving their business objectives. For many of them, technology is not seen as important in the improvement of firm competitiveness.

Adewoye et al. (2011) investigated the role of investment in information systems on service delivery. The study observed that there is a close link between level of information systems usage and services delivery.

Pokharel (2005) study indicates that most interactive applications (such as CRM, ERP) are not widely implemented in both samples investigated, while software to manage basic logistics activities (e.g. transport and warehousing) shows a higher level of implementation. Zaryab, et al. (2012) indicated that using advanced IT in the supply chain enables clearing firms to timely and effectively responds to customer's needs and requirements thus meeting customer expectations. It also reduces the lead time of orders and improves service level of enterprises.

Idris et al. (2013) conducted a study that investigated the roles of information systems usage in customer service delivery and firms' performance. The survey research design was applied to 25 firms. The study found that most of the customers rarely used online services in their engagement with firms. This study recommends that firm administrators to seek appropriate means of providing online services that parallel the customers' ability to apply the technology. Thomas and Sparkkes (2000) also indicated that ICT usage is a key component in the strategic development to improve reliability, responsiveness, assurance, empathy and tangibility of services.

Phillis (2013) indicates that effectiveness of ICT is brought about by having positive change according to response in the quality service being offered and that it has also led to better process efficiency with the organization. This has also resulted to cohesion between departments and the relation of the organization and with other firm.

In relation to barriers to ICT implementation, high investment costs, inadequate employee training and lack of awareness of the ICT benefits were considered the most important barriers to ICT adoption in the Kilpala et al. (2005) survey. Pietro Evangelista and HeliKilpal (2007) also assessed the types of barriers for ICT implementation. They indicated that the lack of technological standards considered as an important barrier for ICT investments, this being particularly true for the Northern survey.

2.3 Identified Research Gap

Literature has shown there are many studies done by researchers on ICT and logistics practices. However, they do not give emphasis specifically for all main ICT factors like perceived utilization and perceived ease of use of ICT (ICT adoption) and the effectiveness of current used ICT tools. They concentrated mainly on the influence of information systems usage on organizations in general. This shows that the researches are highly focused on the importance of ICT usage and ignored the effect of ICT implementation on logistics management. The available literature also does not give

enough evidence concerning the effect of ICT on single logistics firm performance rather most of them are dwelling on the country performance with most of them giving a general descriptive.

Moreover, most of the researches were carried out in developed countries which have different economic, political, technology, social, legal and cultural status. There is also no study made and this subject is not yet wholly explained nor deeply verified to assess the effect of ICT tools on operational performance of logistics management, specifically in Ethiopia Shipping and Logistics Service Enterprise

2.4 Conceptual framework

A conceptual framework is a research tool that purposes to develop an understanding of the situation under investigation. It is a visual or written product, one that, “explains either graphically or in narrative form, the main things to be studied, concepts, or variables and the presumed relationship among them (Lee & Wang, 2011).

Based on the review of literature regarding the impact of ICT on logistics performance, ICT is important in supporting logistics operations. Bradi (2008) believe that obtaining high efficiency and effectiveness in organizations requires investment in information technology components such as internet, office automation and management information system.

The works of Parsons (1983) pointed out the importance of the ICT, in the determination of the firms’ competitive advantage. According to him this is due to the potential that ICT seem to have on lower cost and better services that could be offered. Langley (1986) also demonstrates that the ICT are important to logistics, since they make available the right information, at the right time and at the right place. This popular logistical paradigm, which most often refers to physical goods, is shown to have equal relevance in the management of information.

The positive role of ICT in improving the overall performance, visibility and communication between logistic operators has been recognized by many stakeholders, but there also exist many barriers to the adoption of ICT which vary from company to company, especially between small and large enterprises (Pokharel, 2005).

On the basis of such evidence, the researcher conceptualized that ICT could have a direct effect on performance of ESLSE. The study will guide by the variables. In this logic, the conceptual framework of the research will consist of the dependent variable and independent variable that will

represent diagrammatically in the figure. As can be seen in Figure 2.1, the conceptual framework (the ICT practice has an impact on the **operational performance of logistics management**, meaning that there is a relationship between them); the figure shows ICT as independent variable through ICT adoption, Level of ICT usage, and ICT **effectiveness** while operational performance of logistics management in ESLSE (logistics efficiency and logistics effectiveness) will consider as a dependent variable of the study. The relationship is represented by straight arrow as a direct relationship.

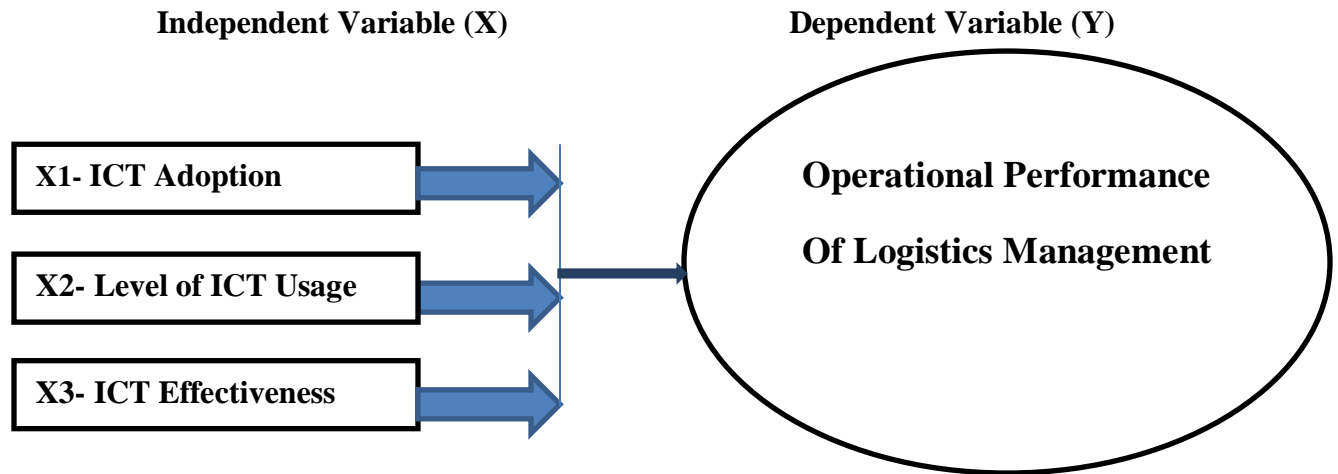


Figure 2.1: Adopted Conceptual Framework of this research -Davis, 1989; Venkatesh, Morris, Davis and Davis, 2003; Bowers ox, 2009; DeLone& McLean, 2003)

Chapter Three: Research Methodology

This section entails the methodology that was used in conducting the research. It consists of the research design, target population, method of data collection and research instruments, reliability test, data analysis techniques and ethical consideration. This is important in ensuring that the study addresses the set objectives and in turn answered the research questions on which it is founded.

3.1 Research approach

The study took the two approaches in order to gathering and reporting information. These are quantitative and qualitative research approach (a mixed research). The qualitative approach was focused on understanding a phenomenon from a closer perspective. On the other hand, the quantitative approach was tends to approximate phenomena from a larger number of individuals using survey methods.

3.2 Research Design

Designing a study helps the researcher to plan and implement the study in a way that will help the researcher to obtain intended results, thus increasing the chances of obtaining information that could be associated with the real situation (Burns & Grove 2001). This study was basically based on descriptive study. The purpose of descriptive research is to observe, describe and document aspects of a situation as it naturally occurs.

According to Orodho (2003), descriptive research defines as the process of collecting data in order to test hypothesis or to answer questions concerning the current status of the subjects in study. He also indicated that a descriptive survey is used to establish the relationship between the variables. This design is therefore, was adopted for this study as it enabled the researcher to obtain some independent confirmation of data, as well as arrange of options.

3.3 Population & Sample

3.3.1 Target Population

According to Hair et al. (2010), target population is said to be a specified group of people or object for which questions can be asked or observed made to develop required data structures and information.

The study area is ESLSE. Ethiopian Shipping and Logistics Service Enterprise is selected since it involves in the practices of the main logistics activities in the country. Even though the enterprise has the head office, branch offices in Addis Ababa, branch offices outside Addis Ababa, and Djibouti branch office, this study was targeted on the head office, branch offices found in Addis Ababa, and Modjo branch office.

In each focus area, the target respondents included staff members working with operation, ICT department, Finance & accounts department, and Procurement department, particularly those whose education level is bachelor degree and above because they are expected to use different ICT tools in the enterprise. Thus, the target population was 561.

3.3.2 Sampling Technique & Sampling Size

This study used non-probabilistic purposive sampling technique to select the head office and branch offices in Addis Ababa (Kality port and terminal and Kality inland transport) which bases on their convenient accessibility and proximity to the researcher since they are in Addis Ababa. Similarly, from seven branch offices found outside Addis Ababa, Modjo branch office was selected purposively with the idea that it is the first dry port in Ethiopia started operations in the first half of 2009. Moreover, Modjo dry port has high density of operation and large number of customers than the others. According to the first half year report of the enterprise in 2011 E.C, Modjo dry port handled 75 % of the total dry port service of the enterprise. This indicated that the other six dry ports provided services only 25 % which is largely lower than Modjo port and terminal service. On the other hand, Djibouti branch office was excluded due to its difficulty to address since it is found outside of the country, Ethiopia.

Furthermore, the exact sample units of respondents were considered from management and employees on the basis of probability sampling technique particularly stratified sampling technique since the total population of the study is heterogeneous in type. This sampling procedure ensures equal chance of every item in the population to be chosen for research (Cooper and Schindler, 2006).

The target population for the study was classified into four strata based on their office. The strata, from which data collected, were: Head office, Kality inland transport branch office, Kality port and terminal office and Mojo port and terminal branch office. Then the samples were selected from each stratum according to their proportion to the total target population.

In order to calculate the sample size, the researcher utilized Yamane (1967)'s formula as provided here below.

$$n = \frac{N}{1 + N(e^2)}$$

Where,

n = is the sample size,

N = is the population size, and

e = is the level of precision.

In computing the sample size, the researcher used 0.05 level of precision, thus a confidence level is 95%. Therefore, out of the 561 member of target population in total, the researcher took 233 as a sample size.

Regarding to sample size, Malhortra and Peterson (2006) and Zikmund (2003) stated that, the larger the sampling size of a research, the more accurate the data generated. Moreover, according to Mugenda&Mugenda, (2009), for any meaningful and representative research, a sample of at least 10% is enough. By considering the above ideas, the sample size of this study was 41.6 percent of the target population.

Then after, the researcher determined the sub-strata sample size based on their proportion to target population. Those are: 135 were in head office, 46 were in Modjo branch, 22 were in Kality dry port, and 30 were in Kality inland transport branch.

Finally, purposive sampling technique was used to interview respondents who are directly related with the topic under investigation.

3.3.3 Sources of Data & Data Collection Method

Data that will be thought relevant to the study was collected from both primary and secondary sources. Primary data used because of its reliability over secondary data.

This is because of recency of information and better reliability of the study as the researcher had the opportunity to control the process to ensure veracity of results. Besides, the secondary data gathered from documents and various books written on issues related to the research topic.

The Quantitative data collection methods rely on random sampling and structured data collection instruments that fit diverse experiences into predetermined response categories. They produce results that are easy to summarize, compare, and generalize. A descriptive survey is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals (Orodho, 2003).

With this idea, in this study the necessary data from different groups was gathered by using questionnaire, interview, and observation. Questionnaire is found to be an appropriate instrument for the research because as a general rule, it is recommended when the respondents are easily contacted, gathered in one place and literate. Accordingly, the respondents fit these requirements. The questionnaire was designed in such a way that they could contain close ended items. Few number of free response items were also included gaining additional information. The closed ended part of the questionnaire items were set up in the form of likert-scale and rating type, this enabled to judge the level of agreement among respondents. The study was employ observation so as to know more about the current situation of the ICT practice in ESLSE. In order to obtain additional information the researcher has used personal interview.

Regarding to data collection procedure, the questionnaire was prepared in English. After the preparation of questionnaire and before the actual data collection was started the questionnaire was tested among 20 respondents from the sample area. And then, the refined and finalized questionnaire was explained to data collectors how to administer the instrument, the purpose of the study and content of the questionnaire.

3.4 Data analysis methods

In general there are two types of data analysis techniques namely: qualitative and quantitative where by the choice of these methods greatly depends on the type of information the researcher has at hand. Therefore, as determined in the data collection tool for this study, data were collected in both questionnaire and interview. Accordingly, the collected data were analyzed quantitatively and qualitatively. Particularly, descriptive and inferential statistical tools were employed.

After the data was collected, the coded data was analyzed using descriptive statistics which included mean, frequency, percentages and standard deviations. Means and standard deviations were calculated from Likert scale where the resulting mean was indicated the average value of extent to which ICT implementation existed in ESLSE. The average value was 3 but to consider intermediate

scores and to get the limits within which the true value falls, 0.5 was added and subtracted from the average. Accordingly, rating values ranging 2.5 – 3.5 was assumed to be average. Thus, mean rating above 3.5 considered as high level against each item, while rating scores less than 2.5 was taken as low extent.

Inferential statistical technique was also employed to analyze the information, as this study is quantitative in nature. It is particularly the Pearson's correlation was used to show the relationship and the strength/degree as well as direction of associations between variables. Classification of correlation and hence impact as strong or weak for this study is based on the classification of Marczyk et al (2005). Their known book entitled as Essentials of Research Design and Methodology classifies the strength of correlation as follows.

- If r falls in the range of 0.01 and 0.30, there is small or weak correlation
- If r falls in the range of 0.30 and 0.50, there is moderate/medium correlation
- If r falls in the range of 0.50 and 0.90, there is large or strong correlation
- If r falls in the range of 0.90 and 1.00, there is very large or very strong correlation

The other inferential statistics used is regression analysis so that to show interdependence of independent variables and dependent variable. Thus, both the strength of the relationship between variables and the effect or influence of independent on dependent variable and statistical significance were assessed. Therefore, the three independent variables were measured separately and examine the effect of each predictor on a single outcome (dependent) variable. It was used to measure the effect of ICT implementation on the operational performance of logistics management in ESLSE. Data analysis was aided with help of Statistical Package for Social Sciences (SPSS) version 24.

On the other extreme, qualitative data analysis tools was used for presented individual interviews, and open –ended questions.

3.5 Ethical Considerations

Ethical clearance and permission letter was obtained from the College of Business and Economics, Department of Logistics and Supply Chain Management, Addis Ababa University. Before the data collection, permissions from the enterprise are asked at each level. During the distribution of the questionnaire, respondents were informed about the purpose and the benefit of the study.

Chapter Four: Data Presentation and Analysis

Having identified the problem of study in chapter one, reviewed existing literature and shown gaps of knowledge in chapter two, chapter three explained the methods that the study used to collect data. This chapter presents analysis and findings of the study as set out in the research methodology. The results are presented on the effect of information communications technology on operational performance of logistics management in ESLSE.

4.1 Validity and Reliability

According to Bryman and Bell (2007), reliability analysis is concerned with the internal consistency of the research instrument. The value ranges between 0-1 with reliability increasing with increase in value. Coefficient of 0.6-0.7 is commonly acceptable rule of thumb that indicated acceptable reliability and 0.8 or higher indicated good reliability (Mugenda&Mugenda,, 2003).

As multiple items in all constructs were used, the internal consistency/reliabilities of ICT implementation and operational performance of logistics management were assessed. The study involved random selection of a pilot group of 20 individuals. The reliability of the questions was approximately calculated 86.2% using Cronbach's Alpha coefficient, which are considered acceptable.

Hamed (2016) mentioned about three types of validity in his study: content validity, predictive validity, and construct validity. This study addressed content validity that refers to the extent to which the items on a test are fairly representative of the entire domain the test seeks to measure through expert comments. Three managers and five employees were approached to test how they understand and respond to the questions in questionnaire. Based on their comment the final questionnaire was amending accordingly.

4.2 Response Rate

The study administered 233 questionnaires to the staff working in ESLSE from the target population in collecting data with regard to the effect of information communications technology on operational performance of management of ESLSE. The questionnaire return rate results are shown in Table 4.1.

Table 4.1: Response Rate

Response rate	Frequency	Percentage
No Response	16	6.87
Response	217	93.13
Total	233	100

Source: Author Survey, 2019

From the study, 217 out of 233 sample respondents that participated filled in and returned the questionnaire contributing to 93.13 %. This is regarded as an excellent response rate, in line with the literature by Mugenda and Mugenda, (2003) which recommends that for generalization, a response rate of 50% is adequate for analysis and reporting. 60% is good and any response rate of 70% and over is excellent for descriptive studies. The response rate demonstrates a willingness of the respondents to participate in the study. The 6.87% questionnaires were not returned due to different reasons.

4.3 Descriptive Analysis

4.3.1 Respondents Demographics Data

Data that was collected from the first section of the questionnaire aimed at understanding the characteristics of respondents representing the staff of ESLSE who undertake ICT related services are presented in Table 4.2.

Table 4.2: Gender of Respondents

Variable	Category	Frequency (No.)	Percentage (%)
Gender	Male	159	73.3
	Female	58	26.7

Source: Author survey, 2019

As it is clearly seen on Table 4.2, out of the 217 respondents 73.3 percent of them were male and the remaining 26.7 percent were female. The participation of female staff members in this study was low. This might be because of the disproportionate number of female with male staff in ESLSE.

Table 4.3: Age of respondents

Variable	Category	Frequency (No.)	Percentage (%)
Age of respondents	Less or equal to 30 years	82	37.8
	30 – 40 years	95	43.8
	40 – 50 years	25	11.5
	Over 50 years	15	6.9

Source: Author survey, 2019

In terms of age distributions this study sought to investigate the composition of the respondents in terms of age brackets to understand their familiarity with the influence of ICT on operational performance of logistics in ESLSE. According to the results depicted in table 4.3, majority (43.8 %) of the respondents were aged between 30 – 40 years, 37.8% of them indicated that they fell below 30 years, 11.5 % of them indicated that they were aged between 40 – 50 years, 6.9 % of the respondents indicated that they were aged over 50 years. These implies the age distribution of the respondents who were interviewed during the survey indicate that the larger group of respondents (43.8 percent) were in the age of 30-40 years.

From these results it is clear that the respondents were well distributed in terms of age and that they are active in ICT application and hence can contribute constructively in the effect of ICT on operational performance of logistics management in ESLSE.

Table 4.4: Experience of Respondents in ESLSE

Variable	Category	Frequency (No.)	Percentage (%)
Experience in the ESLSE	Less or equal to 5 Years	122	56.2
	5-10 years	54	24.9
	10- 15 years	31	14.3
	Over 15 years	10	4.6

Source: Author survey, 2019

In terms of years working in the enterprise, more than half of the total respondents (56.2%) had experience in ESLSE less or equal to 5 years, 24.9% of the respondents worked for 5 to 10 years, whereas 14.3 % and 4.6 % of the respondent worked for 10 to 15 years and more than 15 years respectively.

The study results depicted in table 4.4 reveal that almost half of the respondents (43.8%) indicated that they had an experience of over 5 years. This indicates the extent to which one is more aware of the issues sought by the study.

Table 4.5: Education Level of Respondents

Variable	Category	Frequency (No.)	Percentage (%)
Level of Education	Bachelor's degree	168	77.4
	Master's Degree and above	49	22.6

Source: Author survey, 2019

On the respondents' highest level of education, the study found that majority of the respondents as shown by 77.4% had attained undergraduate/ bachelor's degrees, while 22.6% of them had attained postgraduate qualifications like masters degrees. This information shows that the respondents were knowledgeable enough to contribute positively in this study.

Table 4.6: Respondents' Departments

Variable	Category	Frequency (No.)	Percentage (%)
Departments	Operation	152	70.0
	ICT	23	10.6
	Finance and procurement	42	19.4

Source: Author survey, 2019

Application of ICT in ESLSE affects the various aspects of performance across various departments. It was therefore important to ensure that questionnaires were distributed and returned from the vital departments in ESLSE. From the results shown in table 4.2, 70 % of the respondents were working in the operation departments, 10.6 % of them were working in the ICT, and 19.4 % worked in the other departments like finance and accounts and procurement departments. This implies that all departments that were targeted by the study were involved. It thus shows that all of the respondents either have direct or indirect involvement in logistics practices.

Table 4.7: Respondents' Designations

Variable	Category	Frequency (No)	Percentage (%)
Respondents Designations	Employee	185	85.3
	Manager	32	14.7

Further the study was interested to investigate the positions held by the respondents in ESLSE. The study findings in table 4.2 shows most of the respondents (85.3%) involved in this study were employees and the remaining (14.7%) were the managers.

4.3.2 Extent to which ICT is implemented in ESLSE

The summary of the first three objectives of this study was to determine the extent to which ICT is implemented in Logistics management of ESLSE. As such the respondents were required to indicate their opinion on the extent to which the initiatives on ICT adoption, the level of utilizing ICT, and how effective is ICT practice in ESLSE. The responses are depicted as follows.

4.3.2.1 Extent of ICT Adoption in ESLSE

The study sought to establish the extent of ICT adoption in ESLSE by using a Likert scale of 1-5 where 1= strongly disagree 2= disagree 3= moderately agree 4= agree 5= strongly agree. The respondents were required to indicate the extent to which they agreed with various statements concerning the perception on initiatives on ICT adoption in ESLSE for logistics management. The findings are presented and explained in the following sections.

Table 4.8: Perceived Utilization of ICT and Perceived Ease of Use

Statements	Mean	Standard deviation	Grand mean
Perceived Utilization of ICT System			
ICT system enables me to accomplish tasks more quickly.	4.09	1.035	4.06
ICT system has improved my quality of work.	4.08	0.942	
ICT system makes it easier to do my job.	4.14	0.940	
ICT system has improved my job performance.	4.00	0.910	
ICT system enhances my effectiveness on the job	4.00	0.870	
Perceived Ease of Use ICT System			
My interaction with the ICT system has been clear and understandable.	3.86	0.893	3.63
The ICT system is easy to use.	3.86	0.924	
Learning to operate the ICT system was easy for me.	3.76	0.930	
I can use the ICT system successfully every time.	2.97	1.377	
Using the ICT system is flexible to interact with.	3.72	1.076	

Source: Author survey, 2019

From the finding on the respondent level of agreement with the statement relating to perceived utilization of ICT System in ESLSE, the study revealed that majority of the respondent agreed that they perceived ICT system as enable them to accomplish tasks more quickly, improved their quality of work, makes it easier to do their job, improved their job performance, and enhance their effectiveness on the job, with the high mean score of 4.09, 4.08, 4.14, 4.00, and 4.00, respectively.

As far as the respondents' opinion on technology acceptance, the result also reveals that the respondents strongly agree to the importance of the utilization of ICT System with the highest mean value of 4.06. It suggests that the initiative on the utilization of new ICT System in ESLSE exists at high extent. The standard deviations (1.035, 0.942, 0.940, 0.910, and 0.870) are relatively small compared to the mean which means the responses ranged from strongly agree to strongly disagree; hence the responses were close to the mean.

According to the responses shown in the table above, the majority of respondents agreed that their interaction with the ICT system has been clear and understandable and the ICT system is easy to use as shown by equal high mean of 3.86 for each case. Others are learning to operate the ICT system shown by mean of 3.76, and using the ICT system is flexible to interact with as shown by mean of 3.72. The use of ICT system successfully every time had average mean value of 2.97 which was the least on the list.

The results suggest that there are also relatively small standard deviations (0.893, 0.924, 0.930, and 1.076, which implies the responses ranged from strongly agree to strongly disagree were close to the mean. Thus, in terms of perceived ease of use ICT System, the findings show that the majority of respondents agree that there is a large initiative for perceived ease of use ICT system with the high mean score of 3.63.

The overall result found that the need to accept and adopt new methods of technological development so as to improve service delivery in the study area is high. This is because all the mean values of the identified perceived initiative areas as shown in Table 4.8 almost all had mean scores above the mean score of 3.50 in a 5-point likert measurement. The grand mean of the result still implied that the level of ICT adoption on logistics operation in the study area was averagely very high.

This possibly suggests that for many of them ICT is seen as important in the improvement of ESLSE competitiveness. They believe that new ICT system will bring to them advantages.

As per the results, the respondents agree to the level of initiatives on ICT adoption for logistics operation is considered as high level in ESLSE. The result of this study is not aligned with the findings as suggested by Pietro et al (2012), in which was established that less developed providers have a more limited appreciation of the role of technology in achieving their business objectives. For many of them, technology is not seen as important in the improvement of firm competitiveness.

4.3.2.2 Extent of ICT Usage

One of the issues of this study was to establish the level of ICT usage in ESLSE. The study sought to determine the extent of utilizing ICT systems in logistics management in ESLSE. The result is recorded in the table 4.9 below.

Table 4.9 Extent of Usage of ICT systems in Logistics Management in ESLSE

Statements	1	2	3	4	5	Mean	Standard deviation	Grand mean
The management encourages the use of ICT within the enterprise (ESLSE)	11	23	63	85	35	3.51	1.046	2.94
The existing ICT infrastructure in terms of Usage within the enterprise are not effective	36	67	39	48	25	2.81	1.281	
All operational activities within the enterprise are computerized	40	95	28	41	13	2.50	1.167	
My department uses ICT systems in delivering its service	12	43	52	83	27	3.32	1.096	
I spend over 7 hours using ICT systems in performing my duty in the enterprise	34	71	43	48	21	2.77	1.232	
More advanced logistics-related ICT tools and applications are used within the enterprise	24	69	63	50	10	2.78	1.067	
The investment on technology within the enterprise is sufficient	24	58	57	56	16	2.91	1.139	

Source: Author survey, 2019

Note: 1= Strongly Disagree 2= Disagree 3= moderately agree 4= Agree 5=Strongly Agree

From the findings, majority of the respondent (N=85) agreed that management encourages the use of ICT within their organization, 35 of them strongly agreed with the same statement, while 63, 23 and 11 of respondents were moderately agreed, disagreed and strongly disagreed with the same statement respectively with the highest mean score of 3.51.

The results support the findings by Caldeira & Ward (2002) that observed that management are always leading in ensuring efficient service delivery hence supports ICT innovation and use in the logistic firms.

The study sought to know the level of the existing ICT infrastructure in terms of usage in ESLSE. Around 67 of respondents have disagreed with the statement the existing ICT infrastructures in terms of usage within the enterprise are effective, while 36 and 39 of the respondents were strongly disagreed and moderately agreed with the same statement. The remaining 48 and 25 were agreed and strongly agreed with the same statement. The mean score of this item was 2.81 which indicate average extent.

Around 95 & 40 of respondents disagreed and strongly disagreed respectively that all operational activities within the enterprise are computerized, while around 69 of respondents disagreed that more advanced logistics related ICT tools and applications are used in ESLSE. At the same time, the mean score of 2.5 and 2.78 also revealed that the level of the above two items are at average extent.

The study sought to know the number of departments, which uses ICT system within the enterprise. From the finding, 83 respondents agree, and also 27 respondents strongly agree that their department uses ICT system in delivering its services, while 52, 43, and 12 of respondents moderately agree, disagree, and strongly disagree with the same statement respectively. The mean score of 3.32 shows that the number of departments uses the system in order to deliver their service is at average level.

The respondents were required to indicate the duration in time they had been spent using Information and Communications Technology in their work. The study findings as presented in Table 4.9 shows that 105 of the respondents had used ICT for over less than 7 hours, 43 of them moderately agreed (sometimes spent over 7 hours), and the remaining 69 of respondents agreed to use a period of over 7 hour. This implies that the majority of employees in ESLSE used ICT in their operations for a period of less than 7 hours. The mean of the result was 2.77 which still implied the average extent of using ICT systems in more than seven hours in work place.

Further the study sought to establish the level of investment on technology within the enterprise is sufficient. The results show that 78, 57, and 36 of the respondent disagreed, moderately agreed and agreed to ICT investment in ESLSE is sufficient respectively. Additionally, around 24 of respondent strongly disagreed while 16 were strongly agreed with the same statement. The results suggest that there is an average level of ICT investment in the enterprise with the mean score of 2.91.

The outcome of the result implies that the level of ICT usage in the study area is **low**. This is because five of seven mean values of the identified areas as shown in Table 4.9 had within the average mean score in a 5-point likert measurement. The grand mean of the result was 2.94 which still implied that the level of ICT usage on logistics management in the study area was seemed average.

Analysis Result of the Extent to which ICT is used in Logistics Operation. Table 4.10 shows the extent to which ICT is employed on logistics operations in the study area.

Table 4.10 Use of ICT in the logistics functions:

Statements	Mean	Standard deviation	Grand mean
Sharing of Information	3.59	1.089	3.07
Distribution Requirement Planning	2.89	1.133	
Coordination of logistics flows	3.35	0.951	
Offering greater security to the fleet	2.74	1.139	
Tracking all interactions that the company has had with the customer	2.81	1.154	
Integrating all the departments or functions of an enterprise	2.81	1.191	
Transferring electronic documents from one system to another	3.30	1.069	

Source: Author survey, 2019

From the table, we discovered that sharing of information has the highest mean score of 3.59 which indicated that the enterprise applied ICT tools most in sharing of information with stakeholders. Other logistics services that have been practiced to large extent are coordination of logistics flows, and transferring electronic documents from one system to another with mean score 3.35 and 3.30 respectively.

Distribution Requirement Planning (2.89), offering greater security to the fleet (2.74), tracking all interactions that the company has had with the customer (2.81), and integrating all the departments or functions of an enterprise (2.81) are practiced to average extent. The result indicates that the least logistics service practice in the study area is offering greater security to the fleet that which revealed that ESLSE is not in a position to meet the customer's need in terms of cargo security. In general, logistics function was rated average with mean score 3.07 in ESLSE.

Moreover, the respondents were asked to indicate current ICT Systems used by ESLSE. The findings revealed that Sea liner (American software) and Dry Port Operation Information System – DPOIS (in-house software) were popular in logistics operating in ESLSE. It was further revealed that the different kind of ICT tools that ESLSE used were telephone, fax, mobile, Internet and email.

Apart from these basic technology tools, other ICT tools used by ESLSE are Shipp Expert System (SES), and company website. The import export gate control that assisted with modern technology and it helps to solve major information gaps in the operation process and minimize the time loss has providing services at Modjo port and terminal.

Nevertheless, the types of advanced software that have the greatest potential in terms of service customization and interaction with customers are not widely used in the enterprise. The study clearly shows that, the usage of more sophisticated technologies (such as Wireless LAN, RFID, ERP and CRM) at low level. Warehouse management software is also not widely used. This confirms the use of more complex technologies and applications developed for more specific purposes is quite low in ESLSE, even though Enterprise Resource Planning will implement to integrate logistics functions within a short period of time as indicated by the respondents. They reveal that Oracle, the joint American Information Communication Technology Company, has already on the process to implement the oracle ERP project at the ESLSE.

This finding is consistent with Pokharel (2005) who found that most interactive applications (such as CRM and ERP) are not widely implemented in both samples investigated, while software to manage basic logistics activities (e.g. transport and warehousing) shows a higher level of implementation.

4.3.2.3 Extent of effectiveness of utilizing ICT in ESLSE

The study sought to determine the extent to which how information communication technology practice is effective in ESLSE. The results are shown in the Table 4.11.

Table 4.11: Perceived effectiveness of utilizing ICT in ESLSE

ICT Effectiveness in terms of Information System Factors	Mean	Standard deviation	Grand mean
System quality			
It is easy to use	3.73	1.042	3.41
It generates perfect as well as accurate Information	3.12	1.464	
It prevent operational errors	3.38	1.125	
Information quality			
It provide complete/sufficient information	2.91	1.430	3.35
It produce up to date information	4.03	1.050	
Information needed is on time	3.12	1.533	
Service quality			
It offers greater security to the fleet and reduces the likelihood of accidents.	2.95	1.372	3.29
It uses to transferring electronic documents from one system to another	3.63	1.036	
Usage			
It improve operational outcomes	3.82	1.052	3.77
It supports for decision making	3.71	1.027	
It save time in entry processing	3.79	1.055	

Source: Author survey, 2019

In the context of the result into the effectiveness of the current ICT practice in ESLSE, a survey was considered Information System Factors. Among the above information system factors, the system usage has been an effective at high extent with the mean sore of 3.77. Under this factor the respondents indicated that the ICT system was effective in terms of improving operational outcomes, supporting for decision making, and saving time in entry processing with mean scores of 3.82, 3.71, and 3.79 respectively.

With regard to system quality, the system is easy to use with mean score of 3.73, and it also prevents operational errors with mean score of 3.38. In terms of generating perfect as well as accurate Information, the ICT practice is found to be the least from this factor with the mean score of 3.12.

Regarding to system quality, the mean score value of 3.38 indicates that ICT system is effective to an average extent.

The results showed about the information quality and service quality is that the current system was effective to average extent with the mean value of 3.35 and 3.29 respectively.

Information needed is on time (3.12), producing up to date information (4.03) and transferring electronic documents from one system to another (3.63), are practiced at average and high level respectively in the enterprise by using ICT system.

With regard to providing complete/sufficient information (2.91), and offering greater security to the fleet and reduces the likelihood of accidents (2.95) mean score value indicates that they are averagely practiced. Since these two items are critical for customer satisfaction, the findings revealed that ICT practice in ESLSE is not at a highest position to meet the customer's need in terms of information and service quality.

Among the items the two highest values of standard deviation were Information needed is on time (1.533), generates perfect as well as accurate Information (1.464), provide complete/sufficient information (1.430) and offering greater security to the fleet and reduces the likelihood of accidents (1.372) of which showed high inconsistencies among respondents responses than other items. This signifies that for the above items, there is a higher difference in the response of respondents on the level of ICT effectiveness in ESLSE.

In contrast, the lowest standard deviation was found for supports for decision making (1.027), uses to transferring electronic documents from one system to another (1.036), and easy to use which indicate that there is low variation on responses for this item.

The grand mean of the result indicated that system quality, information quality, service quality, and usage have mean scores of 3.41, 3.35, 3.29, and 3.77 respectively. The outcome of the result implies that the extent of effectiveness of ICT in terms of all factors on logistics operations in the enterprise was seemed average except the last one. This is because the mean value of the usage factor as shown in Table 4.11 has above the mean score of 3.50.

Regarding to the effectiveness of currently used ICT tools in the enterprise, the interviewees were asked and they replied that the level ICT tools in terms of service, system and information quality is moderately well. This means that the system not always provide sufficient information and offers greater security to the fleet and reduces the likelihood of accidents.

For instance, DPOIS has a limitation to provide the balance by deducting the output from the input. It considered the released container as existing in the terminal after any process.

To sum up, the means from ICT implementation measures (level of ICT adoption, Level of ICT usage, and level of ICT effectiveness) were all averaged to yield a single mean that represented their level of existence in ESLSE.

Table 4.12 Overall Extent of ICT Implementation

Independent Variables	Individual Mean	Grand Mean
Level of ICT Adoption	3.84	3.41
Level of ICT Usage	2.94	
Level of ICT Effectiveness	3.45	

From the results shown in table 4.12, the level of ICT usage and the effectiveness of ICT practice at work in ESLSE for logistics operation are to average extent with the mean value of 2.94 and 3.45 respectively except the level of perception on initiatives on ICT adoption in which had means score of 3.84 greater than 3.50 as shown above. The grand mean of the result was 3.41 which implied that the extent of ICT implementation on logistics management in the study area was rated average.

The findings suggest that even though the initiatives on new technologies to use in logistics management activities of the enterprise is at high extent, the current level of usage of ICT systems related to using more advanced logistics-related ICT tools and applications within the enterprise as well as the level of effectiveness of the current ICT system are to average extent. This implies that despite the potentially important role of ICT usage in improving the operational performance of logistics management in ESLSE, there relatively is a limited level of ICT usage with particular reference to the advanced and more complex technologies (such as RFID, ERP, CRM and TOS technologies).

4.3.3 Measures of Operational Performance of Logistics

Table 4.13 shows means of all various statements that were aimed to measure operational performance of logistics in ESLSE. The measures of operational performance of logistics were classified into efficiency and effectiveness.

Table 4.13: Means of measures of operational performance of logistics

Operational performance attribute	Statements	Mean	Standard deviation	Grand mean
Efficiency	Quicker response to customer's inquiries	3.45	.972	3.12
	Reduce logistics costs and maximize profits	3.43	1.102	
	Increase optimal utilization of resources	2.96	1.050	
	Reduce service delivery time	2.98	1.088	
	Reduce service delivery complaints	3.06	1.033	
Effectiveness	Increase reliability of logistics services	2.79	1.278	2.90
	Increase quality consistency of logistics services	2.95	0.974	
	Promptly invoice and receive cash	3.09	1.113	
	Forward better, faster and informed decisions through analytical data	2.94	0.998	
	Reduce irregularities in operating activities	2.75	1.215	
	Accurately identify storage locations	2.89	1.052	

Source: Author survey, 2019

The findings indicate that the means and standard deviations of operational efficiency that was realized from ICT implementation in logistics activities. Quicker response to customer's inquiries had the average mean of 3.45 followed by reduce logistics costs and maximize profits at 3.43 and reduce service delivery complaints with the mean value of 3.06. Increase optimal utilization of resources had the least mean at 2.96 while reduce service delivery time followed by 2.98. The standard deviations were fairly small, which implies almost similar responses from all respondents.

The results in Table 4.13 further indicate the means and standard deviations from respondents which measured operational effectiveness. The result show that the ICT implementation results in an effective operation by providing prompt invoice and receives cash is quite moderate in ESLSE with the mean score of 3.09.

Similarly, the other statements under the effectiveness of operational performance attribute the average mean value were reduce irregularities in operating activities (2.75), increase reliability of logistics services (2.79), accurately identify storage locations (2.89), forward better, faster and informed decisions through analytical data (2.94), and increase quality consistency of logistics services (2.95). This implies that almost all effectiveness factors that considered in this study were not performed effectively at high level. But it does not mean that these are not well practiced.

The grand mean shows that the ICT implementation in logistics operation performance of ESLSE plays a moderate role towards service efficiency with the mean score of 3.12 and in terms of service effectiveness with the mean score of 2.90. This implies that even though the performance of both indicators were average, the respondents agreed that ESLSE achieved operational performance through increasing efficiency in reduce logistics costs within the enterprise than maximizing effectiveness of services.

4.4 Correlation Analysis

This was the fourth objective of this research that aimed at finding effect of ICT implemented in ESLSE on operational performance of logistics that was achieved by ESLSE. There were issues under three independent variables in ICT implementation that were asked to the respondents and eleven aspects under two measures of operational performance of logistics that were thought to result from those independent variables.

The results in Table 4.14 indicate the relationships between the study variables using the Pearson correlation coefficient.

Table 4.14: Zero Order Correlations

	1	2	3	4
Operational Performance of Logistics management (1)	1.000			
Level of ICT Adoption (2)	0.311**	1.000		
Level of ICT Usage (3)	0.590**	.229	1.000	
Level of ICT Effectiveness (4)	0.647**	.407	.462	1.000
**. Correlation is significant at the 0.05 level (1-tailed).				

The results in Table 4.14 reveal that there exists a significant positive relationship between level of ICT adoption and operational performance of logistics management ($r = 0.311^{**}$, $p < .05$).

The results suggest that the two components of ICT adoption (i.e. perceived ease of use and perceived usefulness) are positively and significantly related to the operational performance of logistics management in ESLSE but the strength of a linear association between two variables (independent and dependent) is medium.

These results imply that if there is ICT adoption in ESLSE, it is not strongly influence and lead to improved operational performance of logistics management in ESLSE.

The results in Table 4.14 further indicate that there exists a significant positive relationship between level of ICT usage and operational performance of logistics management ($r=0.590^{**}p<.05$). The results suggest that all components of level of ICT usage are positively and significantly related to the operational performance of logistics management in ESLSE. Based on the r value, there is stronger association of the two variables. These results imply that if the level of ICT usage increases in ESLSE, it is largely influence and lead to improved operational performance of logistics management of the enterprise.

The results in Table 4.14 further reveal that there exists a significant positive and strong relationship between level of ICT effectiveness and operational performance of logistics management in ESLSE ($r=0.647^{**}p<.05$). The results suggest that the four components of ICT effectiveness (i.e., System quality, information quality, service quality and usage) are positively and significantly related to the operational efficiency and effectiveness of ESLSE. These results imply that if there is effective ICT implementation in ESLSE, it is likely to influence and lead to improved operational performance of logistics management in the enterprise.

4.5 Regression Analysis

To achieve the fourth objective of the study which was to determine the effect of ICT implementation in operational performance of logistics management in ESLSE, the researcher conducted a regression analysis so as to determine the effects of information and communications technology on operational performance of logistics management in ESLSE. It was conducted to test the influence of ICT factors (Level of ICT adoption, Level of ICT usage, and Level of ICT effectiveness) on operational performance of logistics management in this study.

The first purpose of regression on this study was to identify the coefficient of determination explains the extent to which changes in the dependent variable. The result is shown in the Table 4.15.

Table 4.15: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig.
1	.726(a)	.528	.521	.54318	.000(b)

- a. Predictors: (Constant), level of ICT adoption, Level of ICT usage, and level of ICT effectiveness

Table 4.10 above indicates that the model had an Adjusted R square value of 0.521. This means that the percentage of the dependent variable variance that was explained by the three independent variables was 52.1% while the remaining percentage (47.9 %) can be attributed to other factors other than level of ICT adoption, level of ICT usage and level of ICT effectiveness.

This regression model was significant (sig. <.05) with its results worth using it as a basis to make decisions related to operational performance of logistics management in ESLSE. From the finding shown above, there was a strong positive relationship between the study variables by 0.726.

Further regression analysis was used to determine whether independent variables (X1, X2 and X3) simultaneously impact the dependent variable (Y). In line with this, the other purpose of regressions on this study was to establish the relationship between independent or predictor variables and the dependent or criterion variable which for this study was operational performance of logistics management. Table 4.16 presents the results of the analysis.

Table 4.16: Coefficients of the independent variables

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity
	B	Std. Error	Beta (β)			VIF
(Constant)	0.012	0.249		0.49	0.961	
ICT adoption	0.046	0.061	0.040	0.765	0.445	1.201
Level of ICT usage	0.432	0.063	0.369	6.884	0.000	1.275
ICT effectiveness	0.449	0.056	0.460	8.069	0.000	1.447

Source: Author survey, 2019

In estimating the contribution of each independent variable in the study, the ICT adoption was excluded from the regression model since it was statistically insignificant ($P > 0.05$). Therefore, it was established that two independent variables (level of ICT usage and ICT effectiveness) significantly contributed to operational performance of logistics management of ESLSE at significance level of 0.05.

However, the relative importance of each independent variable was different with ICT effectiveness ($\beta = 0.46$, $p < 0.05$) contributing the most operational performance of logistics management of ESLSE followed by level of ICT usage ($\beta = 0.369$, $p < 0.05$). This implies that in order for the operational performance of logistics management in ESLSE to improve, there is a need to increase ICT effectiveness and level of ICT usage of the enterprise.

However, level of ICT adoption ($\beta=0.040$, $p>.052$) was found not to be a significant predictor of operational performance of logistics management in ESLSE. This finding is inconsistent with Ahimbisibwe et al. (2016) who found that IT adoption was a better significant predictor of the performance of third party logistics providers because according to the findings it is significant predictor.

In regard to the effects of independent variables on dependent variable, results show that the model used for the regression analysis was expressed in the general form as given below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Whereby Y = Operational performance of logistics management;

X₂ = Level of ICT usage and X₃ = ICT effectiveness.

While β_1 , β_2 and β_3 are coefficients of determination and ε = error term.

This becomes:

$$Y = 0.012 + 0.432 X_2 + 0.449 X_3$$

Since the graph tend to form a straight line, the relationship between X and Y is linear. In addition to that for every value of X, the distribution of Y scores has approximately equal variability (homoscedasticity). Therefore, from the above analysis, it appears that the multiple regression models for predicting the Operational performance of logistics management, Y, was useful and adequate. Y is directly related to a linear combination of the explanatory variables.

According to the regression equation established in the Table 4.16 show, taking all factors (ICT adoption, Level of ICT usage, and ICT effectiveness) constant at zero, the logistics management performance of ESLSE realized would be 0.012.

The study results showed that taking all other independent variables at zero, a unit increase in ICT adoption would lead to an increase in operational performance of logistics management of ESLSE by a factor of 0.046. On the other hand, a unit increases in Level of ICT usage would lead to an increase operational performance of logistics management of ESLSE by a factor of 0.432 a unit increase in level of ICT effectiveness would lead to an increase in operational performance of logistics management of ESLSE by a factor of 0.449.

The variance inflation factor displayed as part of the regression coefficient table. A variance inflation factor was computed for each independent variable. Multicollinearity is a potential problem when VIF is greater than 4; and, a serious problem when it is greater than 10. Based on these

guidelines, we would conclude that multicollinearity is not a problem with each independent variable.

Normality is a measure of how well an observed distribution approximates to a normal distribution. This was assessed by using a histogram of the standardized residuals and the normal probability plot. From these, the researcher observed that there exist approximately linear patterns. This indicates the consistency of the data with a normal distribution.

To test the significance of the model, F statistic and p-values were used. The results are shown in the Table 4.17.

Table 4.17 Analysis of Variance (a)

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	69.236	3	23.079	78.221	0.000(b)
Residual	61.960	210	.298		
Total	131.196	213			

Source: Author survey, 2019

a. Dependent Variable: Operational performance of logistics management

b. Predictors: (Constant), ICT adoption, Level of ICT usage, and ICT effectiveness

The ANOVA result indicate that for all variables the regression model had an F- value of 78.221 and $P < 0.05$ and hence the model was significant. There was a highly significant relationship between the variables at $P = 0.000$. This implies that there is a strong relationship between the three variables and the operational performance of logistics management of ESLSE.

4.6 Challenges facing ICT in the Logistics Management Processes

The study further sought to establish the extent to which ESLSE experience the various challenges in applying ICT in the logistics management processes.

The respondents are asked to select what they believe is the ICT practice challenge, that are collected from different literatures, for ESLSE during their ICT implementation, and the frequency and percentage of each category of ICT challenges are calculated and presented as follows.

Table 4.18:Challenges facing ICT in the Logistics Management Processes

S.N	Type of Challenges of ICT	Specific ICT challenge	Mean	Standard deviation	Grand mean
1	User related Challenges	Management related barriers	3.28	0.987	3.13
		Operation related reasons	3.48	0.928	
		Economic and financial reasons	2.63	1.206	
		Inadequate skills on the management of ICT	3.39	0.989	
		Resistance to change by part of management and staff	2.88	1.278	
2	Policy related Challenges	Lack of related policies	3.30	1.018	3.17
		Coordination and harmonization of related policies	2.80	1.264	
		Lack of standardization supported by policies	3.40	1.045	
3	Technology related Challenges	Computability and interoperability of systems	2.88	1.216	3.12
		Lack of ICT standardization	3.35	1.031	
		Poor Confidentiality of information	3.11	1.122	
		Costly new technology	2.77	1.254	
		Lack of integrated system	3.49	1.146	

Source: Author survey, 2019

As the results shown in table 4.13, from the user challenges facing ICT in the logistics management processes in ESLSE the respondents indicated that operation related reasons was selected to a high extent relative to the other items as shown by a mean score of 3.48, followed by inadequate skills on the management of ICT shown by a mean score of 3.39 and management related barriers shown by a mean score of 3.28. The result also showed that the enterprise face challenges of resistance to change by part of management and staff, and economic and financial reasons to moderate extent as shown by mean scores of 2.88 and 2.63 respectively. This implies that financial resources and resistance to change are not critical problems relative to the others.

Lack of standardization supported by policies was considered as a challenge to a large extent from the policy related challenges with 3.40 mean score followed by lack of ICT related policies by mean scores of 3.30.

On the other hand, coordination and harmonization of related policies shown by mean scores of 2.80 was a challenge to moderate extent in implementation of ICT within the enterprise.

The finding shows that from the technological challenges facing ICT in the logistics management processes in ESLSE, lack of integrated system, which is the most critical challenge, was selected by the majority of the respondents as shown by mean score of 3.49.

Lack of ICT standardization and poor confidentiality of information were also the second and third critical challenge for ESLSE with the mean score of 3.35 and 3.11 respectively. However, costly new technology shown by mean score of 2.77 while computability and interoperability of systems by mean score of 2.88 were not critical for enterprise under this category.

In general, the results shows that most of the challenges facing ICT in the logistics management processes for the enterprise are found under both user related, policy related, and technology related challenges rated average with the mean score of 3.13, 3.17 and 3.12 respectively. These findings support Pietro Evangelista and HeliKilpal (2007) assertion that the lack of technological standards considered as an important barrier for ICT implementation, this being particularly true for the Northern survey.

4.7 Qualitative Analysis

In this study, the researcher has employed personal interviews to collect relevant data besides other instruments. The interviews were semi-structured to help the participants focus on more relevant and critical issues that were directly related with the research questions. They were prepared to gather information from 5 managers and 5 employees who were selected purposively. Because, better information could be obtained from them that have relatively better knowledge on the operational activities in the enterprise. Keeping this in mind, the participants were to explain their opinion against each question as follows.

1. To what extent of ICT adoption in ESLSE?

The majority of them said that we all need to accept and adopt new methods of technological development so as to improve service delivery. We believe that new ICT system will bring to us advantages, but the enterprise lacks to change believe into practice and use more advanced system. For instance, the interest to use terminal operating system was appeared before 3-4 years, but still it is not applied in the enterprise.

As it was understood from this interview, the initiatives on ICT adoption in ESLSE for logistics management were high. But their interest was not changed in to practice and still the enterprise has not used new technologies as they believed.

2. What ICT tools are used in ESLSE?

The interviewee also asked to give the response concerning the ICT tools used in ESLSE.

They justified that in ESLSE many in-house systems are used. From these, dry port operation information system is mainly used in dry ports. Shipp Expert System (SES) and access are also used basically for facilitating financial transactions. Automated System for Customs Data (ASCUDA) was used in multimodal operation for clearance purpose and Container Trucking and Trucing System (CTTS) also used for opening operation in head office as well as Djibouti branch office. Telephone, fax, website and email are the most widely used communication tools. However, more advanced software that has the potential in terms of logistics service delivery and interaction with customers were not widely used in the enterprise.

The above information said that ESLSE used both in-house and worldwide systems like sea liner while it focused on using in-house ICT tools. This implies that the enterprise was not used more advanced ICT tools such as ERP, GPS, TOS, etc., in its operation. Furthermore, the researcher asked to what level of ICT usage in ESLSE? They said that it is possible to say the extent of technologies in terms of number as well as quality was not enough. This showed that the level of ICT usage in ESLSE is relatively low.

3. How information communication technology practice is effective in ESLSE?

Regarding to the effectiveness of currently used ICT tools in the enterprise, the interviewees were asked and they replied that the level of effectiveness of ICT practice in terms of service, system and information quality is moderately well. This means that the system not always provide sufficient information and offers greater security to the fleet and reduces the likelihood of accidents. For instance, DPOIS has a limitation to provide the balance by deducting the output from the input. It considered the released container as existing in the terminal after any process.

As this interviewee said that even though the level of ICT usage either in number or in advancement was at low level, the enterprise used the existing ICT tools properly at a moderate rate in order to provide efficient logistics services.

4. What are the most important challenges in applying ICT in the logistics management processes of ESLSE?

They Said that there were many challenges in applying ICT tools. The customers could not get information as they expected.

The main problems were related to operations like human skill and lack of training and educational activities. There was also technological constraint that prevents operators making full utilization of ICT applications.

It was learnt from the interviewee that the implementation of ICT tools in ESLSE has various problems like user, policy and technology related.

5. What do you think should be done to enhance ICT application in logistics operation performance in ESLSE?

The researcher asked the question about the respondents thought regarding to their suggestion on enhancing ICT application in logistics performance in their enterprise. They said that management of ESLSE should adopt advanced technologies and use them properly as they will help in shortening transaction time which improves customer service. The enterprise should invest in modern technologies in order to integrate its logistics management systems. This would minimize communication costs and increase sharing of information which leads to improved efficiency and effective performance of logistics management in ESLSE. They will also formulate a relevant ICT policy framework in a line of ESLSE business strategy.

Chapter Five: Summary, Conclusion and Recommendations

This is the final chapter in this study which gives the summary of key data findings, conclusion drawn from the findings highlighted and recommendation made thereto. The conclusions and recommendations drawn were focused on addressing the objective of the study.

5.1 Summary of Major Findings

The general objective of the study was to investigate the effect of ICT implementation on operational performance of logistics management in ESLSE. The researcher used quantitative and qualitative approaches. The quantitative approach was conducted using a structured questionnaire and the qualitative one was based on **personal interview guideline**. The open ended items from the questionnaire were also analyzed qualitatively. This section discusses key findings emerging from the present study.

The survey indicates that the overall level of ICT adoption is fairly high. **However, it is not strongly influence and lead to improved operational performance of logistics management in ESLSE. In this way, the findings suggest that management with a longer term strategic view of the business tend to adopt more proactive ICT solutions designed to reinforce and sustain the enterprise's competitive position.** The staff members have a more appreciation of the role of ICT in achieving their business objectives. For many of them, ICT is seen as important in the improvement of operational performance of logistics management.

The study found that although ICT usage has significantly contributed to operational performance of logistics management in ESLSE at significance level of 0.05, the level of ICT usage in ESLSE appears relatively moderate. The study also indicates that the appropriate investment in information systems to improve the integration of logistics operations with ICT tools was average, while communication tools to manage basic logistics activities (e.g. telephone, e-mail, fax, SMS, etc.) shows a higher level of implementation. This implies that the enterprise is at the moderate stage of ICT usage.

The study findings also revealed clearly that ESLSE uses different ICT systems in management of logistics operations to improve its performance. As a result shows that Sea liner and Dry Port

Operation Information System (DPOIS) are the most widely used system, while the use of relatively other advanced and more sophisticated technologies (such as RFID, ERP and CRM) are low in ESLSE.

This indicates that ICT system investment is limited and investments in new technology are still motivated by a tactical rather than a strategic logic. Of course website utilization has begun recently in the enterprise and enterprise resource planning will implement to integrate logistics functions within a short period of time.

Based on its system quality, information quality, service quality, and usage the current practice of ICT has been effective at a large extent. This shows that the effectiveness of ICT practice in the ESLSE appears relatively at large extent. This implies that although the level of ICT usage is at moderate level, there is a better utilization of the current ICT tools in the enterprise, while the enterprise has not benefited from the missing advanced applications because according to the findings there exist a strong and significant positive relationship between level of ICT usage and operational performance of logistics management in ESLSE.

The survey results also indicate that there exists a strong and significant positive relationship between the level of ICT effectiveness and the operational performance of logistics management of ESLSE. It shows that effective practice of ICT tools improves operational performance by rendering services to customers in the most efficient manner and meeting customer demands within the expected time. This means that for the enterprise to do better it require having effective in the ICT. The services provided are efficient and the response to customer's inquiry and order processing is quicker.

The regression results found that 52.1% of the variability in operational performance of logistics in ESLSE was explained by information communication technology used in logistics management. The beta value of level of ICT adoption (0.040) indicates that it only explains about 4% of the variance in operational performance of logistics management), while it has P values greater than 0.05 and hence, does not significantly influence the operational performance of logistics management in ESLSE. On the other hand, the result indicates that the level of ICT effectiveness and the level of ICT usage ($\beta = 0.460$ and $\beta = 0.369$) have a significant influence in explain the variance in operational performance of logistics management ($P < 0.05$), they have P values greater than 0.05 and hence, significantly influence the operational performance of logistics management in ESLSE.

The results also show that level of ICT effectiveness and level of ICT usage significantly affects important dimensions of the operational performance of logistics management in ESLSE; namely efficiency, and effectiveness of services.

The relative importance of each independent variable was different with level of ICT effectiveness contributing the most to operational performance of logistics management of ESLSE followed by level of ICT usage. Thus, they influence better service to customers and they are able to get good services in time limit expected. This helps ESLSE to deliver services to customers in the service expected.at any time they need.

Therefore, the positive correlation between the independent variables and dependent variable indicates that ICT implementation is a critical support tool in increasing the level of efficiency and effectiveness of logistics services in ESLSE.

In relation to barriers to ICT implementation, the policy-related barriers were considered the most important barriers to ICT implementation in ESLSE. These relate to the coordination and harmonization of different policy levels which could prove to be an effective enabler for facilitating some new technologies or methods implemented through specific regulation. The enterprise also face challenges of user-related barriers including economic, operational, managerial barriers and relate to the enterprise's environment followed by technology-related barriers relate to the technological constraints that prevent operators making full utilization of ICT applications, including the issues such as interoperability of systems, ICT integration, standardization, security and data protection. Both barriers have an important role in inhibiting ICT implementation in ESLSE.

5.2 Conclusion of the Study.

- Based on the findings of the study, it is clear that there exists a high level of ICT adoption. But it has insignificant contribution to the operational performance of logistics management in ESLSE. **It is not strongly influence and lead to improved operational performance of logistics management in ESLSE.**
- The survey results indicate the level of ICT usage and the level of ICT practice effectiveness in the ESLSE appears at average extent, **while the use of relatively advanced and more sophisticated technologies are low in ESLSE.**
- Research findings also indicate that level of ICT effectiveness and level of ICT usage influence the operational performance of the enterprise because according to the findings they are significant predictors. However, level of ICT adoption was found not to be a

significant predictor of operational performance of ESLSE. The research concluded that level of ICT effectiveness was a better significant predictor of the operational performance of ESLSE than level of ICT usage.

- From the study findings, it concludes that the regression model was statistically significant in explaining the relationship between ICT and operational performance of logistics management in ESLSE. This implies that implementation of information communication technology on logistics management affected the operational performance of the enterprise.
- The survey results indicate ICT as a larger contributor in operational performance of logistics management in ESLSE.
- The study also concludes that the ICT being implemented in ESLSE faced various challenges which hindered the effectiveness of the usage process. The main challenges included; operation related reasons, lack of ICT related policies, lack of standardization supported by policies, lack of integrated system, and management related barriers.

5.3 Recommendation

- The perception on initiatives on ICT adoption alone does not hold the answer to ICT value creation. The study therefore recommends that top management should proactively and innovatively invest in appropriate advanced technologies. But the enterprise must be focused in terms of its needs and using the right technology to achieve goals, rather, than acquiring any technology of logistics industry for the sake of advancement.
- The study also recommends that ESLSE should maximize level of ICT usage particularly using advanced and sophisticated ICT tools in its operations through appropriate research will help efficiently and effectively meet the business changing needs so as to speed up the process of documentation as compared to the traditional documentation procedures applied by most branches of the enterprise. This will reduce the time taken to process documents with Customs during identifying container location and clearing of cargo.
- The study further recommends that ESLSE should use more modern information communication technology in its service deliverylike
 - Terminal Operating System (TOS) that is a key part of the supply chain and primarily aims to control the movement and storage of various types of Cargo in and around a Container terminal or Port,
 - Warehouse management system (WMS) that enable to support the warehouse and delivery processes in the logistics industry,

- The transportation technologies such as transportation information system (TMS), global positioning system (GPS), and geographical information system (GIS) that can help logistics managers planning, managing and controlling transportation issues and
- ERP that represents a kind of super system able to integrate all functional units, standardize and manage information sharing within its entire departments

in order to achieve integration, minimize communication costs, enhance efficiency and increase sharing of information which will eventually lead to improved performance.

- Level of ICT effectiveness and level of ICT usage influence the operational performance of the enterprise because according to the findings they are significant predictors. Therefore ESLSE needs to increase level of ICT practice effectiveness and ICT usage in order to improve on the operational performances of its logistics operations especially in the areas of offering greater security to the fleet, tracking all interactions that the company has had with the customer, and integrating all the departments or functions of an enterprise.
- The study recommends that in order to achieve effective practice of the various ICT tools, it requires clear related policies to be formulated, implemented and monitored to ensure they remain relevant to the business.
- The implementation of ICT in logistics management of the enterprise was found to bring various benefits. However, there has been several challenges encountered which hinder ESLSE from reaping the full benefits of ICT implementation in logistics management performance. The study therefore recommends that the enterprise will try to diverse challenges that slowed down the ICT implementation process through appropriate assessment or research with an aim to investigate the critical challenge.
- Finally, since this study explored the ICT as a larger contributor in operational performance of logistics management in ESLSE, the researcher recommends that more detail similar studies should be done using more qualitative approach to provide in-depth understanding of effect of ICT on operational performance of logistics management. Thus, this study used largely the descriptive quantitative research method and as such may be lacking extent of the information.

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APPENDIX I: Questionnaire

Dear Sir/Madam,

I am a post graduate student at Addis Ababa University School of Commerce conducting a research on “The Effect of Information Communication Technology on Operational Performance of Logistics Management” in ESLSE as a partial fulfillment of the requirement of degree of master of Logistics and Supply Chain Management.

Enclosed with this letter is a brief questionnaire that asks a variety of close and open ended questions about your experience toward ICT practices in ESLSE. I am asking you to look over the questionnaire and please complete the questionnaire and I will be most grateful if you could kindly complete this questionnaire.

The information given here will only be used for purposes of this study and will be treated with utmost confidentiality. Your assistance in the completion of this questionnaire will be highly appreciated.

Thank you in advance for your cooperation!

QUESTIONNAIRE

This questionnaire consists of three sections, the first part with demographic data, the second part with questions on effects of ICT and the third part with questions on challenges of ICT practice in ESLSE.

SECTION I: Demographic Data

Answer by ticking (✓) against the correct response that represents appropriately your situation

1. What is your gender? Male female

2. Kindly indicate your age bracket (Tick as appropriate)

Less than 30 Years 31 - 40 years

40 – 50 years Over 51 years

3. How long have you been working in this logistics firm?

0-5 yrs 5-10 yrs 10-15 yrs Over 15 yrs

4. What is your highest academic qualification?

Bachelor's degree

Master's Degree and above

5. In which department do you work in?

Operation department

ICT departments

Finance and Accounts & Procurement departments

6. What is your designation?

Manager

Employee

SECTION II: Effects of ICT in ESLSE.

2.1. Level of ICT Adoption

Rate the extent to the following perception on initiatives on ICT adoption in ESLSE for logistics operation. Please place an "X" in the appropriate box to rate the following items using a scale of 1-5: 1= Strongly Disagree 2= Disagree 3= Neutral option 4= Agree 5=Strongly Agree

Statements	1	2	3	4	5
The adoption of ICT system enables me to accomplish tasks more quickly.					
The adoption of ICT system has improved my quality of work.					
The adoption of ICT system makes it easier to do my job.					
The adoption of ICT system has improved my job performance.					
The adoption of ICT system enhances my effectiveness on the job					
My interaction with the ICT system has been clear and understandable.					
The ICT system is easy to use.					
Learning to operate the ICT system was easy for me.					
I can use the ICT system successfully every time.					
Using the ICT system is flexible to interact with.					

2.2 Level of ICT Usage

a. To what extent do you agree with the level of utilizing ICT in ESLSE?

Please place an “X” in the appropriate box to rate the following items using a scale of 1 to 5 using the key; where Not at all 2. Small Extent 3.Moderate extent 4. Large Extent 5. Very large extent

Statements	1	2	3	4	5
The management encourages the use of ICT within the enterprise (ESLSE)					
The existing ICT infrastructure in terms of Usage within the enterprise are not effective					
All operational activities within the enterprise are computerized					
My department uses ICT systems in delivering its service					
I spend over 7 hours using ICT systems in performing my duty in the enterprise					
More advanced logistics-related ICT tools and applications are used within the enterprise					
The investment on technology within the enterprise is sufficient					

b. How would you rate the use of ICT in the following logistics functions in ESLSE?

Please place an “X” in the appropriate box to rate the following items using a scale of 1 to 5 where 1= No extent, 2= little extent, 3= Moderate, 4= Large extent and 5 is to a Very large extent.

Functions	1	2	3	4	5
Sharing of Information					
Distribution Requirement Planning					
Coordination of logistics flows					
Offering greater security to the fleet					
Tracking all interactions that the company has had with the customer					
Integrating all the departments or functions of an enterprise					
Transferring electronic documents from one system to another					
Others (Specify.....)					

C. What ICT systems are used in ESLSE?

2.3 Level of ICT Effectiveness at Work

a. To what extent do you agree with the effectiveness of ICT practice at work in ESLSE?

Please place an “X” in the appropriate box to rate the following items using a scale of 1 to 5 using the key; where 1=Not at all, 2= small extent, 3=moderate 4= great extent, 5= very great extent

ICT Effectiveness in terms of Information System Factors		1	2	3	4	5
System quality	It is easy to use					
	It generates perfect as well as accurate Information					
	It prevent operational errors					
Information quality	It provide complete/sufficient information					
	It produce up to date information					
	Information needed is on time					
Service quality	It offers greater security to the fleet and reduces the likelihood of accidents.					
	It uses to transferring electronic documents from one system to another					

Usage	It improve operational outcomes					
	It supports for decision making					
	It save time in entry processing					

2.4 Logistics Operation Performance

How does application of ICT affect the following aspects in logistics operation performance in ESLSE?

Please place an “X” in the appropriate box to rate the following items using a scale of 1 to 5 where 1= no extent, 2= small extent, 3= moderate, 4= large extent and 5 is to a very large extent.

Statements	1	2	3	4	5
• Efficiency					
Quicker response to customer’s inquiries					
Reduce logistics costs and maximize profits					
Increase optimal utilization of resources					
Reduce service delivery time					
Reduce service delivery complaints					
• Effectiveness					
Increase reliability of logistics services					
Increase quality consistency of logistics services					
Promptly invoice and receive cash					
Forward better, faster and informed decisions through analytical data					
Reduce irregularities in operating activities					
Accurately identify storage locations					

SECTION THREE: Challenges of ICT Practice in ESLSE

With regard to ESLSE, to what extent do you experience the following challenges in applying ICT in the logistics operation? Please place an “X” in the appropriate box to rate the following items using a scale of 1 to 5 where 1= no extent, 2= small extent, 3= moderate, 4= large extent and 5 is to a very large extent.

Barriers to ICT implementation	5	4	3	2	1
• User related					
Management related barriers					
Operation related reasons					
Economic and financial reasons					
Inadequate skills on the management of ICT					
Resistance to change by part of management and staff					
• Policy related					
Lack of related policies					

Coordination and harmonization of related policies					
Lack of standardization supported by policies					
• Technology related					
Computability and interoperability of systems					
Lack of ICT standardization					
Poor Confidentiality of information					
Costly new technology					
Lack of integrated system					

- What other information would you like to share about the effects of ICT and logistics operation performance in ESLSE?
.....
.....
- What do you think should be done to enhance ICT application in logistics operation performance in ESLSE?
.....
.....
- If there are ESLSE ICT practice challenges that are not mentioned, please list them on the space provided.
.....
.....
.....

THANK YOU

APPENDIX II: Interview Guideline

1. To what extent of ICT adoption in ESLSE?
2. What ICT systems are used in ESLSE?
3. To what level of ICT usage in ESLSE
4. How information communication technology practice is effective in ESLSE?
5. What are the most important challenges in applying ICT in the logistics management processes of ESLSE?

6. What do you think should be done to enhance ICT application in logistics operation performance in ESLSE?