

**ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS**



**THE PRACTICES, CHALLENGE AND ROLE OF INFORMATION
COMMUNICATION TECHNOLOGY ADOPTION ON THE ETHIOPIAN
SHIPPING AND LOGISTICS SERVICE ENTERPRISE'S LOGISTICS
OPERATIONAL PERFORMANCE**

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ABBREVIATIONS AND ACRONYMS

3PLS:	Third-party logistic service provider
EDI:	Electronic Data Interchange
ERP:	Enterprise Resources Planning
ESLSE:	Ethiopian Shipping and Logistics Enterprise
ICAO:	International Civil Aviation Organization
ICT:	Information and Communication Technologies
SCM:	Supply chain management
STATA:	Statistical Package for the Social Sciences
LIS:	Logistics information system
DW:	Durbin-Watson
LP:	Logistics Performance

List of Tables

- Table 3.1 Reliability Statistics (page 23)
- Table 4.1 Demographic profile of the respondent (page 24)
- Table 4.2 Questionnaires & STATA output for Practices of ICT adoption on ESLSE's logistics operation. (page 26)
- Table 4.3 Questionnaires & STATA output for dimension of ICT on logistics operation. (page 33-34)
- Table 4.4 Questionnaires & STATA output for dimension of ICT on logistics operation. (page 38)
- Table 4.5 STATA output for Skewness /Kurtosis tests for normality (page 39)
- Table 4.6: STATA output for collinearity statistics (page 39)
- Table 4.7: Correlation matrix (page 40)
- Table 4.8: Durbin Watson Test Model Summary for cost performance dimension (page 40)
- Table 4.9: Durbin Watson Test Model Summary (page 40)
- Table 4.10: Durbin Watson Test Model Summary (page 41)
- Table 4.11: for testing heteroskedasticity for model 1(page 41)
- Table 4.12: for testing heteroskedasticity for model 2(page 41)
- Table 4.13: for testing heteroskedasticity for model 3 (page 42)
- Table 4.14: Model summary (page 42)
- Table 4.15: Model summary (page 42)
- Table 4.16: Model summary (page 42)
- Table 4.17: Regression Results Coefficients (page 44)
- Table 4.18: Regression Results Coefficients (page 45)
- Table 4.19: Regression Results Coefficients (page 46)

List of figures

- Fig 1: conceptual framework (page 21)

Table of Contents

Acknowledgment.....	iv
Acrony and Abbreviation.....	v
List of Tables and Figures	vi
Abstract.....	x
CHAPTER ONE	1
INTRODUCTION	1
1.1. BACKGROUND OF THE STUDY	1
1.2. STATEMENT OF THE PROBLEM	2
1.3. OBJECTIVES OF THE STUDY	3
1.3.1. GENERAL OBJECTIVE OF THE STUDY	3
1.3.2. SPECIFIC OBJECTIVES	3
1.4. RESEARCH QUESTION	3
1.5. SIGNIFICANT OF THE STUIDY	4
1.6. LIMITATION OF THE STUDY	4
1.7. SCOPE OF THE STUDY	5
1.8. OPERATIONAL DEFINITION	5
1.9. ORGANIZATION OF THE STUDY	6
CHAPTER TWO	7
RELATED LITERATURE REVIEW	7
2.1. THEORETICAL LITRATUR REVIEW	7
2.1.1. LOGISTICS	7
2.1.2. LOGISTICS OPERATIONS.....	8
2.1.3. INFORMATION COMMUNICATION TECHNOLOGY	9
2.1.4. INFORMATION AND COMMUNICATION TECHNOLOGY IN LOGISTICS	10
2.1.5. LOGISTICS AND INFORMATION FLOW	11
2.1.6. SYSTEM MODULES	12
2.2. ICT CHALLENGE AND PRACTICE.....	14
2.2.1. RESISTANCE TO CHANGE.....	14
2.2.2. LEADERSHIP.....	14
2.2.3. FUNDING	15
2.3. THE ROLE OF ICT ON ESLSE LOGISTICS PERFORMANCE	16
2.4. Logistics operation performance	18
2.5. EMPIRICAL LITERATURE REVIEW	20
2.5.1. PRACTICE OF ICT ON LOGISTICS	20

2.5.2.	THE CHALLENGE OF ICT TOWARDS LOGISTICS OPERATIONAL	20
2.5.3.	THE ROLE OF ICT ON LOGISTICS PERFORMANCE.....	21
2.6.	CONCEPTUAL FRAMEWORK	22
2.7.	RESEARCH GAP.....	23
CHAPTER THREE.....		24
METHODOLOGY OF THE STUDY.....		24
INTRODUCTION		24
3.1.	DESCRIPTION OF THE STUDY AREA.....	24
3.2.	RESEARCH DESIGN	25
3.3.	RESEARCH APPROACH.....	25
3.4.	POPULATION AND SAMPLE DESIGN.....	26
3.4.1.	POPULATION.....	26
3.4.2.	SAMPLING TECHNIQUE.....	26
3.4.3.	SAMPLE SIZE.....	26
3.5.	TYPES AND SOURCE OF DATA.....	27
3.6.	METHOD OF DATA COLLECTION	27
3.7.	DATA ANALYSIS AND PRESENTATION	27
3.8.	RELIABILITY TEST	27
3.8.1.	RELIABILITY TEST OF INSTRUMENT.....	28
CHAPTER FOUR		29
DATA PRESENTATION AND ANALYSIS		29
4.	INTRODUCTION	29
4.1.	RESPONSE RATE	29
4.1.1	DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS	29
4.2.	DESCRIPTIVE STATISTICS DIMENSIONS OF INFORMATION AND COMMUNICATIONS TECHNOLOGY ADOPTION ON LOGISTICS OPERATION	30
4.2.1.	ORDER MANAGEMENT SYSTEM ADOPTION	32
4.2.2.	WAREHOUSE MANAGEMENT SYSTEM	32
4.2.3.	TRANSPORT MANAGEMENT SYSTEM.....	33
4.3.	DESCRIPTIVE STATISTICS ON CHALLENGE OF INFORMATION AND COMMUNICATION TECHNOLOGY ADOPTION ON ESLSE’S LOGISTICS OPERATION	34
4.3.1.	RESISTANCE TO CHANGE	36
4.3.2.	LEADERSHIP.....	36
4.3.3.	LACK OF AVAILABILITY OF FUND	37
4.4.	THE ROLE OF ICT ON THE ESLSE OPERATIONAL PERFORMANCE OF LOGISTICS.	38
4.4.1.	COST PERFORMANCE DIMENSION.....	40
4.4.2.	RESPONSIVENESS -SPEED PERFORMANCE DIMENSION.....	40
4.4.3.	PERFORMANCE OF RESPONDING IN DYNAMIC ENVIRONMENT DIMENSION.....	40

4.4.4.	QUALITY PERFORMANCE DIMENSION	41
4.4.5.	DEPENDABILITY PERFORMANCE DIMENSION	41
4.4.6.	COMMUNICATION PERFORMANCE DIMENSION	41
4.5.	VALIDITY TEST	42
4.5.1.	ASSESSMENTS OF ORDINARY LEAST SQUARE ASSUMPTIONS	42
4.5.2.	ASSESSMENT OF NORMALITY	42
4.5.3.	ASSESSMENT OF MULTI COLLINEARITY	43
4.5.4.	ASSESSMENT OF AUTO CORRELATION	45
4.5.5.	ASSESSMENT OF HETEROSCEDASTICITY/ PRESENCE OF HOMOSCEDASTICITY ...	46
4.5.6.	REGRESSION RESULTS	47
4.5.7.	TESTS OF COEFFICIENT	49
4.5.8.	INTERPRETATIONS & HYPOTHESIS TEST.....	52
CHAPTER FIVE:		55
CONCLUSIONS & RECOMMENDATIONS		55
5.	INTRODUCTION	55
5.1	Summary of major findings	55
5.2	Conclusion of the Study.	56
5.3	RECOMMENDATIONS	57
5.4	SUGGESTIONS FOR FUTURE RESEARCH.....	58
References		59
annex 1.....		64

Abstract

The study has been conducted with the challenge, practice, and role of information communication technology adoption on Ethiopian shipping and logistics enterprise (ESLSE) the logistics operational performance. This study adopted a quantitative method, descriptive and explanatory research designs, and survey as the research methodology. Accordingly, out of 297 employees taken as a population of the study, using purposive sampling technique, a questionnaire was distributed to 114 employees of the ESLSE head office working in the operation and information communication technology department and various units of department ranging from senior officials to top-level managers and all questionnaires were collected with a response rate of 100 %. The researcher utilized purposive sampling techniques to select the participants. The descriptive statistics were used to analyze the challenge and practice of ICT on the logistics performance of the enterprise and inferential analysis (multiple regression analysis) to determine the cause and effect relationship between the role of information communication technology and logistics performance of the enterprise and to test the hypothesis. According to the regression output of information communication technology (order management system, warehouse management system and transport management system) affect the logistics operation performance in terms of cost, responsiveness (speed), and quality performance dimension significantly and positively. All these three independent variables are making 48.71%, 78.95%, and 47.69% of the contribution for logistics operational performance respectively and there an information communication technology challenge of resistance to change lack of leadership and Lack of fund availability in the adoption of information communication technology. Thus, the researcher recommended that the enterprise should work on automating all logistics operation of the enterprise with advanced information communication technology system, by providing appropriate and necessary short and long term training to employees and managers in order to enhance capacity and attitude change in different disciplines that would enable to perform the value-adding activity within the enterprise and allocation of resource in order to decrease operation cost, increase responsiveness(speed) the operation, increase the quality of operation service.

Keywords: ICT: information communication technology, order processing system, warehouse management system, transport management system, logistics operation performance.

CHAPTER ONE

INTRODUCTION

The main purpose of this chapter is to present an overview of the research, a background of the study, research problem, research questions, research objective, and significance of the study, the scope of the study, limitation of the study and definition of terms and brief summary of the structure.

1.1. BACKGROUND OF THE STUDY

Ethiopia's location gives it strategic domination as a jumping off point in the Horn of Africa, close to the Middle East and its markets. Bordering Eritrea, Somalia, Kenya, South Sudan, and Sudan, Ethiopia is landlocked, and has been using neighboring Djibouti's main port for the last two decades. (worldbank, 2019).

Ethiopia as a developing country known the importance of Trade Logistics before a decade after facing a challenge when importing heavy machineries to satisfy the demand of the industry and service sector. Correspondingly, the export market began to demand immediate delivery and cost effectiveness. Since Ethiopian economy is mainly dependent on Exportable agricultural products mainly Coffee and oilseeds, logistical efficiency is very decisive. As a result, the Ethiopian government implemented many reforms to changes the economy. Specifically, the country issued proclamations, freed the transport sector, merged logistics enterprises, restructured customs Authority and established dry ports connected by railway, which are the major move in the country that gave recognition to trade logistics (Kebede, 2015).

Ethiopia has three types of freight-forwarding service providers namely a) Forwarding and shipping agency service providers, b) Forwarding service providers and c) Customs cleaning agents. Foreign participation in the sector is not permitted under the investment law. Forwarding and shipping agency service providers. The state-owned Ethiopian Shipping and Logistics Services Enterprise (ESLSE) provide freight forwarding and clearing, shipping, as well as trucking and stevedoring services. ESLSE provides Multi-modal and Uni-modal transport operations. About 8% of these services are provided by the private sector. Forwarding service providers represent 17% of the service providers and the majority lacks strong financial bases and faces some problems in management and organization. Customs clearing agents consists of informal operators and represent about 75% of the services

providers and focus on individual consignments in which they provide cheaper services based on personal contacts. The majority lacks strong financial backing, management and organization (UNDP, 2017).

The main challenges of the sector listed as follows inefficient administration of finance and trade policy, Undertaking unprecedented transit and customs, Low competence of logistics service providers and problem of application of modern information technology (MOT, 2011).

1.2. STATEMENT OF THE PROBLEM

ICT is 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 (Somaiya & Oyesiku, 2010). It is now commonly accepted that information and communication technologies provide many benefits to companies 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 (Somaiya & 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.

PERAKOVIĆ¹ (2003) has conducted a study on new challenges of ICT usage in transport and logistics. This study is mainly focused on the use of ICT by transport and logistics and highly focused on the automation and usage of ICT but did not sought from challenges of ICT from the perspective of operational and human element aspect and the study also stated further study needed to be held on those stated elements.

(Abebe, 2019) has conducted a study on the effect of information and communication technologies on operational performance of ESLSE logistics management, this study mainly focused on to investigate the effect of ICT implementation on operational performance of logistics management in ESLSE, the implementation and usage of ICT is at moderate stage but the study did not sought challenge of ICT in deep way and the study also stated further study needed to be held, the study used descriptive research method but this study differs in this regard by using descriptive and explanatory research method.

A study conducted by yafet Makonnen, (2017) assed the role of ICT on logistics of ESLSE from management perspective, however the present study intended to assess from operation perspective

According to Gebretsadik, (2017) on the Second ICAO Meeting On “Multimodal Transport System Challenges & Prospects in Ethiopia” the logistics operation is mostly relying on paper document, fax, and emails in the exchange of official information between departments, ports, agents and all logistics supplies chain. Also (MOT, 2018) stated the major problem of the logistics sector, which is the existing gap in the use of modern ICT and lack of ICT infrastructure. Despite this fact ,the ESLSE adopted different ICT infrastructure to smoothen its operation like DEPOIS,SEALINER ,ERP and IFRS however no prior study has been conducted To assess the practices, challenge and role of those ICT infrastructure on the logistics operation performance This study therefore, sought to examine specifically the role of information technology adoption on Logistics operation of Ethiopian shipping and logistics service enterprise performance to realize its significant impact on its operations in order to guarantee its profitability and growth.

1.3. OBJECTIVES OF THE STUDY

1.3.1. GENERAL OBJECTIVE OF THE STUDY

The general objective of this study is to assess the practice, challenge and role of ICT adoption on logistics operational performance of the ESLSE

1.3.2. SPECIFIC OBJECTIVES

The study is guided by the following specific objectives

- To assess the practice of ICT adoption on the ESLSE’S logistics operation
- To assess the challenge of ICT adoption towards the ESLSE’s logistics operation
- To identify the role of ICT adoption on the ESLSE operational performance of logistics.

1.4. RESEARCH QUESTION

- How ICT adoption is being practiced at the ESLSE logistics operation?
- What is the challenge of ICT adoption towards ESLSE’s logistics operation?
- What are the roles of ICT adoption on ESLSE ‘s logistics operational performance

1.5. SIGNIFICANT OF THE STUDY

To the managers of logistic operation in Ethiopian shipping and logistics enterprise, it will give new information as to how they can effectively adopt the information technology in the operation system in order to increase the performance of the Enterprise. For academic purposes, this study serves to increase knowledge concerning information technology and the performance of the organization and making base for further study ,The study may also give the managers more insights on the role of ICT on the Enterprise performance hence they would be in a position to make strategic decisions concerning the role of ICT within the Enterprise. The study might be useful to the government in terms of revealing the benefits of ICT role in improving service delivery hence government will be in a position to make strategic decisions concerning ICT infrastructure within the country and take initiatives of attracting investors in the country. This would boost economic growth in terms of ICT investments within the country.

1.6. LIMITATION OF THE STUDY

Since the logistics operation management strategy of the company is peculiar to itself, it is difficult to generalize the findings of the study to other firms in the logistics industry in Ethiopia. Finally, the operational performance of logistics measures presented in the study are only a proportion of the potentially relevant variables that might have been included these measures only serve as examples and special attention is rather paid for structuring the vast major of measures. in addition, the research is limited on Ethiopian shipping and logistics service enterprise this is due to time and resource limitation, also this study was highly influenced by the COVID-19 pandemic due to lockdown and unable to use university's library and discussing with advisor in person interruption of internet made the thesis work hard .

1.7. SCOPE OF THE STUDY

The principal concern of this research is to examine the challenge practice and role of the ICT on operational performance of logistics considering the challenge practice and role of ICT as a factor affecting logistics operational performance. 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. This study focuses on the challenge, practice and role of ICT on logistics operational performance of Ethiopian Shipping and Logistics Service Enterprise at head office in department of logistics operation and ICT department (freight forwarding, port and terminal, corporate and shipping sector). So, it covers the accumulated employee's ranging from senior officers to top level managers.

1.8. OPERATIONAL DEFINITION

communications technology (ICT) Stands for "Information and Communication Technologies." ICT is an umbrella term that include any communication device or application ,encompassing radio , television, cellular phone ,computer and network hardware and software ,satellite system , as well as the various service and application associated with them (Razani, 2012).

chain management (SCM) Supply chain management is the coordination of production, inventory, location, and transportation among the participants in a supply chain to achieve the best mix of responsiveness and efficiency for the market being served (Hugos, 2003)

Logistics deals with the planning and control of material flows and related information in organizations, both in the public and private sectors. Broadly speaking, its mission is to get the right materials to the right place at the right time, while optimizing a given performance measure (e.g. minimizing total operating costs) and satisfying a given set of constraints (e.g. a budget constraint) (Gianpaolo Ghiani, 2004)

1.9. ORGANIZATION OF THE STUDY

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, scope 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 is 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 as well as limitation of the study.

CHAPTER TWO

RELATED LITERATURE REVIEW

This chapter reviews what other scholars have had to say about the role of IT on logistics operation and how IT has transformed their operations. It also gives empirical review of the past research both globally, international and nationally. The chapter also focuses on conceptual framework before concluding with the summary of literature review and research gaps

2.1. THEORETICAL LITRATUR REVIEW

2.1.1. LOGISTICS

Logistics refers to the art of managing the flow of physical material and from source to user information. It covers all information and material flows within an organization and organizations involved in intersections. It covers everything from the movement of a product or service to the management of incoming raw materials, manufacturing, storage of finished materials Production, storage and distribution of finished products to the company (Mihai, 2013).

Logistics has now been recognized as an essential element of corporate strategy that could eventually contribute to value creation for consumers, cost savings, applied marketing discipline and improved output flexibility (Gustin, 1993). The emergence of new technologies leads to a change in logistics management practice and significance, and emphasizes its role in corporate strategic function (Tuominen, 2006)

By incorporating new technology in logistics operations, the role of logistics in companies has changed from just a support function to a value-added feature, and businesses can achieve better customer satisfaction and higher cost savings to compete in global markets. IT affects the organization in two ways: it improves the organization's current logistics functions and changes the logistics operations structure (e.g., by eliminating distributors and making direct contact with customers through the use of IT solutions) (Tuominen, 2006).

The role of logistics function is a key determinant of business success in ensuring that material and knowledge flows smoothly across the supply chains of a firm. Also, logistics has become more prominent as a critical success factor in competitive advantage by cutting costs and improving the level of service or customer responsiveness. Problems in small companies include delayed and inaccurate details, inadequate infrastructure, slow and inefficient operation and a high rate of damage to the product (Toyin, 2011).

2.1.2. LOGISTICS OPERATIONS

Precise, timely information is intended to promote logistical operations. Logistics must receive, process, and ship inventory to meet supply-chain requirements.

Order processing refers to the exchange of information on requirements between supply chain members involved in the distribution of the products. The primary command management activity is the correct entry and certification of customer orders. IT like mail, telephone, fax and electronic data interchange (EDI) have radically changed the traditional order management process (Reza Zanjirani Farahani, 2011).

Order assignment identifies responsibility for the inventory and the organization to meet customer requirements. Allocation can occur in real-time, immediate or batch mode, meaning that orders are grouped for periodic processing such as during a day or shift. The common approach has been to delegate customers obligation or scheduled production according to predetermined priorities. Bi-way contact linkages with customers can be established in technology-rich order-processing systems to produce a negotiated order that satisfies customers within the constraints of scheduled logistical operations (Reza Zanjirani Farahani, 2011).

Distribution operations involve information that facilitates work within logistics facilities and coordinates that. In distribution operations, the LIS functions include physical tasks such as product receipt, material processing, storage, and order collection (Reza Zanjirani Farahani, 2011).

Inventory management relates to details needed to execute the logistics program. Inventory management key role is to control and distribute inventory according to expected requirements. Inventory management work is to distribute resources in a manner that ensures the overall logistics system performs as intended (Reza Zanjirani Farahani, 2011).

Information about **transportation and shipping** directs movement in inventory. The transportation and shipping activities include shipment preparation and scheduling, aggregation of shipments Notification of shipments, production of transport documents, and management of carriers. The activities ensure efficient use of the transport resources as well as efficient management of the carrier. It is important to consolidate orders in the distribution operations so as to make full use of transport capacity. It is also necessary to ensure that the necessary equipment for transportation is available where necessary. Logistics Operations and Management Finally, supporting transaction documentation is needed because ownership transfer often results from transportation. Operational information generally aims to facilitate integrated management of market distribution, manufacturing support and procurement Transactions. Planning and coordination identify and prioritize the work required and identify the operational information needed to carry out the daily logistics (Reza Zanjirani Farahani, 2011).

2.1.3. INFORMATION COMMUNICATION TECHNOLOGY

Information can be seen as the life-blood of a system of logistics and distribution. Nowadays, the efficiency and accuracy of delivery systems depend on information transfer. To do this, it is necessary to establish a proper corporate strategy for a company's information requirements (A. Rushton, 2006).

Introna Lucas (1991) shows that the logistical systems and information and communication systems work in parallel, as long as the logistics system converts materials into products, the information and communication systems convert data into information by creating value for customers to facilitate managerial decision-making. In a logistics system, the information flow is as important as the material flow, and information is seen as a key source in the logistics system. The role of information flow in the logistics system becomes more significant when the complexity of logistics systems and channels increases and more members become involved (Lucas D. Introna, 1991).

As Chhibber and Ho ĩte. (2003) suggest, logistics system information flow can be divided into two separate categories based on their relationship to physical material flow. The first type is information that is specifically related to the movement of physical content, such as information on order, distribution and replacement (A. Chibba, 2004).

This type of information is represented by (F), and is required for logistics system production and other operations (A. Chibba, 2004)

The second type is information, which indirectly relates to the movement of physical material. To do daily logistics system operations such as processing customer satisfaction and demands information and market trends, it is not necessary. In a logistics system, data are generated by different kinds of activities and internal or external processes. The generated data will then be transformed into information in the next step. This knowledge may be available in different formats, such as oral, textual, or paper-based (Xian-zhong Xu, 1995)

It should be converted to knowledge to utilize this information for a specific purpose such as decision making. Analysis is used to convert information to knowledge. Thus, the main purpose of collecting, retaining and manipulating data within a company is to make decisions ranging from strategic to operational and to facilitate transactions for a business (Ballou, 2004).

2.1.4. INFORMATION AND COMMUNICATION TECHNOLOGY IN LOGISTICS

An information system represents data integration, supporting equipment, and personnel and problem-solving methods used to help the logistician in planning and operations (Ballou, 1992).

according to Lambert et al. (1998). Such a LIS must be capable of transmitting source and demand point information (Lambert, 1998). This section discusses three LIS concepts: functionality levels, knowledge requirements and structure requirements. Functionality: transaction system, control management, tactical planning and decision analysis, and strategic plan planning (R. Singh, 2006) .

Transaction System

This category covers the most regular logistics management tasks such as order inquiries and receipt, order sorting, inventory status checks, bill-of-lading planning, and transport-rate lookups. These interactions can be replicated several times every hour, hence the speed of the information flow is very critical. Typical users at this level are operative personnel such as order-processing and transport-rate clerks (R. Ballou, 1987).

Management Control

At this level the emphasis is on measuring and reporting performance. First-line managers are the primary users of this phase of the information system. Warehouse supervisors, for example, need space, inventory and labor information to control them, or a truck-fleet manager must have the necessary information about people, equipment, and spare parts to schedule deliveries. The interval of generating this information is daily, and the information is presented in report format (R. Ballou, 1987),.

Strategic Planning

Tactical planning and control are an extension of oversight management. Its interval is less than 1 year but not as frequently as each day. Examples of tactical planning and control problems include the evaluation of inventory-control limits, supplier improvement planning, carrier selection, vehicle routing and scheduling, warehouse layout planning, and planning for seasonal space and transportation needs. The consumers of this level of information system are middle managers like warehouse managers and transport managers. The planning at this level is a sort of decision making (R. Singh, 2006).

Strategic Planning

The strategic planning is the extension of the decision analysis that is more abstract, less structured, and more long-term in focus. At the strategic-planning level, the goals, policies, and objectives of logistics system are established, and the main decisions on the overall logistical structure and resource distribution are taken. At this level, there is no need for high-speed information transfer, and the information system is interrogated infrequently. So off-line systems with manual procedures are enough for this level of planning. Examples of this level of planning include: Strategic alliances with other value-chain members, Identification and development of company capabilities and opportunities, Improvement of services according to customer opinions (R. Singh, 2006)

2.1.5. LOGISTICS AND INFORMATION FLOW

Stan and Reynolds (2001) indicated that data can come from many sources for a logistics management information system. Stock and Lambert (2001) also define the most important data sources for the common database, namely order processing systems, company records, industry data and ICT management and logistics information sharing applications, as an important prerequisite in the logistics management concept or in ensuring accessibility of information to all supply chain partners involved. Creation of centralized databases speeds up the production of supply chain relationships with other operators. Furthermore, the transfer of information, which is probably the most relevant function in the concept of supply logistics operations, ensures the widespread dissemination of internet and e-business technologies, allowing interoperability of systems and applications to be largely overcome. Finally, ICT also plays a major role in supply chain operation planning, to the degree that the advantages of applying logistics operations logic depend almost entirely on the ability of a business to create electronic ties with customers, suppliers and 3pl's logistics third-party (Stock, 2001).

The introduction of ICT has opened up possibilities for the emergence of new positions and functions in the supply chain, the so-called intermediaries or electronic freight, e-market sites, in the light of all of

these. These web-based intermediaries aim to add value to the transportation and logistics business through greater efficiency and transparency in information (Toyin, 2011).

The quicker information flows through the supply chain, it will allow better operational decisions. The quicker inventory and cash flow down the supply chain, the quicker the money of a business is released from the process of production or procurement. One of the main areas of interest that has emerged in recent years relates to ICT 's role in logistics. There is an excess of research in the literature that has analyzed general aspects (Stock, 2001) and specific roles (Lovorn, 2003) of these technologies in logistics, considering the wide range of possible roles, ICT is generally divided into the infrastructure of positioning, tracking, and communication technologies. ICT and LIS enable the combination of operational and information flow with good communication and cooperation along the supply chain, which provides transparent networks for both suppliers and customers.

Zhang *et al*, (2009) says, Visibility of the supply chain can increase collaboration among supply chain participants through real-time data sharing and enhance delivery time. With sufficient information and increased visibility and communication between different logistics operations and shareholders, various parties along the supply chain can take suitable decisions promptly (Zhang, 2009) .

2.1.6. SYSTEM MODULES

The LIS should be comprehensive and sufficiently capable to allow communication not only between a firm's functional areas (marketing, production, finance, logistics, etc.) but also between supply chain members (vendors and customers) (Ballou, 2004) . LIS modules can be listed as follows, according to Frazzle (Frazelle, 2001): Customer Response System (CRS), Inventory Management System (IMS), Supply Management System (SMS), Transport Management System (TMS), Warehouse Management System (WMS)

The CRS and SMS can be viewed as part of the order management system (OMS), with the IMS module usually included in a WMS. So, there are three main modules in LIS: OMS, WMS, and TMS.

The Order Management System

For checking product availability, the OMS is closely related to WMS. The OMS is the first point of customer contact with the logistics system by managing receiving and placing of orders. After checking the availability of the product and the customers accept the delivery time, the next step is credit checking. In this step the OMS communicate with the system of financial information to check the credit status of a customer. Whereas the customer data of a company are important in a customer-based OMS, the focus in a purchase-based OMS is on the vendor data of the company such as its delivery-performance ratings, costs and terms of sale, capabilities, availability and financial strength. Once the order is accepted, The OMS will allocate the product to the customer's order, assign it to the production site, decrease the inventory and prepare the invoice upon confirmation of shipping. [The OMS dose is not isolated from the other information systems of the company (Ballou, 2004).

The manner in which customer orders can be placed varies from entirely manual to automatic when a customer's computer connects directly to the seller's system without human involvement. The initial costs, however, are more than manual orders due to the need for system facilities. In this situation, when a customer order is issued, the system is able to automatically alert customers about the status of the order, including the availability of goods, shipping da And on the availability of credit. The Warehouse Management Program In automated order placement, operation speed and accuracy increase. If the order is allocated from the inventory, the inventory levels are automatically updated; if the item is not in stock, the estimated delivery date will be provided to the customers according to production planning (Ballou, 2004).

The Warehouse Management System

The main elements can be defined as follows (Lucas D. Introna, 1991): receiving Put away Inventory Management Order processing and retrieving Shipment Planning All of these elements may occur in a standard distribution warehouse's WMS, but some may not be present in warehouses mainly used for long-term storage or those with very high turnover. The WMS is a product flow and storage management information subsystem (Ballou, 2004).

The important point is that WMS and OMS have to be related because the sales department should be aware of the availability of products. The WMS may contain the OMS in some LISs, or it may be two separate modules inside the LIS. The WMS may contain an OMS, or two separate LIS modules. The WMS usually gets details from the company's key management system such as an enterprise resource planning (ERP) or legacy program, such as purchase orders and customer orders. Information such as received and dispatched goods, and levels of inventory are then fed back.

The basic function of a Warehouse Management System (WMS) is to improve the logistics management. Banzato (2005) states that the WMS provides for improvement in operational and administrative activities, including all sectors and activities related to the movement of materials within production and commerce (Banzato, 2005) . Poon *et al.* (2009) and Jin *et al.* (2013) complement that the WMS is important in the supply chain, with the emergence of modern logistics, in which the level of knowledge is ever greater. Poon *et al.* (2009) stresses that warehouse management systems (WMSs) were built to deal with warehouse resources and control of operations (Poon, 2009).

The Transportation Management System

The TMS focuses on the transportation in and out of a business. Like the WMS, it shares information with other components of the LIS, such as order content, quantity, weight and cube, delivery date, and delivery schedules for vendors. TMS as part of LIS has the function of planning and controlling the inbound and outbound transport activities of a company. This includes: selection of modes, distribution of freight, routing and scheduling of shipments, management of the fleet, scheduling of repairs, monitoring of vehicle parts, administration of the fleet, costing of the fleet, review of tachographs, processing of claims, recording of shipments, payment of freight and auditing (Reza FarahaniShabnam Rezapour, 2011)

2.2. ICT CHALLENGE AND PRACTICE

2.2.1. RESISTANCE TO CHANGE

Change is unavoidable, particularly within the trading world. Change happens due to developments that take place within the environment that firms operate in, and for an organization to thrive there's got to receive change (Gollapudi, 2012). As such organizations got to undertake the normal upgrade of their innovation and persuade staff to acknowledge such changes. It is imperative to note that changing staff behavior could be a long-term objective and thus organizations have to offer them set for the alter in to arrange for them to understand (Croft, 2005). Picking up acknowledgment at the staff level can end up a bottleneck particularly in the event that unused innovation is troublesome to oversee. In such cases, presenting changes inside an organization can cause disturbances in designs or behaviors that can cause misfortune of progression, supplant standard social structures and commonplace connections (Ogbo, 2011)

Changes have the possibility of affecting an employee's work duties, which can make sentiments of instability. The vulnerability of what unused innovation implies for workers can trigger more resistance to their acknowledgment of it (Affeldt & Silva, 2013). Resistance can moreover come within the frame of connection to ancient forms and bequest instruments that workers are comfortable with. Representatives can end up acclimated to a situation that is not the foremost advantageous and will unequivocally stand up to any proposals to alter it (Caruth, 2011). Technology change is more than fair bringing in a new device or piece of software, it is additionally changing the behavior of workers that can be fulfilled with a given way of doing things and safe to change what they are utilized to. The human inconvenience with change is truly based on the fear of loss the fear of the obscure can cloud employee's judgment around the benefits the changes have for them and the organization (Halvorson, 2011).

2.2.2. LEADERSHIP

Information and communication technology not as it offered a stage for businesses to prosper but to bits of help within the era of unused markets. Hence organizations from developed economies have accomplished a noteworthy level of adoption compared to those within the creating countries (Ige, 2011). Researchers who have inspected the ICT appropriation obstructions from states such as Nigeria, Malaysia, and India are among other nations who have emphasized authority (best management/CEOs) inadequacy as the major oblige to effective ICT selection (Ibironke, 2011) Similarly, other studies have distinguished that the procedures connected by beat administration to overseeing worker behavioral change as a critical boundary to grasping

technological change (Sidawi, 2012). Consequently, the decision employed by the organization to adopt advanced ICT-based applications successfully is dependent on leadership characteristics within that organization (Veugelers, 2012).

2.2.3. FUNDING

when new technology once selected in the organization it should be implemented and introduced to employees. Failure to familiarize changes which were planned by firms can result into paying a high price that could have a huge impact on their market position, credibility with stakeholders among other factors Invalid source specified (Edmonds, 2011). Successful implementation of technology change requires resources in order to develop a detailed plan to foster the implementation over time Invalid source specified (Luo, 2006).

The decision to embrace is frequently a speculation decision. In this manner, selection can be anticipated to be subordinate on taken a toll of a technology and on whether organizations have the specified assets. Technologies that are capital-intensive are as it were reasonable by a few Invalid source specified (El-Oster, 1999). In expansion, changes that taken a toll small are embraced more rapidly than those requiring huge expenditures; consequently, both degree and rate of appropriation may be subordinate on the fetched of an innovation. Financial hypothesis recommends that a diminishment in cost of a great or benefit can result in more of it being requested. In past studies, firms with more prominent technological assets are likely to receive modern technology. Usually since with more monetary assets comes the possibility of more slack assets that can be committed to appropriation of modern innovation Invalid source specified (Hwang, 2004).

2.3. THE ROLE OF ICT ON ESLSE LOGISTICS PERFORMANCE

The proper use of ICT enables tasks and activities to be completed more quickly, speeds up data preparation and transmission times, increases reaction speed to market needs, automates and thus reduces the costs of supervision and information processing, supports decision-making processes, enables efficiency-enhancing distributive operations, reduces data entry errors, improves customer quality, Companies using advanced ICT are more capable of responding to a dynamic environment, and can reduce operation costs more easily. ICT technologies also constitute an essential aspect of the relationship with external partners in that they change the nature of the relations between companies by allowing for real-time exchange of information and documentation in electronic form. (Krmac, 2016)

Performing well is an essential for corporations. winning organizations, for the most part due to the performance of their operations, maintain their name. each organization, in general, desires to be economical and effective. Therefore, the key aim of operations role in organizations is to arrange resources and activities as with efficiency and effectively as doable. Doing imply effectively to provide product the products and services that customers actually need and to be economical suggests that to provide the mandatory goods and services at very cheap doable price and energy. Quality goals for essential operations square measure crucial variables that square measure strategically relevant to organizations. Being strategically necessary suggests that considering the performance goals as strategic goals to be achieved and therefore the primary goal of the operations operate is to deploy the suitable resources to support the action of these goals. Usually, success expectations for the operations square measure directly connected to client satisfaction criteria. In general, the fundamental entertainer Goals that relate to any or all sorts of organizations and square measure closely associated with the standards of client satisfaction square measure speed, dependability, Flexibility, quality and price (Nigel Slack, 2007)

Speed:

Speed suggests that doing quick stuff. it's concerning providing the products and services as quickly as doable to customers. This includes creating swift selections and moving materials and details within quickly selections and speedily moving materials and knowledge within the operations. as an example, 'automated processes' are often a speed-performance think about the context of trade and transport facilitation (Nigel Slack, 2007).

Reliability:

Dependability suggests that doing stuff as planned, on time. this is often concerning building trust. reliability is often accomplished by exploitation reliable facilities, economical commutation economic planning processes, actuated labor pool, method consistency, etc. The 'transparency of border processes' are often Associate in Nursing example of a dependability performance think about the context of trade and transport facilitation (Nigel Slack, 2007).

Flexibility

Versatility is concerning modifying the operations to satisfy completely different needs. As needs will amendment over time, it's necessary that organizations develop operations Ability to launch new or updated merchandise and services and to deliver a good form of merchandise and services or a mix of them. Flexibility additionally involves volume flexibility (ability to regulate the assembly volume over time) and suppleness in delivery (ability to change delivery time). Flexibility within the use of additional versatile instrumentation, suppliers with smart performance in flexibility issue (Nigel Slack, 2007).

Quality:

Quality is concerning doing the correct issue. It suggests that manufacturing systematically merchandise and services that meet expectations. the standard goal is often achieved by providing merchandise or services that satisfy client needs that square measure error free. this needs skilled labor pool, adequate work needs, appropriate technology and economical communication. as an example, at intervals the context of a high-quality potency issue is also the 'adequate transport network' of trade and transport facilitation (Nigel Slack, 2007).

Cost:

Cost-performance is concerning economically doing things. Low price is one issue that's inherently enticing. Higher producing or service delivery prices square measure expressed by a reduced value to the patron. price reduction is often accomplished through the institution of excellent ties with suppliers; Effective contract negotiation, having the correct balance of services and instrumentation as inputs, etc. The 'no hidden prices' is also Associate in Nursing example of cost potency think about the sense of trade and transport facilitation (Nigel Slack, 2007).

2.4. Logistics operation performance

Logistics efficiency is a powerful determinant of national income and is the product of acts by a wide variety of public and private actors. Understanding and decomposing the components of logistics performance is essential for improving the efficiency of transport systems, and the quality of trade and transport regulation LP is defined as 'analysis of both efficiency and effectiveness in carrying out a given task' (Mentzer, 1991).

Other scholar refers to LP as a measure used for quantifying an action 's efficacy and/or effectiveness (Neely, 2005) This discussion continues and LP has been viewed as multidimensional and is defined as the degree of effectiveness, efficiency and differentiation Associated to carrying out activities (Fugate, 2010) Researchers have always found it difficult to define LP because they have multiple and often conflicting objectives. Within this analysis, efficiency is a measure of how the resources of the company are used economically (Mentzer, 1991) and (Neely, 2005). Several critical areas of LP efficacy as described (Langley and Holcomb, 1992, p. 25) are product guarantee, availability, and time of fulfilment. They also expanded the concept of effectiveness by incorporating differentiation as the ability to generate value for the customer through logistics services special and distinctive.

At the logistical level, the value of measuring performance was first demonstrated in the work of (Bowersox, 1996) which stated that logistics performance assessment consisted of a framework for evaluating logistics role resources, and its key objectives were to track and manage logistics operations. After this initial step, logistics performance analysis has become an important issue in management science research, but there is little convergence for its validity, despite this attention from researchers, both in terms of methods and outcomes.

As mentioned in (David J. Robba, 2008), since logistics deal with physical, information and cash flow management, this is generally recognized as a major determinant of business performance, but practices are still at the stage of being studied by professionals and academics, particularly in terms of performance analysis.

2.5. EMPIRICAL LITERATURE REVIEW

The study empirically reviewed researches which are made internationally, Africans and countrywide

2.5.1. PRACTICE OF ICT ON LOGISTICS

The study conducted by Fasanghari (2008) on the impact of Information Technology (IT) on Supply chain management in the case of Iranian automobile industry indicates that firms could improve their business competitiveness, flexibility and responsiveness by varying their operational strategy, methods of doing business and technologies utilizing Supply Chain Management (SCM) paradigm. Hence, IT improves performance SCM. Though, the research specifies and evaluates the areas of SCM affected by IT, even though its effect on different aspects of SCM are not the same. Since the judgments of Iranian automobile industry are qualitative, the evaluation has been done by fuzzy ranking method, the main dimensions of SCM were (firm, logistic, vendor relationship management procurement, operation, and customer relationship management), and the results of the study were ICT enhanced teamwork and customer relationship management. To evaluate the impact of IT on SCM of automobile industry of Iran, it is tested by eight experts of Iranian automobile industry supply chains which 90% were pleased with the obtained results.

2.5.2. THE CHALLENGE OF ICT TOWARDS LOGISTICS OPERATIONAL

The study made by tamirat jaleta (2019) on the title of factors affecting logistics performance: the case of Ethiopian logistics service providers Based on the F-statistics of the analysis of variance, it is concluded that the linear multiple regression model for logistics performance is viable or significant. Regression coefficients implied that political, social, technological, legal, infrastructural, management, and operational predictors are significant factors that determine the Ethiopian logistics service performance effectiveness. Economic, geographic, and operational variables are not significant variables that influence logistics service performance effectiveness.

A study conducted by (OSODO, 2014) On information and communications technology and supply chain performance among logistics firms in Nairobi found that the logistics firms adopted ICT in supply chain that affects supply chain performance significantly. From the results, ICT is used in sharing of information support planning and execution operations and distribution requirement planning to great extents, while it is used in material requirements planning, advance planning and scheduling and coordination of logistics flows to moderate extents. The study established that ICT affects the supply chain performance of the logistics firms. ERP systems provide such paperless platforms where a supplier

can exchange data related to orders. (2008) that intermodal logistics needs can be enhanced by connecting the regional stakeholders with an ICT system. ICT affects Order Fulfillment Cycle Time (OFCT), lead time and supply chain adaptability as well as supply chain flexibility and proportion of budget on ICT.

2.5.3. THE ROLE OF ICT ON LOGISTICS PERFORMANCE

The Study of (Abebe, 2019) on the title of ‘‘the effect of information and communication technologies on operational performance of logistics management’’ in this study the researchers aimed to better understand the value of | (ICT) in supply chain grounded in the TAM (the technology acceptance model) he developed a conceptual model that link three ICT variable (ICT adoption ,level of ICT usage and ICT effectiveness) to operational performance of logistics management .using the data collected questioners from 233 employee from head office ,mojo dry port and kality inland and port analyzing the data though qualitative and quantitative approach .

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. For many of them, ICT is seen as important in the improvement of operational performance of logistics management. The study findings also revealed clearly that ESLSE uses different ICT systems in management of logistics operations to improve its performance. The regression results found that 52.1% of the variability in operational performance of logistics in ESLSE is explained by information communication technology used in logistics management.

2.6. CONCEPTUAL FRAMEWORK

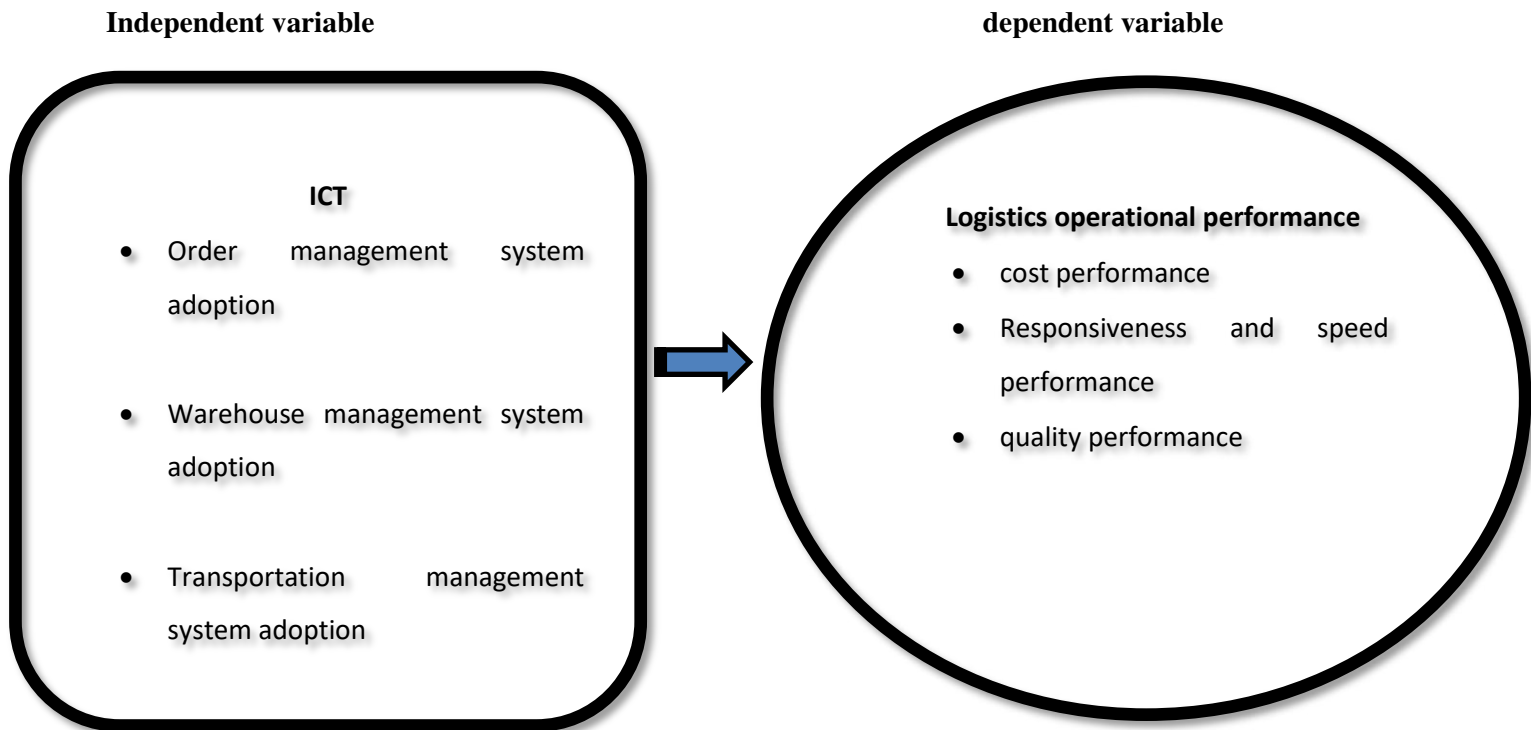


Fig1 conceptual frame work

Source: Author (2019)

Hypothesis

H1 Adoption of ICT positively and significantly affect the cost of logistics operation

H2 Adoption ICT positively and significantly affect the quality of logistics operation

H3 Adoption ICT positively and significantly affect the responsiveness

(speed) of logistics operation

2.7. RESEARCH GAP

Literature shows that there are many researches, which has been done on the role of IT on logistics operation as general. However, literature has shown very little concerning the direct impact of IT on the logistics operation firms. Many researches which have been done majorly dwell on the IT impact on the organization in general. This paper explored more on the actual role of IT on logistic operational performance of Ethiopian Shipping Lines Service Enterprise (ESLSE).

CHAPTER THREE

METHODOLOGY OF THE STUDY

INTRODUCTION

A research methodology is a systematic process which is followed in conducting a research study (Kothari, 2005). It comprises a body of knowledge that enables researchers to explain and analyze the research methods they use, indicating their limitations and resources, identifying their presuppositions and consequences, and relating their potentialities to research advances. This chapter is about the methods that is used for collecting information in the field and how the study is conducted, the applied methods and techniques in data collection and the reasons as to why they used according to the research. Accordingly, the issue of research methodology is essential to any study and an appropriation between the research paradigm, type of data, and collection methods has significant implications for the research findings.

3.1. DESCRIPTION OF THE STUDY AREA

Ethiopian Shipping and Logistics Service Enterprise (ESLSE) is Company that is established and owned by the government to maintain the less admirable economic growth that has been registered in the country over the last several years. One of the strategic measures taken by the Federal Government of Ethiopia is merging the former three public enterprises that have until recently been operating separately in a rather similar and interdependent maritime sub-sector; namely, Ethiopian Shipping Lines SC, Maritime and Transit Services Enterprise and Dry Port Enterprise. The Ethiopian Shipping and Logistics Services Enterprise is the result of this merger.

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 SC has recently been transferred to ESLSE following a government decree issued in the mid of (2014).

ESLSE play vital role in the country economy in general foreign trade. As set out in the regulation issued by the federal government of Ethiopia in 2011 (Regulation No. 255/2011), the objectives for which the ESLSE is established are: to reduce coastal and international marine and inland water transport services, to reduce freight forwarding agency, multimodal transport, shipping agency, to provide the services of stevedore, shore-handling, dry-port, warehousing and other logistics

services, to provide container terminal services, to engage in the development, management and operation of ports, to establish and run human resources development and training center in the fields of maritime profession, to study the country's, import and export trade demand and thus develop technological capacity in order to render maritime and transit transport services and to engage in other related activities conducive to the achievement of its objectives. Accordingly, the enterprise put in place its own new organizational structure in Dec 2012 on the basis of which, it has one chief executive officer and four deputy chief executive officers appointed by the government to lead and direct the enterprise at top management level.

The enterprise has four sectors led by the four deputy CEO's, namely: Shipping Sector, Freight Forwarding Sector, Port& Terminal sector and Corporate Services Sector (Samuel, 2016). ESLSE is giving so many services to the country by using the major service such as Shipping Sector (Sea Transport Services, Agency Services, Stevedoring, Shore handling), Freight Forwarding Sector (Multimodal transport service: Uni-modal transport service, Customs and port clearing Trucking) and Port& Terminal Sector (Receiving and delivering cargoes) to generate income (Samuel, 2016).

3.2. RESEARCH DESIGN

Both descriptive research design and explanatory research design was used to identify the practice the challenge and role of ICT in logistics operations. The main aim of descriptive research is to provide accurate and effective representation of variables under study (Creswell, 2013). descriptive and explanatory design is appropriate because it makes use of data collection and analysis techniques that capture the measures of central tendency, variation, and correlation (Shajahan, 2009).

3.3. RESEARCH APPROACH

The study was conducted two approaches, 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 intended the approximate phenomena from a larger number of individuals using survey methods (Creswell, 2013).

3.4. POPULATION AND SAMPLE DESIGN

3.4.1. POPULATION

Employees directly related with the ICT, logistics and SCM is selected as they can clearly define the role of IT plays in their day to day operation of the logistics and SCM activities. The total population of employees working in head office are 297. The target population is 160 as per the sampling method states below, the sample size is 114.

3.4.2. SAMPLING TECHNIQUE

Data is collected both from the side of the logistics operation provider (ESLSE) and the service users(customer). For the data collection, the researcher utilized purposive sampling method in order to get appropriate data from employees directly related with the ICT and logistics operation because the data that can be gathers from those people is helpful to get firsthand information about the role that the ICT in the day to day operation of the logistics.

3.4.3. SAMPLE SIZE

The study utilized the following formula to draw its sample size. The sample size is 114

Sample size determination formula

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

Where n is number of respondents

N stands for total population

e stands for error term of 5%

Source (Yamane, 1967)

3.5. TYPES AND SOURCE OF DATA

The type of data collected was primary data. The instrument included for the primary data, questionnaire. The primary data is going to be collected from employee at head office.

3.6. METHOD OF DATA COLLECTION

The data was collected using research questionnaire. The closed-ended questions were provided to compute and analyze.

3.7. DATA ANALYSIS AND PRESENTATION

Data processing involves coding, editing, data entry, and monitoring the whole data processing procedure (Hyndman, 2008). Data collected is coded and analyzed using STATA, descriptive and inferential statistics. correlations and regression analysis are done to determine relationship between variables under study. Mean, standard deviation, frequencies and percentages was used to present descriptive statistics. Results was presented in tables and figures.

3.8. RELIABILITY TEST

Reliability is a measure of the degree to which a research instrument yields consistent results or data after a repeated administration (Mugenda, 2012). Questionnaires is pre-tested to determine reliability and accuracy of the questionnaire. According to Creswell (2014), pilot study is used to test the feasibility of the questionnaires, interview schedules or other instruments is in use to collect data. Results from pilot test is going to refine the research design prior to conducting the full-scale study (Hildebrand, 2011) . the internal consistency/reliabilities of Information Technology practices, role of Information Technology, and logistics operation management is assessed with Cronbach's Alpha and the reliability values for all constructs confirmed as greater than 0.7, which are considered acceptable (nunnally, 1978).

3.8.1. RELIABILITY TEST OF INSTRUMENT

In Likert-scale questionnaires, measuring the consistency or reliability of the questionnaires is essential. To measure such a reliability analysis Cronbach's Alpha (α) is the most common measure of reliability scale. Reliability analysis value (α) greater than 0.60 is acceptable (Cronbach's, 1951). According to Field (2009) a reliability analysis value (α) greater than 0.70 is very acceptable. As indicated in table 4.8, the value of Cronbach's alpha for each variable was greater than 0.70 which is very acceptable. Therefore, the responses generated from all variables in this study were reliable enough for data analysis

Table 3.1 Reliability Statistics

Variables	Cronbach Alpha
Order management system	0.9597
Warehouse management system	0.9590
Transport management system	0.9615
Resistance to change	0.9602
Leadership performance dimension	0.9599
Lack of fund availability	0.9593
Cost performance dimension	0.9584
Responsiveness -speed performance	0.9570
Responding in dynamic environment	0.9553
Quality performance dimension	0.9584
Dependability performance dimension	0.9573
Communication performance dimension	0.9600

Source: Field survey, 2020

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4. INTRODUCTION

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 challenge, practice and role of information communications technology on operational performance of logistics in ESLSE.

4.1. RESPONSE RATE

For data collection purpose, depending on sample of the study, a total of 114 questionnaires were distributed to respondents and of 114 them are collected and responded correctly Therefore the response rate is 100 percent which show the response rate is very acceptable for analysis.

4.1.1 DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

The demographics profile of the respondents includes the variables gender, education level, position and work experience. Table 4.2 below displays that distribution of demographics variables.

Table 4.1 Demographic profile of the respondent

Demographic profile of the respondent	Dimension	Frequency	Percent
Respondents Gender	Female	18	15.79
	Male	96	84.21
	total	114	100
Work experience	1 to 5 years	14	12.28
	6 to 10 years	38	33.33
	11 to 15 years	46	40.35
	15 & above years	16	14.04
	total	114	100
Educational background	Degree	110	96.49
	Master's Degree	4	3.51
	Total	114	100

The table shows that 15.79% of the respondents are female while 84.21 % are Male. The study revealed that (12.28%) of the respondents had worked for a period ranging 1 to 5 years, (33.33%) of the respondent was between 6 to 10 years, (46%) of the respondents had served 11 to 15 years, and (14.04%) had served 15 years and above. This implies that majority of the respondents have knowledge accumulated and which in turn added recognized value for this study.

the study found that majority of the respondents as shown by 96.49% had attained undergraduate/ bachelor's degrees, while 3.51 % of them had attained postgraduate qualifications like master's degrees. This information shows that the respondents were knowledgeable enough to contribute positively in this study.

4.2. DESCRIPTIVE STATISTICS DIMENSIONS OF INFORMATION AND COMMUNICATIONS TECHNOLOGY ADOPTION ON LOGISTICS OPERATION

The summary of the first three objectives of this study was to assess the practice of ICT on logistics operational performance of ESLSE. As such the respondents were required to indicate their opinion on practice of ICT on order management system adoption, warehouse management system adoption, and transport management system how effective is ICT adoption in ESLSE. The responses are depicted as follows.

Table 4.2 Questionnaires & STATA output for Practices of ICT adoption on ESLSE's logistics operation.

Practices of ICT adoption on ESLSE's logistics operation	Mean	St. Deviation
1. The ESLSE's ICT has order management system responsible for checking product availability.	1.95	0.845
2. The ESLSE's ICT has order management system responsible for accepting the delivery time by the customers.	1.92	0.933
3. The ESLSE's ICT has order management system responsible for credit checking (communicate with the financial information system to check a customer's credit status).	1.95	0.845
4. The ESLSE's ICT has order management system responsible for allocating the goods to the customer order, and assign to a production location	1.95	0.979
5. The ESLSE's ICT has order management system responsible for decrement inventory	1.92	0.832
6. The ESLSE's ICT has order management system responsible for preparing an invoice when shipping has been confirmed	1.92	0.836
7. The ESLSE's ICT has warehouse management system responsible for management of product flow and storage	1.79	0.913
8. The ESLSE's ICT has warehouse management system responsible for working by integration with order management system	2.85	0.933
9. The ESLSE's ICT has warehouse management system responsible for managing warehouse operation	1.92	0.832
10. The ESLSE's ICT has warehouse management system responsible for getting information (such as purchase orders and customer orders from the company's main transaction system such as an enterprise resource planning (ERP))	1.92	0.693
11. The ESLSE's ICT has warehouse management system responsible for giving and getting information on goods received and dispatched and inventory levels	1.92	1.017
12. The ESLSE's ICT has transport management system responsible for inbound and outbound transportation	1.71	0.806
13. The ESLSE's ICT has transport management system responsible for having components such as order content, quantity, weight and cube, delivery date, and vendor shipping schedules	1.92	0.823
14. The ESLSE's ICT has transport management system responsible for planning inbound and outbound transportation activities like (Mode selection, Freight consolidation, Routing and scheduling shipments, and Fleet management) ...	1.71	0.806
Grand mean of Practices of ICT adoption on ESLSE's logistics operation.	1.95	0.549

Source: Field survey, 2020

4.2.1. ORDER MANAGEMENT SYSTEM ADOPTION

From the finding on the respondent level of agreement with the statement relating to Order management system of ICT in ESLSE, the study revealed that majority of the respondent agreed that the ESLSE ICT system has no order management system which enable them checking service availability , accepting the delivery order time as per the customer request , communicating customer financial status ,allocation goods to destination ware the customer needed, taking responsibility for decreed goods and preparing invoice when the shipping has been confirmed . with the mean score of (1.95, 1.92, 1.95, 1.95, 1.92and 1.92) respectively. Hence all response had a mean response value less than 2.00. This implies that participants were agreed on the ICT practice of ESLSE has no order management system responsible for checking product availability, accepting delivery time by the customer, accessing financial information of customer allocation goods to the customer order and decrement of inventory. The standard deviations (0.845, 0.933, 0.845, 0.979,0.832 and 0.836) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree; hence the responses were close to the mean.

Order management system is all about processing Order to the exchange of requirements information between supply-chain members involved in product distribution. The primary activity of order management is accurate entry and qualification of customer orders. IT such as mail, phone, fax, and electronic data interchange (EDI) has radically changed the traditional process of order management (Reza, 2011).

According to , Mohammad Reza Khoei and Morteza Lalmazlounian,(2011) “Order Processing in Supply Chain Management with Developing an Information System Model” stated that in today’s high competitive market business needs fast, effective, high responsiveness, online interactive, 24 hours 7 days availability and easy to follow up order processing (Khoei, 2011).

4.2.2.WAREHOUSE MANAGEMENT SYSTEM

According to the finding on the respondent on relating to warehouse management system of ICT in ESLSE, the study revealed that majority of the respondent agreed that the ESLSE ICT system has no warehouse management system responsible for flow and storage of goods , working integrally with order processing, enable them to manage operation , getting information on such as purchase orders and customer orders from the company’s main transaction system such as an enterprise resource planning (ERP) and responsible for getting and receiving information on goods receive and dispatch . with the mean score of (1.79, 2.85, 1.92,

1.92, 1.92 and 2.00) respectively. Hence all responses had a mean response value less than 2.00. This implies that participants were agreed on the ICT practice of ESLSE has no order management system responsible for product flow and storage, working integrally with order management, managing warehouse management and getting information. The standard deviations (0.913, 0.933, 0.832, 0.693, and 1.017) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree; hence the responses were close to the mean.

Based on the study made by Sagawa. (2018) after implementing warehouse management system there was a significant improvement in the picking process due to the WMS system tools, which, together with the use of a supermarket (stock area closed to the assembly stations), allowed the separation/picking time to be reduced by almost half. The delimitation of the routes by the system optimizes the use of time, and the radio frequency system guarantees the reliability of the operations. The high stock accuracy guarantees the speed in the process (Sagawa, 2018).

4.2.3. TRANSPORT MANAGEMENT SYSTEM

According to the finding on the respondent on relating to transport management system of ICT in ESLSE, the study revealed that majority of the respondent agreed that the ESLSE ICT system has no transport management system responsible for inbound and outbound transport, having component such as order content, quantity, weight, and cube and planning inbound and outbound transport activities like (mode selection, freight consolidation, routing and scheduling shipment and fleet management). with the mean score of (1.71, 1.92 and 1.71) respectively. hence all responses had a mean response value less than 2.00. This implies that participants were agreed on the ICT practice of ESLSE has no order management system responsible for inbound and outbound transportation, having necessary data such as order content delivery date vendor selection etc...., planning inbound and outbound transportation activities like mode selection freight consolidation routing and scheduling shipment and fleet management. The standard deviations (0.806, 0.823 and 0.806) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree; hence the responses were close to the mean.

It was also noted from the study conducted by Judith A. (2017). that logistical optimization of third-party logistic service providers in Kenya has greatly improved due to implementation of automated transport management system the most improved indicators of logistical optimization were: Cost reduction, Efficiency of asset utilization and Responsiveness while the least rated indicators were Productivity and Flexibility. However, the two were also rated to have improved to a great extent. Regression analysis established that there was strong relationship ($R= 0.835$) between automated transport management system and logistical optimization automated transport management accounting for 62.8% of the total variance in logistical optimization of third-party logistic service providers in Kenya. Further, the study found out that components of automated transport management system (route planning & optimization, load optimization, freight audit and payment, yard management and order visibility) have a positive and significant effect logistical optimization of third party logistic service providers in Kenya (AMOGOLA, 2017)

4.3. DESCRIPTIVE STATISTICS ON CHALLENGE OF INFORMATION AND COMMUNICATION TECHNOLOGY ADOPTION ON ESLSE'S LOGISTICS OPERATION

The summary of the first three objectives of this study was to assess Challenges of Information and Communications Technology on adoption of ICT in ESLSE. As such the respondents were required to indicate their opinion on Challenges of Information and Communications Technology on resistance to change, leadership and lack of fund availability in ESLSE. The responses are depicted as follows.

Table 4.3 Questionnaires & STATA output for dimension of ICT on logistics operation.

Challenge of information and communication technology adoption on ESLSE's logistics operation.	Mean	St. Deviation
15. Resistance to change in adoption of ICT negatively affect the effectiveness of order management system in the ESLS's logistics operation	4.07	0.463
16. Resistance to change in adoption of ICT negatively affect the effectiveness of warehouse management system in the ESLS's logistics operation	4.05	0.561
17. Resistance to change in adoption of ICT negatively affect the effectiveness of where transport management system in the ESLS's logistics operation	4.05	0.561
Mean of Resistance to change	4.06	0.466
18. Lack of good leadership in adoption of ICT negatively affect the effectiveness of order management system in the ESLS's logistics operation	4.05	0.561
19. Lack of good leadership in adoption of ICT negatively affect the effectiveness of ware house management system in the ESLS's logistics operation	4.05	0.463
20. Lack of good leadership in adoption of ICT negatively affect the effectiveness of where transport management system in the ESLS's logistics operation	4.07	0.463
Mean of lack of leadership	4.07	0.428
21. Lack availability of funding for ICT adoption negatively affect the effectiveness of order management system in the ESLS's logistics operation	4.07	0.463
22. Lack availability of funding for ICT adoption negatively affect the effectiveness of warehouse management system in the ESLS's logistics operation	3.49	0.843
23. Lack availability of funding for ICT adoption negatively affect the effectiveness of where transport management system in the ESLS's logistics operation	4.07	0.463
Mean of lack of fund availability	4.07	0.428
Grand mean for Challenge of ICT adoption in the ESLS's logistics operation	4.00	0.409

Source: Field survey, 2020

4.3.1. RESISTANCE TO CHANGE

According to the second section of the questionnaire (Q15-Q17) which examines the resistance to change, the study revealed that majority of the respondent agreed that the resistance to change in adoption of ICT negatively affect the effectiveness of order management system in ESLSE logistics operation, negatively affect the effectiveness of order management system in the ESLS's logistics operation and negatively affect the effectiveness of where transport management system in the ESLS's logistics. with the mean score of (4.07, 4.05, and 4.05) and total mean of 4.07 respectively. This implies that participants were agreed on the resistance to change in adoption of ICT negatively affect order processing management logistics operation in ESLSE.

The standard deviations (0.432, 0.962and, 0.792) and total standard deviations of **0.428** are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree, hence the responses were close to the mean

4.3.2. LEADERSHIP

According to the second section of the questionnaire (Q18-Q20) which examines the leadership all the study revealed that majority of the respondent agreed that the lack of leadership in adoption of ICT negatively affect the effectiveness of order management system in ESLSE logistics operation, negatively affect the effectiveness of warehouse management system in the ESLS's logistics operation and negatively affect the effectiveness of where transport management system in the ESLS's logistics. with the mean score of (4.52, 4.07, and 4.07) respectively. This implies that participants were agreed on lack of good leadership in adoption of ICT negatively affect logistics operation in ESLSE.

The standard deviations (0.561, 0.463and, 0.463) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree, hence the responses were close to the mean. As far as the respondents' opinion on challenges of ICT, the result also reveals that the respondents strongly agree lack of good leadership in adoption of ICT negatively affect logistics operation with the highest mean value of 4.09. It suggests that resistance to change in adoption of ICT in ESLSE exists at high extent. The standard deviations (0.984, 1.043 and, 0.432) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree, hence the responses were close to the mean.

4.3.3. LACK OF AVAILABILITY OF FUND

According to the second section of the questionnaire (Q21-Q23) which examines lack of fund availability, the study revealed that majority of the respondent agreed that the lack of fund availability in adoption of ICT negatively affect the effectiveness of order management system in ESLSE logistics operation, negatively affect the effectiveness of warehouse management system in the ESLS's logistics operation and negatively affect the effectiveness of where transport management system in the ESLS's logistics. with the mean score of (4.07, 3.49 and 4.07) respectively. This implies that participants were agreed on lack of fund availability in adoption of ICT negatively affect logistics operation in ESLSE.

The standard deviations (0.824, 1.043 and, 0) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree, hence the responses were close to the mean. The study conducted by Collins M. (2013) The key challenges alluded to from interviews and secondary data available from KRA included budget constraints, financing challenges and sources, resistance to change from internal and external stakeholders, lack of knowledge and skills in leadership. manager in charge of ICT procurement indicated that ICT has had a very severe deficit in its budget allocations. (MUKHONGO, 2013).

Resistance to change was recognized by all managers interviewed as a serious cause to some programmed not achieving intended objectives. The resistance was recognized to come from stakeholders such as employees, taxpayers, other government agencies, other states especially from the East Africa Cooperation (EAC) region and technology partners. Some of the projects enumerated to have endured this obstacle during implementation included the Electronic Cargo tracking system (ECTS) which has since been resisted for nearly 3 years to the date of the study by the Kenya Transport Association (KTA) in a continuing court case. In the interviews and other project review and evaluation documentation, one thing that came out strongly as a challenge was the problems associated with procurement of ICT solutions. This was alluded to by managers in charge of ICT procurement and the managers in the procurement and 38 supplies services section. The problems highlighted ranged from failure of the relevant tender and procurement committees convening in time, high instances of non-responsive bids on tenders and quotations, procurement bureaucracies from bilateral donors, lack of expertise and capacity on procurement procedures and difficulties in dealing with non-resident suppliers. Managers from the procurement and ICT and procurement departments indicated that there is a massive deficiency of training budgets for ICT staff (MUKHONGO, 2013).

4.4. THE ROLE OF ICT ON THE ESLSE OPERATIONAL PERFORMANCE OF LOGISTICS.

The summary of the first three objectives of this study was to assess Role of Information and Communications Technology. As such the respondents were required to indicate their opinion on Role of Information and Communications Technology on cost performance dimension, Responsiveness-Speed Performance, Performance of responding in dynamic environment, Quality performance dimension, Dependability performance dimension and communication. The responses are depicted as follows.

Table 4.4 Questionnaires & STATA output for dimension of ICT on logistics operation.

The role of ICT adoption on the ESLSE operational performance of logistics	Mean	St. dvion
The role of ICT to reduce Cost of performance of logistics.		
The use of ICT decreased the cost of order processing in ESLSE	4	0.977
25. The use of ICT decreased the cost of order assignment in ESLSE	4.07	0.463
26. The use of ICT decreased the cost of distribution management in ESLSE	4.22	0.549
27. The use of ICT decreased the cost of inventory management in ESLSE	4.07	0.463
28. The use of ICT decreased the cost of transportation and shipment in ESLSE	4.16	.664
Mean of Cost	4.11	0.299
The role of ICT to increase the Responsiveness of logistics performance	mean	St.dev
29. The use of ICT increased the speed of order processing in ESLSE	3.64	0.986
30. The use of ICT increased the speed of order assignment in ESLSE	4.16	0.664
31. The use of ICT increased the speed of distribution in ESLSE	3.51	1.032
32. The use of ICT increased the speed of inventory management in ESLSE	4.16	0.664
33. The use of ICT increased the speed of transportation and shipment in ESLSE	4.16	0.664
Mean of Responsiveness	3.93	0.513
The role of ICT to increase Performance of responding in dynamic environment	mean	St.dev
34. The use of ICT enables responding in dynamic environment in respect of order processing in ESLSE	4.07	0.463
35. The use of ICT enables responding in dynamic environment in respect of order assignment in ESLSE.	4.05	0.561
36. The use of ICT enables responding in dynamic environment in respect of distribution in ESLSE	4.07	0.463
37. The use of ICT enables responding in dynamic environment in respect of inventory management in ESLSE	3.20	0.913
38. The use of ICT enables responding in dynamic environment in respect of transportation and shipment in	4.07	0.463
39. The use of ICT increased flexibility of order processing in ESLSE	4.05	0.561
40. The use of ICT on increased flexibility of order assignment in ESLSE	4.07	0.463
41. The use of ICT on increased the flexibility of distribution in ESLSE	4.05	0.561
42. The use of ICT on increased the flexibility of inventory management in ESLSE	4.07	0.463
43. The use of ICT on increased the flexibility of Transportation and shipment in ESLSE	4.05	0.561
Mean of responding in dynamic environment	4.01	0.405

The role of ICT to increase Quality performance dimension	mean	St.dev
44. The use of ICT increased the quality of order processing in ESLSE	4.05	0.561
45. The use of ICT on increased the quality of order assignment in ESLSE	4.05	0.561
46. The use of ICT on increased the quality of distribution in ESLSE	3.46	0.932
47. The use of ICT on increased the quality of inventory management in ESLSE	4.05	0.561
48. The use of ICT on increased the quality of Transportation and shipment in ESLSE	4.05	0.561
Mean of quality performance	4.02	0.498
The role of ICT to increase dependability performance dimension	mean	St.dev
49. The use of ICT increased dependability of order processing in ESLSE	4.07	0.463
50. The use of ICT on increased dependability of order assignment in ESLSE	4.07	0.463
51. The use of ICT on increased the dependability of distribution in ESLSE	4.05	0.561
52. The use of ICT on increased the dependability of inventory management in ESLSE	4.05	0.561
53. The use of ICT on increased the dependability of Transportation and shipment in ESLSE	4.05	0.561
Mean of dependability	4.06	0.453
The role of ICT to increase communication performance dimension	mean	St.dev
54. The use of ICT increased communication of order processing in ESLSE	4.05	0.561
55. The use of ICT on increased communication of order assignment in ESLSE	4.05	0.561
56. The use of ICT on increased the communication of distribution in ESLSE	4.22	0.549
57. The use of ICT on increased the communication of inventory management in ESLSE	4.22	0.549
58. The use of ICT on increased the communication of Transportation and shipment in ESLSE	4.05	0.561
Mean of communication	4.12	0.431
Grand mean for the role of ICT on the ESLSE operational performance of logistics.	4.01	0.332

Source: Field survey, 2020

4.4.1. COST PERFORMANCE DIMENSION

From the findings, majority of the respondent agreed that the use of ICT decrease the cost of order processing, order assignment, distribution management, inventory management and transportation and shipment in ESLSE at the mean value of (4,5,4.07,4.22,4.16 and 4.16) respectively. The standard deviations (0.977, 0.463,0.549,0.463 and, 0.664) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree, hence the responses were close to the mean.

4.4.2. RESPONSIVENESS -SPEED PERFORMANCE DIMENSION

The study sought to determine the use of information increase the responsiveness -speed performance of logistics operation increase the speed of order processing ,order assignment , distribution management ,inventory management and transportation and shipment in ESLSE in this case majority of the respondent agreed at the mean value of (3.64,4.16,3.51,4.16 and 4.16) respectively . The standard deviations (0.986, 0.664,1.032,0.664 and, 0.664) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree, hence the responses were close to the mean.

4.4.3. PERFORMANCE OF RESPONDING IN DYNAMIC ENVIRONMENT DIMENSION

From the study majority of the respondent agreed on the use of ICT enables logistics operation responding in dynamic environment by increasing the flexibility and responsiveness of the system in dynamic environment in respect of order processing, order assignment , distribution management , inventory management and transportation and shipment at the mean value of (4.07, 4.05, 4.07, 3.20 , 4.07, 4.05, 4.07, 4.05, 4.07 and 4.05) respectively. The standard deviations (0.463, 0.561, 0.463, 0,913, 0.463, 0.561, 0.463, 0.561, 0.463 and, 0.561) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree, hence the responses were close to the mean.

4.4.4. QUALITY PERFORMANCE DIMENSION

the study sought to know the use of ICT increased the quality of order processing ,order assignment ,distribution management , inventory management and transportation and shipment majority of the respondent agreed with the highest mean value of (4.05, 4.05, 3.46, 4.05 and 4.05) respectively , The standard deviations (0.561 ,0.561, 0.932, 0.561 and, 0.561) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree, hence the responses were close to the mean.

4.4.5. DEPENDABILITY PERFORMANCE DIMENSION

It shows that the use of Information Technology increase the dependability of its logistics performance of order processing order assignment ,distribution management , inventory management and transportation and shipment majority of the respondent agreed with the highest mean value of with mean and (4.07, 04.07, 4.05, 4.05 and 4.05) respectively , The standard deviations (0.463 ,0.463, 0.561, 0.561 and, 0.561) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree, hence the responses were close to the mean.

4.4.6. COMMUNICATION PERFORMANCE DIMENSION

the study also find that communication increased by using ICT in respect of order processing order assignment, distribution management, inventory management and transportation, according to the respondent's majority of them agreed on by scoring with the mean value of (4.05, 4.05, 4.22, 4.22, 4.22 and 4.05) respectively , The standard deviations (0.561, 0.561, 0.549, 0.549 and, 0.561) are relatively small compared to the mean which means the responses ranged from strongly disagree to strongly agree, hence the responses were close to the mean.

Kramarc f. (2016) stated that proper use of ICT enables tasks and activities to be completed more quickly, speeds up data preparation and transmission times, increases reaction speed to market needs, automates and thus reduces the costs of supervision and information processing, supports decision-making processes, enables efficiency-enhancing distributive operations, reduces data entry errors, improves customer quality, Companies using advanced ICT are more capable of responding to a dynamic environment, and can reduce operation costs more easily. ICT technologies also constitute an essential aspect of the relationship with external partners in

that they change the nature of the relations between companies by allowing for real-time exchange of information and documentation in electronic form. (Krmac, 2016)

4.5. VALIDITY TEST

To establish the validity of the research, instrument the researcher sought the opinion of experts in the field of study especially the researcher's supervisor and lecturers in the school of business. This facilitated the necessary revision and modification of the research instrument thereby enhancing validity. The clarity of the instrument items to the respondents was established so as to enhance the instrument's validity and reliability. The results helped the researcher to correct inconsistencies arising from the instruments, which ensured that they measured what is intended.

4.5.1. ASSESSMENTS OF ORDINARY LEAST SQUARE ASSUMPTIONS

The study conducted the regression analysis to show the relationship between order management system, warehouse management system, transport management system, cost performance dimension responsiveness-speed performance dimension, leadership performance dimension, quality performance dimension, dependability performance dimension, responding in dynamic environment and communication. Before using the regression analysis, the data was subjected to assumptions of regression analysis with no violation observed. Then, the followings were done to assess the assumptions of ordinary least square (OLS).

4.5.2. ASSESSMENT OF NORMALITY

The Skewness and Kurtosis were used to test normality distribution. Skewness is used to describe the balance of the distribution, that is, it is unbalanced and shifted to one side (right or left) or it is centered or symmetrical. A positive skew denotes a distribution shifted to the left whereas a negative skewness reflects a shift to the right. Whereas, Kurtosis refers to the peakedness or flatness of the distribution compared with the normal distribution. The Skewness and Kurtosis values (available as part of the basic descriptive statistics for a variable computed by all statistical programs) and if the value computed exceeds the specific critical value, then the distribution is non-normal. The most commonly used critical values are ± 2.58 (0.01 significance level) and ± 1.96 which corresponds to a 0.05 error level (Joseph et al, 2014). With this test, the researcher can easily assess the degree to which the skewness and kurtosis distributions vary from the normal distribution. The result of normality distribution test is presented in

table 4.24 shows that the Skewness and Kurtosis values computed in STATA software not exceeds the critical value. Therefore, it indicates that the data were normal and reliable for analysis.

Table 4.5 STATA output for Skewness /Kurtosis tests for normality

Variables	Observation	PR(Skewness)	PR(Kurtosis)
Order management system	114	0.9475	0.5366
Warehouse management system	114	0.3135	0.4229
Transport management system	114	0.8799	0.6345
Resistance to change	114	0.7794	0.7038
Leadership performance dimension	114	0.9465	0.6458
Lack of fund availability	114	0.8673	0.9665
Cost performance dimension	114	0.7420	0.3616
Responsiveness -speed performance	114	0.6693	0.3656
Responding in dynamic environment	114	0.9884	0.2407
Quality performance dimension	114	0.9428	0.8026
Dependability performance dimension	114	0.1165	0.1910
Communication performance dimension	114	0.7800	0.5878

Source: Field survey, 2020

4.5.3. ASSESSMENT OF MULTI COLLINEARITY

In multiple regression analysis, the regression coefficient became less reliable as the degree of correlation between the independent variable increases and there is a problem of what is commonly described as the problem of multi collinearity (Kothari, 2004). Multi-collinearity is a statistical problem which occurs when the explanatory variables (independent variables) are much correlated with each other. It means when the strong correlation among predictors and the existence of correlation value greater than 0.80, tolerance value less than 0.10 and Variance Inflation Factor (VIF) greater than 10 in the correlation matrix (Field, 2009). Tolerance in this case defined as a statistical tool which is used to indicate the variability of the specified independent variables from other independent variables in the model. Based on Table 4.6, the tolerance levels for all variables were greater than 0.10 and the Variance Inflation Factor (VIF) value for all variables were less than 10 and according to Table 4.25 which shows the

correlation between independent variables, the correlation matrix of all variables among the predictor was also less than 0.80. Therefore, correlation value, tolerance level, and VIF value indicates that there was no multi collinearity problem in this study.

Table 4.6 STATA output for collinearity statistics

Model	Collinearity statistics	
	Tolerance	VIF
Order management system adoption	0.47	2.11
Warehouse management system adoption	0.52	1.90
Transport management system adoption	0.59	1.67

Table 4.7 Correlation matrix

	orderm~m	wareho~m	transp~m	costpe~n	respon~e	qualit~n	depend~e	commun~e	respon~t
ordermanag~m	1.0000	0.6049	0.5440	0.5932	0.7962	0.5740	0.6567	0.8961	0.8010
warehousem~m	0.6049	1.0000	0.6649	0.6389	0.7972	0.6341	0.6693	0.7074	0.8006
transportm~m	0.5440	0.6649	1.0000	0.5859	0.6467	0.5929	0.6249	0.5087	0.7428
costperfor~n	0.5932	0.6389	0.5859	1.0000	0.6891	0.8741	0.8802	0.5592	0.7530
responsivn~e	0.7962	0.7972	0.6467	0.6891	1.0000	0.6651	0.8203	0.8518	0.7976
qualityper~n	0.5740	0.6341	0.5929	0.8741	0.6651	1.0000	0.7590	0.5306	0.7481
dependabil~e	0.6567	0.6693	0.6249	0.8802	0.8203	0.7590	1.0000	0.6159	0.7948
communicat~e	0.8961	0.7074	0.5087	0.5592	0.8518	0.5306	0.6159	1.0000	0.7755
responding~t	0.8010	0.8006	0.7428	0.7530	0.7976	0.7481	0.7948	0.7755	1.0000

Key word

orderm~m= order management system adoption

wareho~m=warehouse management system adoption

transp~m= transport magnet system adoption

costperfor~n= cost performance dimension

responsivn~e= responsiveness-speed performance

qualityper~n=quality performance dimension

dependabil~e= dependability performance dimension

communicat~e= communication performance dimension

responding~t= performance of responding in dynamic environment

4.5.4.ASSESSMENT OF AUTO CORRELATION

If there are patterns in the residuals from a model, then they can be considered as auto correlated (Brooks, 2008). The Durbin-Watson (DW) is a test for first order autocorrelation (Field, 2009). It assumes that the relationship between an error and the previous of an error. In this type of test, the null hypothesis of no autocorrelation can't be rejected when DW result is near 2, (Brooks, 2008). Because, it shows there is little or no evidence of autocorrelation. Based on Table 4.27 the Durbin-Watson (DW) statistics value is 2.158 which is close to 2. Therefore, there is no evidence of autocorrelation among error terms in this study.

Table 4.8 Durbin Watson Test Model Summary

Model	R square	Adjusted R squared	Durbin Watson
I	0.5007	0.4871	2.04

Independent variable: (Constant), ordermanagment system adoption, warehouse management system adoption, transport management system adoption. Dependent variable: cost performance dimension.

Table 4.9 Durbin Watson Test Model Summary

Model	R square	Adjusted R squared	Durbin Watson
II	0.7951	0.7895	2.04

Independent variable: (Constant), ordermanagment system adoption, warehouse management system adoption, transport management system adoption. Dependent variable: responsiveness(speed) performance.

Table 4.10 Durbin Watson Test Model Summary

Model	R square	Adjusted R squared	Durbin Watson
III	0.4908	0.4769	2.04

Independent variable: (Constant), ordermanagment system adoption, warehouse management system adoption, transport management system adoption. Dependent variable: quality performance dimension.

4.5.5. ASSESSMENT OF HETEROSCEDASTICITY/ PRESENCE OF HOMOSCEDASTICITY

It has been assumed that the variance of the error is constant and this is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedasticity (Brooks, 2008). All statistical packages have tests to assess homoscedasticity and P – value > 0.05 is acceptable (Joseph et al, 2014). Breusch Pagan test in STATA software for Homogeneity was conducted and the results mentioned in below table shows critical value greater than 0.05 which shows there is no evidence for the presence of heteroscedasticity.

Table 4.11 for testing heteroskedasticity for model 1

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted valuesof cost performance dimension
chi2(1) = 0.23
Prob > chi2 = 0.6352

Table 4.12 for testing heteroskedasticity for model 2

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted valuesof responsiveness(speed) performance
chi2(1) = 3.57
Prob > chi2 = 0.0589

Table 4.13 for testing heteroskedasticity for model 3

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted valuesof quality performance dimension
chi2(1) = 0.01
Prob > chi2 = 0.9061

4.5.6. REGRESSION RESULTS

Regression analysis was done to establish the statistically significant relationship between the independent and dependent variables. The regression analysis results were presented using model summary, beta coefficient tables. The analysis applied STATA software and the result of the analysis is presented as follows:

The coefficient determination also known as model summary was carried out to measure how well the statistical model was likely to predict future outcomes. In the course of model estimation, it is common practice to evaluate the appropriateness of a single descriptive model for the study with the help of coefficient determination, R^2 .

In empirical studies, the most important benefit of R^2 is that it serves as a measure for the goodness of fit of the estimated model (Reisinger, 1997). The r-squared value more than 25% can be acceptable and good to fit (Thompson, 2002).

Table 4.14 Model summary

Model	R square	Adjusted R squared	Durbin Watson
I	0.5007	0.4871	2.04

variable: (Constant), ordermanagement system, warehouse management system, transport management system. Dependent variable: cost performance dimension.

4.15 Model summary

Model	R square	Adjusted R squared	Durbin Watson
II	0.7951	0.7895	2.04

Independent variable: (Constant), ordermanagement system, warehouse management system, transport management system. Dependent variable: responsiveness(speed) performance

Table 4.16 Model summary

Model	R square	Adjusted R squared	Durbin Watson
III	0.4908	0.4769	2.04

Independent variable: (Constant), ordermanagement system, warehouse management system, transport management system. Dependent variable: quality performance dimension.

Based on the table 4.17, the model I had a coefficient of determination (R^2) = 0.5007 indicated that 50.07% of the variation in cost performance dimension was explained by the variables in the model leaving 49.93% of the variation in cost performance dimension to be explained by variables not in the model I . Adjusted R^2 indicates the true behavior of R^2 that varies in accordance with the changes in independent variables. It means the overall contribution of ordermanagement system, warehouse management system, transport management system to cost performance dimension accounted for 48.71% of the variation in cost performance dimension.

Based on the table 4.18, the model II had a coefficient of determination (R^2) = 0.7951 indicated that 79.51% of the variation in cost performance dimension was explained by the variables in the model leaving 20.49 % of the variation in cost performance dimension to be explained by variables not in the model II. Adjusted R^2 indicates the true behavior of R^2 that varies in accordance with the changes in independent variables. It means the overall contribution of ordermanagement system, warehouse management system, transport management system to cost performance dimension accounted for 78.95% of the variation in cost performance dimension.

Based on the table 4.19, the model III had a coefficient of determination (R^2) = 0.4908 indicated that 49.08% of the variation in cost performance dimension was explained by the variables in the model leaving 50.92% of the variation in cost performance dimension to be explained by variables not in the model III. Adjusted R^2 indicates the true behavior of R^2 that varies in accordance with the changes in independent variables. It means the overall contribution of ordermanagement system, warehouse management system, transport management system to cost performance dimension accounted for 47.69% of the variation in cost performance dimension.

4.5.7. TESTS OF COEFFICIENT

The table below shows the level of significance on the variables. The standardized and unstandardized coefficients were also presented as follows:

Table 4.17 Regression Results Coefficients

Model	Unstandardized coefficients		Standardized coefficients	t.	Sig.	Collinearity statistics	
	(β)	St. Error	(β)			Tolerance	VIF
Constant	0.903	0.234		3.85	0.000		
Order management system	0.252	0.793	0.277	3.18	0.002	0.47	2.11
Warehouse management system	0.302	0.090	0.326	3.33	0.001	0.52	1.90
Transport management system	0.180	0.077	0.218	2.35	0.020	0.59	1.67

- a. Dependent variable: cost performance dimension
- b. Independent variable: ordermanagement system, warehouse management system, transport management system

The Beta (β) sign includes a sign of positive (+) and negative (-). It shows the effect of independent variables over the dependent ones (Field, 2009). Based on table 4.20 beta sign of all the independent variable shows positive (+). Thus, the independent variables: ordermanagement system, warehouse management system, transport management system on dependent variable, cost performance dimension.

The independent variable with a level of significance (sig) value less than 5% can make a significance contribution to the predicted value of the dependent variable and a variable beyond this level of significance (sig) cannot make a significance contribution to the predicted value of the dependent variable, (Brooks, 2008). Based on table 4.30, the statistical significance of the independent variable (ordermanagement system, warehouse management system, transport management system) over the dependent variable cost performance dimension was significance at 5% level of significance. The independent variable ordermanagement system, warehouse management system, transport management system was significantly contributed for the dependent variable for cost performance dimension.

The table below shows the level of significance on the variables. The standardized and unstandardized coefficients were also presented as follows:

Table 4.18 Regression Results Coefficients

Model	Unstandardized coefficients		Standardized coefficient	t.	Sig.	Collinearity statistics	
	(β)	St. Error	(β)			Tolerance	VIF
Constant	0.003	0.164		0.02	0.000		
Order management system adoption	0.473	0.555	0.475	3.18	0.002	0.47	2.11
Warehouse management system adoption	0.457	0.063	0.450	3.33	0.001	0.52	1.90
Transport management system adoption	0.080	0.053	0.088	2.35	0.020	0.59	1.67

- a. Dependent variable: responsiveness(speed) performance.
- b. Independent variable: ordermanagement system, warehouse management system, transport management system

The Beta (β) sign includes a sign of positive (+) and negative (-). It shows the effect of independent variables over the dependent ones (Field, 2009). Based on table 4.21 beta sign of all the independent variable shows positive (+). Thus, the independent variables: ordermanagement system, warehouse management system, transport management system on dependent variable, responsiveness(speed) performance.

The independent variable with a level of significance (sig) value less than 5% can make a significance contribution to the predicted value of the dependent variable and a variable beyond this level of significance (sig) cannot make a significance contribution to the predicted value of the dependent variable, (Brooks, 2008). Based on table 4.30, the statistical significance of the independent variable (ordermanagement system, warehouse management system, transport management system) over the dependent variable responsiveness(speed) performance. Was significance at 5% level of significance. The independent variable ordermanagement system, warehouse management system, transport management system was significantly contributed for the dependent variable for responsiveness(speed) performance.

The table below shows the level of significance on the variables. The standardized and unstandardized coefficients were also presented as follows:

Table 4.22 Regression Results Coefficients

Model	Unstandardized coefficients		Standardized coefficients	t.	Sig.	Collinearity statistics	
	(β)	St. Error	(β)			Tolerance	VIF
Constant	0.943	0.234		4.07	0.000		
Order management system adoption	0.221	0.079	0.245	2.79	0.006	0.47	2.11
Warehouse management system adoption	0.296	0.090	0.322	3.27	0.001	0.52	1.90
Transport management system adoption	0.200	0.077	0.244	2.61	0.010	0.59	1.67

- a. Dependent variable: quality performance dimension.
- b. Independent variable: ordermanagement system, warehouse management system, transport management system

The Beta (β) sign includes a sign of positive (+) and negative (-). It shows the effect of independent variables over the dependent ones (Field, 2009). Based on table 4.22 beta sign of all the independent variable shows positive (+). Thus, the independent variables: ordermanagement system, warehouse management system, transport management system on dependent variable, quality performance.

The independent variable with a level of significance (sig) value less than 5% can make a significance contribution to the predicted value of the dependent variable and a variable beyond this level of significance (sig) cannot make a significance contribution to the predicted value of the dependent variable, (Brooks, 2008). Based on table 4.30, the statistical significance of the independent variable (ordermanagement system, warehouse management system, transport management system) over the dependent variable quality performance. Was significance at 5% level of significance. The independent variable ordermanagement system, warehouse management system, transport management system was significantly contributed for the dependent variable for quality performance.

4.5.8. INTERPRETATIONS & HYPOTHESIS TEST

The constant has a coefficient value of 0.903 and p value 0.000 which is significant. The interpretation is that if all factors were to be held constant, logistical performance of which is measured in terms of cost would be 90.3% and this amount will be up or down by the standard deviation of 0.234.

H1: ICT positively and significantly affect the cost of logistics operation.

The first hypothesis tested ICT in order management system, warehouse management system and transport management system that have an effect in cost performance dimension of ESLSE logistics operation. The result shows that the strong relationship between the dependent variable cost performance dimension and the independent variables (order management system, warehouse management system and transport management system) at significant level of ($P < 0.05$). The magnitude (β) of the effect of this variable on operational performance of the enterprise was positive and the t value was greater than 2. The positive magnitude sign but t-value of less than 2 is indicating a weak relationship between the independent and dependent variable (Tadios., 2016). The interpretation is that holding all other variables constant, ICT in cost performance dimension statistically significance at 5% level of test. Thus, the regression coefficient of order management system, warehouse management system and transport management system were significant in predicting cost performance dimension of logistics operation.

This result is consistent with the finding by Churcher k. (2016) and Pérez-López (2019) that adoption of ICT in supply chain and logistics operation initially decrease cost of operation and increase operational performance. The study thus accepts the null hypothesis that *ICT positively and significantly affect the cost of logistics operation.*

H2: ICT positively and significantly affect the quality of logistics operation

The constant has a coefficient value of 0.943 and p value 0.000 which is significant. The interpretation is that if all factors were to be held constant, logistical performance of which is measured in terms of cost would be 94.3% and this amount will be up or down by the standard deviation of 0.234.

The first hypothesis tested ICT in order management system, warehouse management system and transport management system that have an effect in quality performance dimension of ESLSE logistics operation. The result shows that the strong relationship between the dependent variable quality performance dimension and the independent variables (order management system, warehouse management system and transport management system) at significant level of ($P < 0.05$). The magnitude (β) of the effect of this variable on operational performance of the enterprise was positive and the t value was greater than 2. The positive magnitude sign but t-value of less than 2 is indicating a weak relationship between the independent and dependent variable (Tadios., 2016). The interpretation is that holding all other variables constant, ICT in cost performance dimension statistically significance at 5% level of test. Thus, the regression coefficient of order management system, warehouse management system and transport management system were significant in predicting cost performance dimension of logistics operation.

This result is consistent with the finding by habitamu. (2019) that adoption of ICT in supply chain and logistics operation had positive relationship with service quality. The study thus accepts the null hypothesis that *ICT positively and significantly affect the quality of logistics operation.*

H3: ICT positively and significantly affect the responsiveness (speed) of logistics operation

The constant has a coefficient value of 0.003 and p value 0.000 which is significant. The interpretation is that if all factors were to be held constant, logistical performance of which is measured in terms of cost would be 3% and this amount will be up or down by the standard deviation of 0.164.

The first hypothesis tested ICT in order management system, warehouse management system and transport management system that have an effect in quality performance dimension of ESLSE logistics operation. The result shows that the strong relationship between the dependent variable quality performance dimension and the independent variables (order management system, warehouse management system and transport management system) at significant level of ($P < 0.05$). The magnitude (β) of the effect of this variable on operational performance of the enterprise was positive and the t value was greater than 2. The positive magnitude sign but t-value of less than 2 is indicating a weak relationship between the independent and dependent variable (Tadios., 2016). The interpretation is that holding all other variables constant, ICT in cost performance dimension statistically significance at 5% level of test. Thus, the regression

coefficient of order management system, warehouse management system and transport management system were significant in predicting cost performance dimension of logistics operation.

This result is consistent with the finding by yafet m. (2017) indicated that in order to improve the overall performance of logistics and supply chain management the enterprise should focus on making ICT more flexible which in turn improves the overall logistics and SCM efficiency resulting in improved organizational performance. other study conducted by Mohammadreza A. (2017) indicated, it is claimed that IT competency has a significant impact on enhancing the agility (flexibility, speed) of the supply chain.

The study thus accepts the null hypothesis that *ICT positively and significantly affect the responsiveness (speed) of logistics operation*

CHAPTER FIVE:

CONCLUSIONS & RECOMMENDATIONS

5. INTRODUCTION

This chapter presents conclusions and recommendations which are based on the results of the responses for the questionnaires. It has three parts; the first part presents conclusion of the study. The second part presents recommendations and the third part highlighted proposed future research areas.

5.1 Summary of major findings

To fulfill the research objectives, the study used questionnaires prepared for employee at head office. The responses obtained were tabulated and interpreted by using STATA software through descriptive and inferential statistics while result from documentary reviews was presented to support the survey result.

The survey indicates that the overall order management system adoption , with the mean value of 1.92 and with standard deviation of 0.832 this showed us the respondent order management system adoption is in lack of Checking availability of the product, Customer accept delivery time, Check the Customer's financial and credit status, Allocating the products to the order and position of the consumer, Responsible for decremented product and Preparation of invoice after receipt of shipment which implies that the adoption of order management system is very low .the study also found that also the warehouse management system adoption 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 low ,the study also indicates that the transport management system adoption with the mean value of 1.95 and standard deviation of 0.549 this result showed us transport management system adoption is in lack of contribution to the effectiveness and efficiency of logistics performance in supporting inbound and outbound transport ,mode of selection and planning transportation.

From the findings it was noted that ESLSE faces challenges which impacted the ICT adoption , The key challenges identified included those occasioned by internal factors were identified as budget constraints in financing ICT adoption , resistance to change and hardships in the logistics performance of order processing ,order assignment .inventory, distribution and warehousing ,

lack of knowledge and skills in leading the order management system adoption , warehouse management system adoption and transport management system adoption which have the role on the operational performance of logistics in the aggregate mean value of 4.00 and 0.409 in significant level of 0.05.

The study also noticed that there is a high cost of logistics operation and low quality of service delivery and responsiveness and speed due to low level of ICT adoption in respect of order management system, warehouse management system and transport management system with the grand mean of 4.01 and the standard deviation of 0.332 and with 0.05 level of significant .

5.2 Conclusion of the Study.

- The ESLSE ICT system has no order management system which enable them checking service availability, accepting the delivery order time as per the customer request, communicating customer financial status, allocation goods to destination ware the customer needed, taking responsibility for decreed goods and preparing invoice when the shipping has been confirmed.
- The ESLSE ICT system has no warehouse management system responsible for flow and storage of goods, working with integration, operation management, information exchange on purchase orders and customer orders from the company's main transaction system such as an enterprise resource planning (ERP) and flow of information on goods receive and dispatch.
- The ESLSE ICT system has no transport management system responsible for inbound and outbound transport, for having component such as order content, quantity, weight, and cube and planning inbound and outbound transport activities like (mode selection, freight consolidation, routing and secheduling shipment and fleet management)
- Resistance to change in adoption of ICT negatively affect the effectiveness of order management system, warehouse management and transport management system in the ESLS's logistics operation.
- Lack of leadership in adoption of ICT negatively affect the effectiveness of order management system, warehouse management and transport management system in the ESLS's logistics operation.

- Lack of fund availability in adoption of ICT negatively affect the effectiveness of order management system, warehouse management and transport management system in the ESLS's logistics operation.
- Low level adoption of ICT increases the cost of order processing, order assignment, distribution management, inventory management and transportation and shipment in ESLSE
- Low level adoption of ICT decreases the responsiveness (speed) of order processing, order assignment, distribution management, inventory management and transportation and shipment in ESLSE
- Low level adoption of ICT decreases the quality of order processing, order assignment, distribution management, inventory management and transportation and shipment in ESLSE

5.3 RECOMMENDATIONS

Based on the overall findings and conclusions made, the under listed recommendations are made.

- ✓ To improve the performance of logistics operation the enterprise should adopt order management system in capable of checking service availability , accepting the delivery order time as per the customer request , communicating customer financial status ,allocation goods to destination ware the customer needed, taking responsibility for decreed goods and preparing invoice when the shipping has been confirmed.
- ✓ To improve the performance of logistics operation the enterprise should adopt the warehouse management system in capable of checking service availability , accepting the delivery order time as per the customer request , communicating customer financial status ,allocation goods to destination ware the customer needed, taking responsibility for decreed goods and preparing invoice when the shipping has been confirmed.
- ✓ The enterprise should increase adoption of ICT in order to decrease the cost of order processing, order assignment, distribution management, inventory management and transportation and shipment in ESLSE
- ✓ The enterprise should increase adoption of ICT in order to increase the responsiveness (speed) of order processing, order assignment, distribution management, inventory management and transportation and shipment in ESLSE
- ✓ The enterprise should increase adoption of ICT in order to increase the quality of order processing, order assignment, distribution management, inventory management and transportation and shipment in ESLSE

- ✓ Employees should be encouraged to embrace change. The organization should develop mechanism that will enable them introduce and control resistance to change. Moreover, the organization should also ensure that it provides training that will enable employees to increase their knowledge and skills, ESLSE should also ensure that having good leadership and available of fund to develop and motivate employees to increase logistics operation performance.

5.4 SUGGESTIONS FOR FUTURE RESEARCH

The researcher suggests other researchers to study in the following areas:

“the effect of information technology on cost performance of the ESLSE logistics performance “

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Annex 1

Questionnaire to be filled by the Ethiopian Shipping and Logistics Service Enterprise's Employee

Dear all Subject:

This questionnaire is prepared to collect primary data in order to assess the **practice, challenge and role of Information Communication technology on the Ethiopian Shipping and Logistics Service Enterprise's (ESLSE's) logistics operational performance**. I am a Graduate student of Addis Ababa University School of Commerce in Department of Logistics and Supply Chain Management. First of all, I would like to forward my heartfelt gratitude and respect to you for administering this questionnaire honestly and responsibly. The questionnaire is designed to collect the necessary information to undertake a research on the topic **"The practice , challenge and role of Information Communication technology on the Ethiopian Shipping and Logistics Service Enterprise (ESLSE) logistics operational performance"** for the partial fulfillment of the requirement of the degree of Masters of Logistics and Supply Chain Management. The information that you provide will remain confidential and will be used for only Research purpose. For any further enquiry please use the address below.

Thank you in advance for your cooperation!

Yours Sincerely,

Henok Frew

Email: henok.frew@gmail.com or mobile phone 0983793879

Questionnaire

Please give answers in the spaces provided and tick in the box that matches your response to the questions where applicable.

Part One-Respondents Demographic profile

1. Sex Male Female

2. Educational Background:

Below Diploma Diploma Degree Masters&above

3. Years of experience in the company: 1-5Yrs 6-10 Yrs. 11-15 Yrs. ≥15 Yrs.

Objective 1: Practice of Information and Communications Technology on Logistics operation of the ESLSE

Rate the extent to the following perception on initiatives on the challenges of ICT on logistics operational performance of ESLSE. 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

Dimensions of Information and Communications Technology on Logistics operation		Scale				
		1	2	3	4	5
A	Order management system					
1	The ESLSE's ICT has order management system responsible for checking product availability.					
2	The ESLSE's ICT has order management system responsible for accepting the delivery time by the customers.					
3	The ESLSE's ICT has order management system responsible for credit checking (communicate with the financial information					
4	The ESLSE's ICT has order management system responsible for allocating the goods to the customer order, and assign to a production location					
5	The ESLSE's ICT has order management system responsible for decrement inventory					
6	The ESLSE's ICT has order management system responsible for preparing an invoice when shipping has been confirmed					
B	Warehouse management system	1	2	3	4	5
1	The ESLSE's ICT has warehouse management system responsible for management of product flow and storage					
2	The ESLSE's ICT has warehouse management system responsible for working by integration with order management system					
3	The ESLSE's ICT has warehouse management system responsible for managing warehouse operation					
4	The ESLSE's ICT has warehouse management system responsible for getting information (such as purchase orders and customer orders from the company's main transaction system such as an enterprise resource planning (ERP))					
5	The ESLSE's ICT has warehouse management system responsible for giving and getting information on goods received and dispatched and inventory levels					
C	Transport Management system	1	2	3	4	5
1	The ESLSE's ICT has transport management system responsible for inbound and outbound transportation					
2	The ESLSE's ICT has transport management system responsible for having components such as order content, quantity, weight and cube, delivery date, and vendor shipping schedules					

3	The ESLSE's ICT has transport management system responsible for planning inbound and outbound transportation activities (like Mode selection, Freight consolidation, Routing, and scheduling shipments, Fleet management)					
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Objective 2: Challenges of Information and Communications Technology on Logistics operation

Rate the extent to the following perception on initiatives on the challenges of ICT on logistics operational performance of ESLSE. 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

Challenges of Information and Communications Technology		Scale				
A	Resistance to change	1	2	3	4	5
1	Resistance to change in adoption of ICT negatively affect the effectiveness of order management system in the ESLS's logistics operation					
2	Resistance to change in adoption of ICT negatively affect the effectiveness of warehouse management system in the ESLS's logistics operation					
3	Resistance to change in adoption of ICT negatively affect the effectiveness of where transport management system in the ESLS's logistics operation					
B	Leadership	1	2	3	4	5
1	Lack of good leadership in adoption of ICT negatively affect the effectiveness of order management system in the ESLS's logistics operation					
2	Lack of good leadership in adoption of ICT negatively affect the effectiveness of ware house management system in the ESLS's logistics operation					
3	Lack of good leadership in adoption of ICT negatively affect the effectiveness of where transport management system in the ESLS's logistics operation					
C	Lack of funding availability	1	2	3	4	5
1	Lack availability of funding for ICT adoption negatively affect the effectiveness of order management system in the ESLS's logistics operation					
2	Lack availability of funding for ICT adoption negatively affect the effectiveness of warehouse management system in the ESLS's logistics operation					
3	Lack availability of funding for ICT adoption negatively affect the effectiveness of where transport management system in the ESLS's logistics operation					

Objective three: Role of Information and Communications Technology on operational performance of Logistics.

Rate the extent to the following perception on initiatives on the challenges of ICT on logistics operational performance of ESLSE. 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

	Role of Information and Communications Technology	1	2	3	4	5
A	Cost performance dimension					
1	The use of ICT decreased the cost of order processing in ESLSE					
2	The use of ICT decreased the cost of order assignment in ESLSE					
3	The use of ICT decreased the cost of distribution management in ESLSE					
4	The use of ICT decreased the cost of inventory management in ESLSE					
5	The use of ICT decreased the cost of transportation and shipment in ESLSE					
B	Responsiveness-Speed performance dimension	1	2	3	4	5
1	The use of ICT increased the speed of order processing in ESLSE					
2	The use of ICT increased the speed of order assignment in ESLSE					
3	The use of ICT increased the speed of distribution in ESLSE					
4	The use of ICT increased the speed of inventory management in ESLSE					
5	The use of ICT increased the speed of transportation and shipment in ESLSE					
C	Performance of responding in dynamic environment	1	2	3	4	5
1	The use of ICT enables responding in dynamic environment in respect of order processing in ESLSE					
2	The use of ICT enables responding in dynamic environment in respect of order assignment in ESLSE.					
3	The use of ICT enables responding in dynamic environment in respect of distribution in ESLSE					
4	The use of ICT enables responding in dynamic environment in respect of inventory management in ESLSE					
5	The use of ICT enables responding in dynamic environment in respect of transportation and shipment in ESLSE					
6	The use of ICT increased flexibility of order processing in ESLSE					
7	The use of ICT on increased flexibility of order assignment in ESLSE					
8	The use of ICT on increased the flexibility of distribution in ESLSE					
9	The use of ICT on increased the flexibility of inventory management in ESLSE					
10	The use of ICT on increased the flexibility of Transportation and shipment in ESLSE					

D	Quality performance dimension	1	2	3	4	5
1	The use of ICT increased the quality of order processing in ESLSE					
2	The use of ICT on increased the quality of order assignment in ESLSE					
3	The use of ICT on increased the quality of distribution in ESLSE					
4	The use of ICT on increased the quality of inventory management in ESLSE					
5	The use of ICT on increased the quality of Transportation and shipment in ESLSE					
E	Dependability performance dimension	1	2	3	4	5
1	The use of ICT increased dependability of order processing in ESLSE					
2	The use of ICT on increased dependability of order assignment in ESLSE					
3	The use of ICT on increased the dependability of distribution in ESLSE					
4	The use of ICT on increased the dependability of inventory management in ESLSE					
5	The use of ICT on increased the dependability of Transportation and shipment in ESLSE					
F	Communication performance dimension	1	2	3	4	5
1	The use of ICT increased communication of order processing in ESLSE					
2	The use of ICT on increased communication of order assignment in ESLSE					
3	The use of ICT on increased the communication of distribution in ESLSE					
4	The use of ICT on increased the communication of inventory management in ESLSE					
5	The use of ICT on increased the communication of Transportation and shipment in ESLSE					