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St. Mary's University, Ethiopia

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MASTER OF BUSINESS ADMINISTRATION

EFFECT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON TRADING PERFORMANCE: A CASE STUDY IN ETHIOPIA COMMODITY EXCHANGE

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May, 2019

ADDIS ABABA

Statement of Declaration

I, KUMSSA CHERINET WAKGARI, hereby declare that this thesis entitled "EFFECT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON TRADING PERFORMANCE: THE CASE OF ETHIOPIA COMMODITY EXCHANGE" submitted by me for the award of the degree of Master of Art in Business Management (MBA), St. Mary University, Ethiopia, is my original work and it has never been presented in any university. All sources and materials used for this thesis have been duly acknowledged.

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This is to certify that the thesis entitled, "EFFECT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON TRADING PERFORMANCE: THE CASE OF ETHIOPIA COMMODITY EXCHANGE "was carried out by KUMSSA CHERINET WAKGARI under the supervision of Hailemariam Kebede (PHD), submitted in partial fulfilment of the requirements for Master of Art in Business Management (MBA) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Table of Contents Page

Statement of Declaration ii

ACKNOWLEDGMENTS iv

List of Tables viii

List of Figures ix

List of Acronyms and Abbreviations x

ABSTRACT xi

CHAPTER ONE: INTRODUCTION 1

1.1 BACKGROUND OF THE STUDY 1

1.2 STATEMENT OF THE PROBLEM 3

1.3 BASIC RESEARCH QUESTIONS 4

1.3.1 RESEARCH MAIN QUESTION 4

1.4 OBJECTIVES OF THE STUDY 5

1.4.1 GENERAL OBJECTIVE 5

1.4.2 SPECIFIC OBJECTIVES 5

1.5 HYPOTHESES DEVELOPMENT 5

1.6 DEFINITION OF TERMS 8

1.7 SIGNIFICANCE OF THE PROBLEM/STUDY 8

1.8 DELIMITATION/SCOPE OF THE STUDY 9

1.9 ORGANIZATION OF THE RESEARCH REPORT 9

CHAPTER TWO: REVIEW OF LITERATURE 10

2.1 THEORETICAL REVIEW 10

2.1.1 COMMODITY EXCHANGE 10

2.1.2 PURPOSE OF COMMODITY EXCHANGE 10

2.1.3 COMMODITY EXCHANGE IN ETHIOPIA 11

2.1.4 INFORMATION AND COMMUNICATION TECHNOLOGY 12

2.1.5 COMPONENTS OF INFORMATION AND COMMUNICATION TECHNOLOGY 14

2.1.6 INFORMATION AND COMMUNICATION TECHNOLOGY IN COMMODITY EXCHANGES 18

2.1.7 ICT IN ETHIOPIA COMMODITY EXCHANGE 19

2.1.8 TRADING IN ETHIOPIA COMMODITY EXCHANGE 21

2.1.9 WAREHOUSING SERVICE IN ETHIOPIA COMMODITY EXCHANGE 22

2.1.10 INFORMATION AND COMMUNICATION TECHNOLOGY AND PERFORMACE IN ORGANIZATION 23

2.2 EMPIRICAL LITERATURE 25

2.3 CONCEPTUAL FRAME WORK 26

CHAPTER THREE: RESEARCH METHODOLOGY 27
3.1 INTRODUCTION 27
3.2 RESEARCH APPROACH and DESIGN 27
3.3 SAMPLE AND SAMPLING TECHNIQUES 27
3.4 SOURCE AND DATA 29
3.5 Validity and Reliability Test 29
3.5.1 Validity Test 29
3.5.2 Reliability Test 30
3.6 PROCEDURES OF DATA COLLECTION 32
3.7 METHODS OF DATA ANALYSIS 33
3.7.1 DESCRIPTIVE STATISTICS 33
3.7.2 INFERENTIAL STATISTICS 33
CHAPTER FOUR: ANALYSIS, DISCUSSION AND PRESENTATION OF RESULT 36
4.1 INTRODUCTION 36
4.2 QUANTITATIVE ANALYSIS RESULTS 36
4.3 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS 36
4.3.1 RESPONDENT'S STATISTICS BY SEX AND AGE 36
4.3.2 RESPONDENT STATISTICS BY POSITION 38
4.3.3 RESPONDENTS BY EDUCATION AND EXPERIENCE 38
4.4 INTERPRETATION OF THE SUMMARY STATISTICS RESULTS OF KEY VARIABLES 40
4.4.1 DESCRIPTIVE STATISTICS 40
4.4.2 CORRELATION ANALYSIS 41
4.4.3 REGRESSION ANALYSIS 44
4.5 INTERVIEW RESULTS 53
4.5.1 ECX AND ITS INFORMATION AND COMMUNICATION TECHNOLOGY DEPARTMENT 53
4.5.2 INFORMATION AND COMMUNICATION TECHNOLOGY SERVICES AND IT INFRASTRUCTURE IN ECX 55
4.5.3 MARKET PRICE DISSEMINATION TOOLS 59
4.5.4 WAREHOUSES, CLEARING AND SETTLMENT, TRADING CENTRES 60
4.5.5 CHALLENGES OF INFORMATION AND TECHNOLOGY SERVICES 62
4.5.6 VOLUME OF TRADED COMMODITIES 63
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION 65
5.1 CONCLUSIONS 68
5.2 RECOMMENDATIONS 68
5.3 Areas for further research 70

REFERENCES.....71
APPENDICES.....75

List of Tables

Table 3. 1 Reliability Statistics Employee 31
Table 3. 2 Reliability Statistics Traders 31
Table 3. 3 Total Statistics Employee 31
Table 3. 4 Total Statistics Traders 31

Table 4. 1 Table Employee by Sex 37
Table 4. 2 Employee by Age 37
Table 4. 3 Traders by Sex 37
Table 4. 4 Traders by Age 37
Table 4. 5 Participant Employees by Position 38
Table 4. 6 Participant Traders by Position 38
Table 4. 7 Participant Employees by Education 39
Table 4. 8 Participant Employees by year of Experience 39
Table 4. 9 Participant Traders by Education 39
Table 4. 10 Participant Traders by their experience 39
Table 4. 11 Response of Employee 40
Table 4. 12 Response of Traders 40
Table 4. 13 Dependent and Independent Variables Correlation Matrix : employee 42
Table 4. 14 Dependent and Independent Variables Correlation Matrix : Traders 43
Table 4. 15 Regression Model summary Employee 45
Table 4. 16 Regression Model summary Traders 45
Table 4. 17 Analysis of Variance employee 46
Table 4. 18 Analysis of Variance Traders 46
Table 4. 19 Regression coefficient Employee 47
Table 4. 20 Regression coefficient Traders 48
Table 4. 21 Hypothesis test result using Employee Response 51
Table 4. 22 Hypothesis test result using Traders Response 51
Table 4. 23 Volume of traded commodities by each year 63

List of Figures

Figure 2. 1 Ethiopia commodity exchange Electronic and outcry trading Platform 21
Figure 2. 2 Conceptual Frame work 26

Figure 4. 1 ECX Transaction Cycle 62

List of Acronyms and Abbreviations

CPU	Central Processing Unit
CEO	Chief executive Officer
CIO	Chief Information Officer
DBMS	Database Management System
ECX	Ethiopia Commodity Exchange
Etrade	Electronic Trade
EAuction	Electronic Auction
Email	Electronic Mail
ICT	Information and communication Technology
IT	Information technology
IVR	Interactive Voice record
LAN	Local Area network
PC	Personal Computer
SMS	Short message system
WAN	Wide Area Network
VPN	Virtual Private Network

ABSTRACT

The main objective of the study was to investigate the effect of information and communication technology on trading performance of Ethiopia Commodity Exchange. ECX Employees(140) and 128 traders who are selling and buying commodities using ECX trading platform had been selected using stratified random sampling technique. The study used both primary and secondary sources of data. The primary source of data was collected using self-designed questionnaire and structured interview. Secondary sources which include study papers, ECX historical documents, strategy documents, annual reports, sources from internet, and Extracted data from ECX database. Descriptive statistics and inferential statistics analysis had been used to describe relationships among independent and dependent variables. The data had been analysed using statistical software's Statistical Package for the Social Sciences (SPSS). The dependent variable used in this study was trading performance which was described in this study by volume of traded commodities, trader's satisfaction, Market price accessibility, clearing and settlement efficiency, warehouse and trading efficiency. The independent variables are Electronic trading Application (ETA), computer system (CS), Network System (NS) and Data base management system (DBMS). Correlation analysis of the data showed that there is significant positive correlation among the dependent and independent variable. Using regression analysis, it was found that 75.9 % of variation in trading performance was due to the independent variables. Other factors which were not mentioned with in this research had a share of 24.1%. The regression result showed that ETA, NS, CS and DBMS have positive significant effect on trading performance. Based on the research finding Information and communication technology services enhance the reliability accuracy and efficiency of clearing and settlement, warehouse and trading operations which are the three core functions of the exchange. In addition, the usage of ICT significantly Improve Market data accessibility, trading centres accessibility, Level of customer satisfaction and volume of traded and deposited data. Finally the researcher concluded that Ethiopia commodity exchange trading performance is significantly dependent on information and communication technology services and recommended that upgrade of technologies; enhancement of existing ICT infrastructure and application, identifications of system interruption factors, implementation of business continuity plan will improve the efficiency ,effectiveness ,scalability and quality of ICT services which in turn helps in improving the performance of trading.

***Key terms**: ICT, Trading Performance, Ethiopia Commodity Exchange, warehouse and clearing & settlement efficiency, Market data accessibility, volume of traded and deposited data*

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Information and Communication Technologies (ICTs) is a broader term for Information Technology (IT), which refers to all communication technologies, including the internet, wireless networks, cell phones, computers, software, middleware, video-conferencing, social networking, and other media applications and services enabling users to access, retrieve, store, transmit, and manipulate information in a digital form. According to Daft (1997) IT can be defined as the hardware, software, telecommunications, database management, and other information-processing technologies used to store, process, and deliver information. Information technology is commonly used to assist managers with direct control over business functions, personnel and other resources. ICTs are also used to refer to the convergence of media technology such as audio-visual and telephone networks with computer networks, by means of a unified system of cabling (including signal distribution and management) or link system. However, there is no universally accepted definition of ICTs considering that the concepts, methods and tools involved in Information and Communication Technologies (ICTs) are one of the key drivers of globalization and development in the current age. By facilitating the creation, distribution and application of knowledge in digital form, ICTs serve as a major source of wealth creation and improvement in the quality of life in countries and for people across the world.

Organisations are increasingly using information technology to develop solutions to business problems, to improve both the efficiency and effectiveness of the decision-making process, to enhance productivity and service quality, to achieve dynamic stability, and compete for new markets (Attewell & Rule, 1984; Molloy & Schwenk, 1995; Boynton, 1993). The impact of Information Technology on organizations' services and performance has been examined by many studies (Beckey, Elliot, & Procket, 1996; McNutt, & Boland, 1999). Although most of these studies have suggested that IT plays a vital role in improving the quality and quantity of information, its potential for adoption and innovation is often uncertain (Mano, 2009). Different firms allocate their resources differently in a way that maximizes their objectives and those firms that allocate more resources on IT perform better than those firms that allocate less resources (McAfee & Brynjolfsson, 2008). Achieving high performance also requires good IT infrastructure supported by good IT management practice (Mwania & Muganda, 2012).

An exchange reduces transaction costs by facilitating contact between buyers and sellers, enabling centralized grading of products, ensuring that contracts are enforceable, providing mechanism for price discover, simplifying transactions with standard contracts, transmitting information about prices and

volumes, An exchange provides a mechanism for increasing market liquidity, An exchange enables transfer of price risk, and An exchange creates trust, order, and integrity in the market.(Eleni Gabre-Madhin & Goggin,2005)

A commodity exchange also depends on the functioning of "allied" sectors: banking, insurance, transport, IT services, and even inspection services. Thus, while these sectors are not strictly part of an integrated institutional development plan, they must be nonetheless engaged and involved and brought along as the exchange development proceeds. (Eleni Gabre-Madhin & Goggin, 2005)

The Ethiopia Commodity Exchange (ECX) is an organized marketplace, where buyers and sellers come together to trade, assured of quality, quantity, payment, and delivery. The Ethiopia Commodity Exchange (ECX) is a new initiative for Ethiopia and the first of its kind in Africa. The ECX was formed in 2008 to address the problems of market access and market infrastructure primarily for grain farmers, and subsequently became the sole body responsible for managing trade in coffee and other Agricultural commodities sesame, Maize ,white pea bean ,red kidney bean , green mung Bean and Wheat. Since its establishment Ethiopia commodity Exchange, has been using information technology services in its internal processes and external communication among financial and other institutions. Ethiopia commodity Exchange uses ICT services in almost all areas of its Business units.

As organisations grow and change, they depend more and more on information technology for their survival (Feeny & Willcocks, 1998). Companies today implement and use information technology to find solutions to business problems, to improve management decision-making, enhance productivity and quality, and compete for new markets in our global and aggressive business environment (Porter & Millar, 1985).

The Ethiopia commodity exchange uses ICT services for conducting business processes that are related to its main core function of trading activities such as warehousing, clearing & settlement, central depository, integration with commercial Banks, Auction Trading, and other internal Processes. The Ethiopia commodity Exchange disseminates market data information using SMS, IVR, Price displays, Kiosks, websites, TV, Radio and other means to provide real time data to its stakeholders.

Well-functioning agricultural exchange platforms disseminate relevant information to all decision makers and thereby facilitate price discovery and price risk management (Gonzalo & Figuerola-Ferretti, 2007; Kaur & Rao, 2012). Such institutions may therefore be of great importance for optimal resource allocation.

Even if different Information and communication technology services are used by Ethiopia commodity exchange, there is a gap in proper usage of Information and communication technology services because of lack of proper awareness on the effect it creates on performance of trading activities. Low attention is also given to Information and communication technologies investment, management and allocation of resources. Even though many studies have been conducted on effect of ICT on trading performance, limited studies are available in Ethiopia that investigate the effect of ICT on performance of trading in Ethiopia commodity Exchange. Therefore, the purpose of this research is to study the Effect of information & communication technology on trading performance in case of Ethiopia Commodity Exchange.

1.2 STATEMENT OF THE PROBLEM

The Ethiopian government made market reforms in the beginning of the 1990s. The government believed that these market reforms were to solve inefficiencies of local agricultural products marketing system that continued in the subsequent years. Some of these inefficiencies included: long chains of transaction between the farmer and the consumer; poor access to reliable and timely market information; and small volumes of products of highly varied quality offered by individual smallholder farmers. One of the major contributors to poor market access is the lack of reliable and timely market information on input and output process as well as on input and output quantity and quality. This absence substantially increases transaction costs and reduces market efficiency. For any one crop, the marketing chain consists of multiple intermediaries; each taking a margin at every stage of the chain, and price variation in space and time are often large and erratic. So to solve these problems the ECX went operational by utilizing modern ICT-based technologies. (Samson, 2014)

The study presented by Messay (2007), confirmed that the provision of basic market information is a service that aims to increase the efficiency of the ECX and contribute towards overcoming basic issues of market failure based on asymmetrical access to information. As the writer concluded, "Access to spot prices assists [exporters] to make decisions on where to sell their goods and to negotiate for better prices from a position of strength. Traders also use this information to assist in facilitating arbitrage and the distribution of goods."

An efficient and reliable commodities exchange system can provide producers and agribusinesses in emerging markets with a competitive edge. The implementation of information technology in exchanges can have a transformational effect for emerging markets, delivering transparency, access to market data, and the ability to trace and determine the quality of products. It plays a crucial role in creating and promoting fair and orderly markets and mitigating price risks. Exchanges can also bring broad-based

economic benefits, stimulating growth while linking smallholder farmers, financial institutions, and communications technology. (IFC, 2017)

The Ethiopia Commodity Exchange is established to create a better market environment for farmers as well as consumers. ICT is one of the three pillars of Ethiopia Commodity Exchange. Using tools of ICT, one can provide accurate market information to farmers and traders in rural areas. (Messay, 2007)

Even if different Information and communication technology services are used by Ethiopia commodity exchange, there is a gap in proper usage of Information and communication technology services because of lack of proper awareness on the effect it creates on performance of trading activities. Low attention is also given to Information and communication technologies investment, management and allocation of resources. Even though many studies have been conducted on effect of ICT on trading performance, limited studies are available in Ethiopia that investigate the effect of ICT on performance of trading in Ethiopia commodity Exchange. These studies had not quite given detailed insights and analysis of the issues that were addressed in this study therefore leaving a knowledge gap on the effect of information technology on trading performance This study, therefore, investigated effect of information and communication technology on trading performance particularly focusing on Volume of some Agriculture Commodities traded, satisfaction of Different stakeholders, the internal efficiency of trading and other related activities.

This study is motivated to fill this gap in knowledge by investigating effect of information and communication technology on trading performance in Ethiopia commodity Exchange. Apart from its significance to the organization, it will help to experience the practice of performing even higher researches in the future.

1.3 BASIC RESEARCH QUESTIONS

The study focused on the following main and Sub questions

1.3.1 RESEARCH MAIN QUESTION

What are the effects of information and communication technology on performance of trading operation in Ethiopia Commodity Exchange?

1.3.1.1 SUB QUESTIONS

1. Does ECX information and communication technology service helps Traders in easily accessing trading platform and commodity market Price?

2. To what Extent the usage of information and communication technology is crucial to ECX end to end trading process?

3. What is the effect of information and communication technology service in improving Volume of commodity being traded by Traders?

4. What is the satisfaction level of Members and Traders in Trading using ECX Information and communication technology trading platform?

5. Does ECX information technology service improve the warehousing and clearing & settlement efficiency?

1.4 OBJECTIVES OF THE STUDY

The general and specific objectives of the study are discussed below

1.4.1 GENERAL OBJECTIVE

The study has the general objective of effect of Information and Communication technology on trading performance in Ethiopia commodity Exchange

1.4.2 SPECIFIC OBJECTIVES

- To identify the ICT role in accessibility of ECX trading platform and commodity market Price.
- To identify the Importance of ICT in ECX end to end Trading process.
- To identify the satisfaction level of ECX members and Traders using ICT trading platform.
- To Identify ICT role in Volume of traded commodities by ECX member and clients.
- To Identify the ICT role in commodity warehousing and clearing and settlement services.

1.5 HYPOTHESES DEVELOPMENT

"Hypothesis is a formal statement that presents the expected relationship between an independent and dependent variable."(Creswell, 1994) "A hypothesis can be defined as a tentative explanation of the research problem, a possible outcome of the research, or an educated guess about the research outcome." (Sarantakos, 1993: 1991)

As per the study made by BOZGA LIVIU (2015) on INFORMATION TECHNOLOGY AND THE COMPANY PERFORMANCE IN THE SECTOR OF SERVICES Technology (IT) represents one of the most dynamic factors contributing to the technical progress in the design, process and supply of all categories of services. The theoretical and practical investigations already demonstrated the potential of the Information Systems adoption and implementation, to improve the organization performances (efficiency, productivity, organization competitiveness and development etc.).

As per the study made by cosmas k. Mwalya(2010) on the impact of information communication technology on stock returns and trading volumes for companies quoted at the Nairobi stock exchange, the study concludes that the market was very sensitive to adoption of ICT at NSE where there was significant increase in mean daily returns and trade volume which could be attributed to Technology allows information to be disseminated to a broad base of investors in real time and at low cost, thus expanding the universe of investors with access to information. Second, technology is also reducing the barriers to entry for providing financial services (e.g. market making and brokerage) and the resulting competition is driving down transaction costs, the study therefore conclude that adoption of OICT impacted positively on the trade volume and mean daily returns .

In the study made by Rajiv D. Banker, Mitra sabyasachi (2005) on IMPACT OF INFORMATION TECHNOLOGY ON AGRICULTURAL COMMODITY AUCTIONS IN INDIA In an effort to increase efficiency, commodity auctions have been experimenting with online formats in recent years. Such online auctions have generated significant interest in the trade process because of their potential to generate higher commodity prices for producers, reduce unfair trading practices by middlemen, and bridge the digital divide We find that electronic auction prices are 4 percent higher and the difference is statistically significant. Further, we find that the price differential is higher for coffee grades that have higher price volatility and that are traded less frequently in the physical exchange. They also find that the price differential increases over time as buyers become more familiar with the benefits of the electronic trading format. The above arguments lead to our two hypotheses

Hypothesis H1**: There is significant relationship between Electronic trading Application and performance of Trading in Ethiopia Commodity Exchange**

Hypothesis H2: There is significant relationship between Computer system and performance of Trading in Ethiopia Commodity Exchange

As per the Report of the UNCTAD Study Group on Emerging Commodity Exchanges (2009) on Development Impacts of Commodity Exchanges in Emerging Markets; by Price dissemination, reduced information asymmetries and improved farmer returns: Readily available price references can benefit farmers who are otherwise disconnected from the market and are vulnerable to receiving sub-optimal prices and conditions from better-informed intermediaries. Information disseminated by the exchange can therefore reduce the information asymmetries that privilege intermediaries, and can empower participants

in the commodity sector to take better decisions in light of a more accurate understanding of market conditions. For example, with reference to Ethiopia, the Economist magazine (2007) documented how intermediaries' margins plus other market failures add 20 per cent to the cost of grain. It argued that "information, crucial to efficient trading, is scanty. But, thanks in part to technology, things are improving. Mobile phones help farmers to find out about price discrepancies from which they might benefit. In some cases, better market information has encouraged farmers to diversify their crops."

As per the study made by SAMSON (2014) on CONTRIBUTIONS OF INFORMATION AND COMMUNICATION TECHNOLOGY IN THE PUBLIC SECTOR: THE CASE OF THE ETHIOPIA COMMODITY EXCHANGE The ICT‟s contribution has been through the provision of market information, 84% of sample respondents confirmed that the exchange provided them with timely and accurate market information. The exchange applied technologies like SMS, IVR Services, electronic and print media, price tickers, and so on services including additional methods of disseminating market information. The main beneficiaries are different stakeholders like smallholder farmers but traders, suppliers, exporters, different interested companies, government offices, and individuals benefit from the information collected and disseminated. Research findings show that 79% respondents agreed that the exchanges‟ ICT supported technologies contributed and helped exporters‟ decision making process by providing integrated daily marketing reports and data. As a result, exporters got an opportunity to secure an informed business decision-making environment. The above arguments lead to our two hypotheses

Hypothesis H3: There is significant relationship between Network Infrastructure and performance of Trading in Ethiopia Commodity Exchange

Hypothesis H4: There is significant relationship between Data management system and performance of Trading in Ethiopia Commodity Exchange

1.6 DEFINITION OF TERMS

ICT (information and communication technology): A wide term that includes any communication device or application, for example, Internet, radio, television, cellular phones, computer and network hardware and software, satellite systems, and so on, as well as the various software services and applications associated with them, for example, the ERP systems, data warehouses, and so forth.

Commodity exchange: A commodity exchange is an institution or system where people who want to sell can come and make an offer of product that they want to sell. Simultaneously, people who want to buy are also making bids. The exchange as an institution matches the buyer with the seller. This matching process results in the market price that becomes known to all (Gebre-Madhin, 2006).

Trading Platform: means a physical or electronic facility where trade representatives make bids or offers through open outcry, electronic or any other method as provided by the Exchange.

Clearing and Settlement: means the procedure by which an organization acts as an intermediary and assumes the role of a buyer and seller as a central counter party for Exchange trade transaction in order to reconcile orders between transacting parties, and insures the physical or financial settlement of the transaction;

1.7 SIGNIFICANCE OF THE PROBLEM/STUDY

The findings of this study will help Ethiopian commodity exchange to look in-depth about its practice in relation to ICT usage, it will help analyse the effect of ICT on performance of selected business activities by reviewing the research result, and it will create view and correct its gap to achieve its goal through applying the output of the research. Apart from its significance to the organization, it will help to experience the practice of performing even higher researches in the future. It will also serve as stepping stone for those who would like to study further in the area. It will provide more information to management and staffs of Ethiopia commodity Exchange regarding the effect of Information Technology on trading services, it will provide recommendations which are useful to address the strategic issue of the Exchange especially issues regarding Information and communication Technology related products. Hence, policy makers can use this study to draw some policy implications, and it will serve as a reference material for other researchers who conduct their study in related topics.

1.8 DELIMITATION/SCOPE OF THE STUDY

The scope of the research was delimited to the analysis of the Effect of ICT in performance of trading in a case of ECX. Even if ECX uses a lot of Applications, technology products and so on Limited numbers of information and communication tools which are used by ECX were considered in this research. In addition from the number of commodities traded by ECX only coffee and sesame were considered in this research. The researcher used the following Dependent variables Volume of traded commodity, Traders satisfaction, Market price information availability, trading & warehouse efficiency and accessibility of trading platform .The researcher collected data from Traders and members who were Located in Addis Ababa because majority of the traders and members were located in here . The researcher also collected data from Employee of ECX who were working under different department in Head quarter which were located in Addis Ababa and from 24 Branch offices located outside Addis Ababa. The researcher communicated the ECX Branch office employees by using only Email and phone.

1.9 ORGANIZATION OF THE RESEARCH REPORT

This research is organized into five chapters. Chapter one contains introduction, back ground, statement of the problem, research questions, research objectives, Definition of Terms , significance of the study, limitations and scope of the study.

Chapter two provides a literature review informing the reader of what is already known in this area of study. Chapter three discussed the methodology that is employed in this study, including, research design, sample size and sampling technique, data source and collection method, procedure of data collection and method of data analysis**.** Chapter Four discussed the results and interpretation of the research findings and in chapter five conclusion and Recommendation based on this research is discussed.

CHAPTER TWO: REVIEW OF LITERATURE

2.1 THEORETICAL REVIEW

Under this section of the chapter of the theoretical review of Commodity Exchange, information and communication technology and its relation with the trading performance in commodity exchange will be presented.

2.1.1 COMMODITY EXCHANGE

Commodity Exchanges are believed to have existed since the 17th century, such as in Amsterdam in 1695 and the Dojima rice market of Osaka in 1730, but it was only in the 19th century that successful commodity exchanges began to emerge. The first five successful commodity exchanges in the world traded in cotton futures contracts and were connected by cable; this was in New York, Liverpool, Alexandria, La Havre and New Orleans (Baffes, 2011). However, these commodity exchanges were derailed after the Second World War, which first highlighted the weaknesses of commodity exchanges that are primarily policy interventions. Post World War Two, heavy government intervention brought about the collapse of commodity exchanges in China, Egypt and India while changes in trade agreements and government policy led to the failure of commodity exchanges elsewhere such as in various parts of Europe (Baffes, 2011).

Before 1990, commodity exchanges were generally restricted to the industrialized nations, but since then the liberalisation of markets, the rise in affordable technology as well as deregulation have enabled the growth of commodity exchanges worldwide (Rashid et. al., 2010). In fact according to United Nations Conference on Trade and Development (UNCTAD, 2007), by the mid-2000s, most of the world's functional commodity exchanges existed outside Europe and North America notably in Asia and Latin America, Africa regrettably has not been as successful in the adoption of commodity exchanges.

2.1.2 PURPOSE OF COMMODITY EXCHANGE

A commodity is a product having monetary value. A commodity is an item that can be manufactured, produced, purchased, sold, and consumed. Commodities are primarily the products of agricultural sector of the economy. Natural resources such as crude oil, natural gas, different types of minerals, etc can also be considered as commodities (MCX- Training Department, 2006).

A market can be defined as a place where buyers and sellers meet to exchange goods for money. Commodity exchange is essentially an organized market place, which is governed by rules that are

established by stakeholders of the market. It is a way to bring together all the market players and try to achieve a maximum level of competition (Gebre-Madhin, 2006).

A commodity exchange is an institution or system where people who want to sell can come and make an offer of product that they want to sell. Simultaneously, people who want to buy are also making bids. The exchange as an institution matches the buyer with the seller. This matching process results in the market price that becomes known to all (Gebre-Madhin, 2006).

A commodity exchange is a market in which multiple buyers and sellers trade commodity-linked contracts on the basis of rules and procedures laid down by the exchange. In developed countries, such exchanges typically act as a platform for trade in futures contracts, or standardized contracts for future delivery. In the developing world, a commodity exchange may act in a broader range of ways to stimulate trade in the commodity sector. This may be through the use of instruments other than futures, such as the cash or "spot" trade for immediate delivery, forward contracts on the basis of warehouse receipts or the trade of farmers' repurchase agreements, or "repos"(UNCTAD,2007)

Commodity exchanges are organized market venues where buyers and sellers of a commodity meet to trade it or its derivatives. They are designed to help mitigate counterparty risk and ensure that payments are made through reliable financial service providers. Exchanges provide a framework for market actors, financial institutions, and commodity operators to interact based on rules that provide legal protections. Exchanges further reduce information asymmetry. This encourages competition among buyers and sellers by allowing them to discover the real value of commodities in the market. Commodity exchanges in emerging markets typically trade with spot contracts that offer immediate delivery of the traded good, while those in more advanced economies tend to trade in futures and options contracts. (IFC, 2017)

2.1.3 COMMODITY EXCHANGE IN ETHIOPIA

Ethiopia's exchange was formed to overhaul the country's agriculture sector and create a dynamic, forward-looking, and efficient agricultural market system. The first modern commodity exchange in Sub-Saharan Africa outside South Africa and a pioneer for Rwanda's East Africa Exchange, it now connects 3.5 million Ethiopian smallholder farmers to markets. Similar to those in most emerging markets, Ethiopia's exchange was launched with an open outcry system which deployed spot contracts for three staple foods—maize, wheat, and haricot beans—with one satellite delivery center and two partner commercial banks. Before its launch, Ethiopia's agriculture sector was fragmented and suffered from high transaction costs, equally high contract default rates, a lack of quality standards, and an unreliable commodity supply. Weak infrastructure in terms of electricity, roads, telecommunications, financial services, and warehouses, along with an absence of necessary market infrastructures, including reliable

and timely market information, standards, and reliable ways to connect buyers and sellers, all hampered the exchange's initial progress. (IFC, 2017)

Ethiopia's exchange was positioned to function as an end-to end service for commodity warehousing, quality control, trading, clearing, and market data dissemination. Its indigenous all-in-one model gave it the functions of an exchange, quality certifier, warehouse operator, and clearinghouse. The Ethiopian commodity exchange assures all commodity market players the security they need in the market through providing a secure and reliable End-to End system for handling, grading, and storing commodities, matching offers and bids for commodity transactions, and a risk-free payment and goods delivery system to settle transactions, while serving all fairly and efficiently. ECX creates trust and transparency through aggressive market data dissemination to all market actors, through clearly defined rules of trading, warehousing, payments and delivery and business conduct, and through an internal dispute settlement mechanism. (www.ecx.com.et)

ECX is a membership-based exchange. Any individuals, private company, public enterprise, or cooperative that meets the membership requirements can be a member of the Exchange. ECX members are the core actors of the market. Membership is acquired through the purchase of a membership seat, provided other requirements are met. The Exchange on the ECX trading floor can be carried out only by members of the Exchange. ECX provides basically two types membership seat for the Exchange participants: the Ordinary and Limited membership seats. Each kind of membership has its own right in the Exchange operation. An Ordinary Members can be a Trading Member or Intermediary Member. Those who own Trading Member license could trade only on his/her account while Intermediary Member could trade either on his/her account or on the behalf of other clients. The other category is Limited Membership seat and those who have a license for this Limited membership seat can be registered either for Limited Trading member or Limited Intermediary members. Those traders who own Limited Trading membership seat could be engaged in commodity trading either as a seller or a buyer. The other type of membership under Limited membership is a Limited Intermediary member, which could be engaged in trading only as a seller (Gizaw & Solomon, 2014)

2.1.4 INFORMATION AND COMMUNICATION TECHNOLOGY

ICT refers to a wide range of computerized technologies that enables communication and the electronic capturing, processing and transmission of information. These technologies include products and services such as desk top computers, laptops, hand held devices, wired or wireless intranet, business productivity software, data storage and security, network security etc. With the use of ICT, businesses can interact more efficiently and enables businesses to be digitally networked. With the use of ICT, the time

constraint and distance barrier to accessing relevant information is eliminated or drastically reduced hence it improves coordination of activities with in organizational boundaries (Spanos , 2001).

In keeping with their complex nature and multiple applications, information and communication technologies (ICTs) may be viewed in different ways. The World Bank defines ICTs as "the set of activities which facilitate by electronic means the processing, transmission and display of information" (Rodriguez and Wilson, 2000). ICTs "refer to technologies people use to share, distribute, gather information and to communicate, through computers and computer networks" (ESCAP, 2001). "ICTs are a complex and varied set of goods, applications and services used for producing, distributing, processing, transforming information – [including] telecoms, TV and radio broadcasting, hardware and software, computer services and electronic media" (Marcelle, 2000). ICTs represent a cluster of associated technologies defined by their functional usage in information access and communication, of which one embodiment is the Internet. Hargittai (1999) defines the Internet technically and functionally as follows: "the Internet is a worldwide network of computers, but sociologically it is also important to consider it as a network of people using computers that make vast amounts of information available. Given the two [basic] services of the system – communication and information retrieval – the multitude of services allowed…is unprecedented". ICTs, represented by the Internet, deliver "at once a worldwide broadcasting capability, a mechanism for information dissemination, a medium for interaction between individuals and a marketplace for goods and services" (Kiiski & Pohjola, 2001).

"ICT has been seen to have a positive influence in the livelihoods of farmers in several developing countries such as India, Uganda, Kenya, Ethiopia and Malawi "(Asenso-Okyere & Mekonnen, 2012:17). The impact is experienced through various means as ICT has been seen as an enabling technology. However, sustainability and scale have been major issues that have hindered the success of ICT in African agriculture. Some technologies used by farmers are radios, mobile phones, computers and the internet.

"Some of the ways that ICT can be of benefit to agriculturalists are access to market information; distribution and supply chain management and traceability; financial services (mobile banking); farm extension services, access to sector experience and research; and commodity exchanges/warehouse receipt systems. Since the 1980s, several African countries have used liberalised agricultural systems and have not experienced any major food crises because of it" (Coulter & Onumah, 2002:319). However, due to the nature of their establishment, the systems have become very inefficient and are not fully developed. One of the ways in which these liberalised systems have enabled transparency and efficiency in the agricultural market is through agricultural commodity exchanges.

ICT technologies that are of major use to farmers are mobile phones, radios, computers, the internet, digital cameras, geographic information systems and global positioning systems (USAID, 2010a:1). ICT-based applications rely a lot on the channels of communication such as the internet, mobile phones and computers. Mobile phones have by far been the most accessible to African farmers, considering the fact that the areas they live in are inaccessible and underdeveloped. The benefits realised by many through the use of ICT in agriculture are reduction in transaction costs, increase in access to markets, provision of information on critical market information and improvement of communication inside the value chain (Maritz, 2011). Though the impact of ICT cannot be observed directly it is important to note how the impact would have been without ICT and the cost effectiveness of using ICT technologies (USAID, 2010a:3).

Services are becoming more tradable, and more traded, but the statistical system for classifying and capturing these international transactions lags behind. Information and communications technologies (ICTs) are the main enabling factor. Falling prices for voice and data communications, along with the computerization of tasks, allow service providers to segment and relocate work to take advantage of large, remote pools of lower cost labor with the language and technical skills needed to deliver high quality services in a timely manner. A growing number of countries and industries are embracing these opportunities, both as importers and exporters. Services trade is evolving from basic call centers, simple software coding, and generation of digital content to more complex business process such as system design and R&D (UNCTAD, 2009, 2012). It is therefore crucial that policymakers gain the ability to characterize and quantify services imports and exports in more detail and with more precision than the current statistical system allows. This trend will certainly continue. ICT systems have clearly moved beyond their earlier role as labour saving and cost-cutting tools to become core platforms on which innovation and work takes place, quality is ensured, and products are built and delivered. Because of this, data improvements need to encompass both the trade generated by provision of ICT services (telecommunications services, IT system design, software development, and related tasks), and the remote provision of ICT-enabled services, such as human resource management, payroll, accounting, architectural design, research, editing, education, and so on.

2.1.5 COMPONENTS OF INFORMATION AND COMMUNICATION TECHNOLOGY

In the engineering and technical point of view, there are 5 dimensions which should be considered: Software (computer programs in order to achieve, process and produce information), hardware (process, storage and retrieval of information), human resource training (training involved forces and technological products' consumers), raw data and information (data is the raw material of IT which should be reliable, precise and new), and communication systems (creating a connection among computers). In this section,

prioritization of successful components from time and selection of cases points of view are the most important elements in the IT structure (Mobaraki, Hossein et al, (2003)

IT infrastructure is the shared technology resources that provide the platform for the firm's specific information system applications. IT infrastructure includes hardware, software, and services that are shared across the entire firm. Major IT infrastructure components include computer hardware platforms, operating system platforms, enterprise software platforms, networking and telecommunications platforms, database management software, Internet platforms, and consulting services and systems integrators. An IT infrastructure consists of a set of physical devices and software applications that are required to operate the entire enterprise. But an IT infrastructure is also a set of firm wide services budgeted by management and comprising both human and technical capabilities. These services include the following:

• Computing platforms used to provide computing services that connect employees, customers, and suppliers into a coherent digital environment, including large mainframes, midrange computers, desktop and laptop computers, mobile handheld devices, and remote cloud computing services.

• Telecommunications services that provide data, voice, and video connectivity to employees, customers, and suppliers

• Data management services that store and manage corporate data and provide capabilities for analysing the data

Application software services, including online software services, that provide enterprise-wide capabilities such as enterprise resource planning, customer relationship management, supply chain management, and knowledge management systems that are shared by all business units

• Physical facilities management services that develop and manage the physical installations required for computing, telecommunications, and data management services

• IT management services that plan and develop IT infrastructure, coordinate IT services for business units, manage accounting for IT expenditure, and provide project management services

• IT standards services that provide the firm and its business units with policies that determine which information technology will be used, when, how, and by whom

IT education services that provide training in system use to employees and provide managers with training in how to plan for and manage IT investments

• IT research and development services that provide the firm with research on potential future IT projects and investments that could help the firm differentiate itself in the marketplace

2.1.5.1 NETWORKING AND TELECOMMUNICATION

A telecommunications system consists of hardware and of software that transmits information from one location to another. These systems can transmit text, data, graphics, voice, documents, or full-motion video information. The major components of a telecommunications system include the following:

- Hardware: all types of computers (e.g., desktop, server, mainframe) and communications processors (such as a modems or small computers dedicated solely to communications)
- Communications media: the physical media through which electronic signals are transmitted, including wireless media (used with satellites and cell phones)
- Communications networks: the links among computers and communications devices
- Communications software: software that controls the telecommunications system and the entire transmission process
- Data communications providers: regulated utilities or private firms that provide data communications services
- Communications protocols: the rules for transmitting information across the system
- Communications applications: electronic data interchange, teleconferencing, videoconferencing, e-mail, facsimile, and electronic funds transfer, and others

2.1.5.2 NETWORKS

A computer network consists of communications media, devices, and software needed to connect two or more computer systems and/or devices. Computer networks are essential to modern organizations for many reasons. First, networked computer systems enable organizations to be more flexible and adaptable to meet rapidly changing business conditions. Second, networks enable companies to share hardware, computer applications, and databases across the organization. Third, networks make it possible for geographically dispersed employees and workgroups to share documents, ideas, opinions, and creative insights, encouraging teamwork, innovation, and more efficient and effective interactions. Finally, the network is increasingly the link between businesses and between businesses and their customers

2.1.5.2.1 TYPES OF NETWORK

- A **local area network (LAN)** connects two or more communicating devices within 2,000 feet (usually within the same building), so that every user device on the network has the potential to communicate with every other device
- **Wireless local area networks (WLANs).** WLAN technologies provide LAN connectivity over short distances, typically limited to less than 150 meters, and usually within one building.
- **Bluetooth technology.** Bluetooth is a wireless technology that allows digital devices such as computers, printers, keyboards, cell phones, and Palm Pilots to communicate with each other via low-power radio frequencies
- **Private branch exchanges**. A private branch exchange (PBX) is a type of LAN. The PBX is a special-purpose computer that controls telephone switching at a company site. PBXs can carry both voice and data and perform a wide variety of functions to make communications more convenient and effective, such as call waiting, call forwarding, and voice mail.
- **Wide area networks (WANs)** are long-haul, broadband (analogue) networks covering wide geographic areas. They generally are provided by common carriers. WANs include regional networks such as telephone companies or international networks such as global communications services providers. They usually have very-large-capacity circuits, with many communications processors that make it possible to use these circuits efficiently. WANs may combine switched and dedicated lines, microwave, and satellite communications.
- **Virtual private networks**. A virtual private network (VPN) is a WAN operated by a common carrier. VPNs allow an organization to leverage the robust, shared communications infrastructure of the Internet to hook up with remote users, branch offices, and business partners worldwide, without paying the distance-sensitive fees that carriers charge for conventional network links.

2.1.5.2.2 NETWORKING COMPONENTS

Networking Components are Hubs ,Switches ,Bridges ,Routers ,Gateways ,CSU/DSU (Channel Service Unit/Data Service Unit) , NICs (Network Interface Card) ,ISDN (Integrated Services Digital Network) adapters ,WAPs (Wireless Access Point) ,Modems ,Transceivers (media converters) ,Firewalls

2.1.5.3 DATA MANAGEMENT SYSTEM

Database Management System or DBMS in short refers to the technology of storing and retrieving users' data with utmost efficiency along with appropriate security measures. DBMS allows its users to create their own databases as per their requirement. These databases are highly configurable and offer a bunch of options.

Database is a collection of related data and data is a collection of facts and figures that can be processed to produce information. Mostly data represents recordable facts. Data aids in producing information, which is based on facts. For example, if we have data about marks obtained by all students, we can then conclude about toppers and average marks. A database management system stores data in such a way that it becomes easier to retrieve, manipulate, and produce information.

Some of the popular Database management software's are Oracle RDBMS, IBM DB2, Microsoft SQL Server, SAP Sybase ASE, MySQL, Microsoft Access, and Informix

2.1.5.4 DATACENTRE

The data centre is home to the computational power, storage, and applications necessary to support an enterprise business. The data centre infrastructure is central to the IT architecture, from which all content is sourced or passes through. Proper planning of the data center infrastructure design is critical, and performance, resiliency, and scalability need to be carefully considered. Another important aspect of the data center design is flexibility in quickly deploying and supporting new services. Designing a flexible architecture that has the ability to support new applications in a short time frame can result in a significant competitive advantage. Such a design requires solid initial planning and thoughtful consideration in the areas of port density, access layer uplink bandwidth, true server capacity, and oversubscription, to name just a few

2.1.5.5 SYSTEMS AND APPLICATION SOFTWARE

System software is the set of programs designed to coordinate the activities and functions of the hardware and various programs throughout the computer system. A particular system software package is designed for a specific CPU design and class of hardware

Application software consists of programs that help users solve particular computing problems. Application software is designed to address the need of a particular organizational activity or function. Application software includes packaged software such as word processing, spreadsheet, database, and programming languages such as BASIC, COBOL, C, Visual Basic, and other commercial and custom software.

2.1.6 INFORMATION AND COMMUNICATION TECHNOLOGY IN COMMODITY EXCHANGES

ICT upgrade and promotion: The last decade has seen the progressive transition from "open outcry" trading, based on the physical presence of market users on an exchange trading floor, to electronic trading executed by market users remotely from the exchange premises. Adoption and upgrade of financial and trading technologies is now a top priority for commodity exchanges around the world. ICT has the

potential to increase the speed and efficiency of market performance, and to reduce the costs of volume expansion and new product development. Furthermore, ICT offers possibilities for integrating previously disparate services into packaged service bundles. Importantly, ICT can enable exchanges to overcome the market-access barriers faced by small-scale farmers that are caused by geographical distance and deficient physical infrastructure. Moreover, by extending ICT-enabled market access to previously marginalized entities, exchanges can also open the way for provision of other electronically delivered services. These might include banking, insurance, crop and weather advisory services, and e-commerce models for the supply of inputs and equipment. (UNCTAD, 2007)

2.1.7 ICT IN ETHIOPIA COMMODITY EXCHANGE

As per the study made by Samson, ICTs was found to be contributing significantly to the Ethiopian commodities market in its application of various technological ICT support systems that facilitates the daily transaction activities of its own and exporters various operations, ICT also enhanced decision-making capacity, and create an opportunity for a smooth and faster clearing and settlement of transactions. The most common perceived barriers felt by exporters are the exchange's website was not user-friendly, unable to know the stock positions at the exchanges" hand, frequent communication breakdown and interruptions, and increased operational costs are among the few to mention. (Samson ,2014)

Modern communication technologies or information and communications technologies (ICT) have been credited with not only improving efficiency or productivity in the business world but also with improving the standard of living for global citizens (Mistry and Jalal, 2012).

Ethiopia's technologically advanced exchange offers trades based on an electronic warehouse receipt system that links data from warehouse operations, clearing and settlement, and market-information onto one platform. The system also has a warehouse receipt financing component to provide short-term working capital loans to at small-scale traders. The exchange also provides a fully secured clearing and settlement service and central depository that are electronically linked to eleven commercial banks and a warehouse operator, which in turn is linked to a network of warehouses across the country (IFC, 2017).

These connected warehouses reduce price dispersion among regions and transaction costs for regional farmers. The exchange's secured payment system is digitally linked to the warehouse operator, financial institutions, tax administration agency, and more than 16,000 traders. The exchange settles transactions of more than $10 million per day with settlements made the following business day. Similarly, the exchange's clearinghouse has cleared more than $6 billion worth of transactions so far without default. Market participants in Ethiopia now have access to reliable market data through various sources provided

by the exchange, including a mobile push service that delivers up-to-date daily market information to farmers and agro-processors via text message and interactive voice response services offered in Amharic, Oromoiffa, Tigrigna, and English. The exchange continues to innovate. In July 2015, with the help of a $2.2 million grant from the Investment Climate Facility for Africa, it introduced a $3.8 million electronic trading platform to replace the original open outcry system. This created the capacity to execute significantly more transactions than the former system, with greater speed and data capture display functions, and the ability to cater to far more participants. The majority of the exchange's trades are now made electronically. (IFC, 2017)

The establishment of the ECX has also contributed to a substantial improvement in the information infrastructure for commodities traded at the exchange: traders can now receive market information via SMS, Interactive Voice Response, Internet, other media (radio, television and newspaper), or via electronic tickers placed in rural markets that display real time prices of all commodities traded on the platform. Finally, the ECX has a comprehensive legal framework and an advanced system for clearing and settlement of contracts in order to guarantee payment and delivery, for example by requiring all trading members to have prepaid credit accounts. (Andersson, Bezabih & Mannberg, 2015)

ECX has become Africa's largest exchange after South Africa's SAFEX (EAG, 2015). The ECX's design is unique in that it integrates the entire eco-system related to the market, spanning the central trading system, warehouse delivery centers, product grade certification, clearing banks, an arbitration tribunal, a market information system linking rural sites, remote electronic trading centers, and a secure datacentre to manage membership and market information. An over-arching legal framework and a government regulatory agency ensure the viability of this entire integrated environment. Since 2008, the ECX has increased the number of agricultural commodities traded at the exchange from only one to seven. Currently the ECX trades coffee, sesame, pea beans, maize, wheat, and green mung beans, and red kidney beans are in the pipeline. Until June 2015 ECX has been trading through an open outcry trading platform. In order to increase trade efficiency, transparency and accessibility, the ECX introduced its modern eTRADE Platform. To successfully launch this initiative the exchange has trained and certified over 514 online traders (Vasu, April 2017)

The eTRADE Platform was officially launched on October 8, 2015. It has the capacity to trade nearly 5,000 times more transactions than its counterpart Open Outcry or Pit Trading platform. The eTRADE platform was entirely developed by the Exchange over the past two years and it has dramatically increase trade efficiency, transparency and accessibility. The eTRADE Platform saw its soft launch on July 20, 2015, by introducing local washed/unwashed by product coffee trades. Thus far, a total trade volume of

2,390 MT has been traded on the platform with a trade value of ETB 120 million (US$5.7 million). The platform facilitates the increase in the number and types of commodities being traded at the exchange, which in turn enables a wide range of farmers to benefit from trading through the exchange (Vasu, April 2017)

2.1.8 TRADING IN ETHIOPIA COMMODITY EXCHANGE

It is well known that many markets in developing countries are characterized by small trading volumes, incomplete competition and a high volatility in prices (i.e., by being 'thin'). Low trading volumes implies that the quantity and quality of information disseminated from trade is limited and therefore that the price discovery process (i.e., the process through which buyers and sellers arrive at a transaction price) is hampered (Tomek, 1980; Carter, 1989; Mattos and Garcia, 2004).

Because of the nature of the new coffee trading model, new electronic system is designed by IT staffs of ECX which is called e Auction Electronic Trading and the electronic auction system is a trading system that is part of the electronic transaction system which enables both the buyers and sellers to transact through an electronic auction system (GEBEYACHIN, 2017)

ECX has currently two trading centres located at Head Quarter and one Regional Electronic Trading centre and there is 5 days a week trading and 6 days settlement operations (2018, Abenet).

Figure 2. 1 Ethiopia commodity exchange Electronic and outcry trading Platform

2.1.9 WAREHOUSING SERVICE IN ETHIOPIA COMMODITY EXCHANGE

Commodity exchanges with a specific focus on correcting fundamental shortcomings such as lack of physical and informational infrastructure, storage facilities and access to credit. A well-functioning agricultural exchange platform that disseminates relevant information to all decision makers and provides storage facilities as well as a legal framework for negotiating contracts has the potential to reduce such transaction costs, and thereby to improve resource allocation and to make the price discovery process more efficient (Easwarana & Ramasundaram 2008; Shalini & Duraipandian 2014).

Ethiopia has a relatively long history of using decentralized warehouses for storage. However, with the liberalization of the economy, many warehouses fell into disuse because they were not profitable. The ones that remained active were located in a few urban areas. Within the ECX, warehouses play a pivotal role, and the ECX has a mission to gradually re-open local warehouses. Within this new system, coffee is sold directly from the warehouses in the different regions instead of being transported to a central auction in Addis Ababa. The new system also implies that commodities in surplus areas across Ethiopia are stored in the nearest regional warehouse. Commodities are sampled and graded according to quality and quantity at the warehouses (Onumah, 2010). Individuals who deposit goods at the warehouses are issued an Electronic Goods Received Note and a signed print copy as evidence of the deposit (Onumah, 2010).

ECX offers an integrated warehouse system from the receipt of commodities on the basis of industry accepted grades and standards for each traded commodity by type to the ultimate delivery. Commodities are deposited in warehouses operated by ECX in major surplus regions of the country. At the ECX warehouse, commodities are sampled, weighed and graded using state-of-the-art technology grading and weighing equipment. ECX warehouses issue an Electronic Goods Received Note and provide the depositor or his/her representative with a signed print copy. The Electronic Goods Received Notes are not negotiable, transferable or represent legal title to the deposited commodity. The depositor has to get Electronic Warehouse Receipt issued by the ECX Central Depository in order to establish legal title to the deposited commodity. The Deposited commodities are stored using global standards of inventory management which rely on First-In-First-Out principles, rotation, and careful environmental control. ECX Inventory Management system guarantees the quality and quantity of the commodity throughout the pre-determined period of storage. Further, ECX warehouses are insured at maximum coverage to protect against loss and damage of deposits. (Vasu,2017).

ECX has Reached to 50 warehouses with a total 370,000 Mt handling capacity at a time (2018, Abenet)

2.1.10 INFORMATION AND COMMUNICATION TECHNOLOGY AND PERFORMACE IN ORGANIZATION

Organization performance have been defined in many ways by various literatures, Georgopoulos &Tannenbaum (1957: p. 535) define organizational performance as the extent to which organizations, viewed as a social system, and fulfilled their objectives. Organization performance is set of financial and non- financial indicators which offer information on the degree of achievement of objectives and results (Kaplan& Norton, 1992 as cited in Lebans & Euske 2006).Vorhies and Morgan (2005) said firm performance is a three dimensional construct that comprises the dimensions of customer satisfaction, market efficiency and corporate profitability. In general organization performance is the state on which organizations find themselves while achieving their goals and objectives.

Both Lebas (1995) and Whooley (1996) consider performance as subjective and interpretative, not least, being related to the cost lines, which emphasizes the ambiguous nature of the concept. Rolstadas (1998) believes that the performance of an organizational system is a complex relationship involving seven performance criteria that must be followed: effectiveness, efficiency, and quality, and productivity, quality of work, innovation and profitability. Performance is closely related to the achievement of the criteria listed above, which can be regarded as performance objectives. According to Rolstadas, it cannot be established a precise definition of performance because it is dependent on the seven criteria of performance, that cannot be clearly defined. In the research of performance in business, the definition of performance has led Folan (2007) to highlight three priorities or objectives of governance of performance: - firstly, performance should be analysed by each entity within the limits of the environment in which they decide to operate. For example, a company's performance needs to be analysed in the markets in which it operates and not those that are not relevant to its operations. - Secondly, performance is always linked to one or several objectives set by the entity whose performance is analysed. Therefore, a company measures its performance against objectives and targets established and accepted internally rather than on those used by external bodies. - Thirdly, performance is reduced to the relevant and recognizable features.

According to Folan's theory, performance is influenced by the environment, the objectives to be achieved and the relevant and recognizable features. Folan uses several definitions for the concept of performance as it should be analysed and quantified from several points of view. Neely (2002) believes that performance should consider quantifying the efficiency and effectiveness of actions. This quantification can be expressed both qualitatively and quantitatively. According to the definition of Neely and other authors, performance is closely related to efficiency and effectiveness. Kane (1996) argues that the performance is ″something that a person leaves behind and which exists outside the said purpose″. According to Kane, performance is defined at the level of each individual within the organization or at

organization level. It is perceived as an understanding of the achieved results. The author emphasizes the particular nature of the definition and the impossibility of outlining a general definition. Therefore, we can speak of an accuracy of the definition at particular level and an ambiguity of it at general level.

Various studies have been undertaken to measure the impact of IT on organizational performance (efficiency & effectiveness) of business organizations using different performance indicators which are considered key factors for assessments. These variables include income, customer satisfaction, supplier/customer links, company image, job interest of employees, stake holder's confidence and interoffice links etc. Many researchers have investigated the impact of IT on organization performance using these variables. Researchers like Parthasamthy and Sethi(1993), Kelly(1994), Earls et. al. (1996), O'Dell and Elliot (1999) etc. have investigated the impact of IT on quantitative performance variable i.e. incomes/profits of the companies and found positive impact. Whereas, Franklin (1997), Olalla (2000), Schmid et. al(2001), Zee and Han(2002) etc. have seen the increase/decrease in different qualitative performance indicators i.e customer satisfaction, company image, job interest of employees, stake holders confidence, interoffice link etc. after implementation of IT and have concluded that IT ultimately has positive impact. Information and knowledge are the foundation of the ICT and performance. The pervasiveness of ICT is affecting traditional performance. New products, new processes and new organisational forms are improving the production function and increasing output. New technologies are strengthening the bases of highly innovative firms, widening their set of ―eligible choices‖ and increasing their performance (Greenberg, 2004).ICT has provided new technologies that reduce transport costs, production costs, enhanced quality, and faster workflows thus facilitating organizational performance. Communication and co-operative working is being made easier and less costly, and is producing several benefits in terms of cost and time saving, routines, information exchange, and increased quality and variety of output (Brynjolfsson & Hitt, 2000).

An important number of studies considered indicators of the basic business process performance (so called intermediate process level measures) such as productivity, profit, cost reduction etc. (Bharadwaj, 2000; Devaraj and Kohli, 2003; Mithas et al., 2011 and 2012). Other studies used organizational level performance measures such as competitive position or market share value (Mata, 1995; Hitt and Brynjolfsson, 1996; Dehning and Richardson, 2002; Agan, 2011; Ceccobelli et al., 2012). Alternatively, the firm performance is sometimes defined by the firm efficiency (an internal standpoint, defined by cost reduction and productivity enhancement) or the firm effectiveness (denoting the achievement of objectives in relation to external environment and attainment of competitive advantages) (Melville et al., 2004).

2.2 EMPIRICAL LITERATURE

Under this section, previous empirical studies on the effect of information and communication technology on the performance of Commodity exchange and related studies in developed and developing countries and Ethiopia will be reviewed. However, there are limited numbers of studies conducted in Ethiopia on effect of ICT on performance of trading.

As per the study made by Rajiv D. Banker & Sabyasachi Mitra (2005) On Impact of Information Technology on Agricultural Commodity Auctions in India, they found out that that electronic auction prices are 4 percent higher and the difference is statistically significant. Further, they found that the price differential is higher for coffee grades that have higher price volatility and that are traded less frequently in the physical exchange. They also found that the price differential increases over time as buyers become more familiar with the benefits of the electronic trading format.

As per the study made by Kariuki Alex Kimani (2015) on Impact of Information Technology on Organizational Performance: Case of Population Services Kenya, The study findings also revealed that there was a positive relationship between the level of IT use and organisational performance at Population Services Kenya. The study results indicated that IT use explains 82.4% of organisational performance at PS Kenya. The study recommends that organisations should embrace IT tools and services so as to have competitive edge and improve service delivery to their customers.

In the context of Ethiopia, there are few studies that examine effect of Information and communication technology on trading performance of Ethiopia commodity Exchange, to the knowledge of the researcher, even the these researches do not directly match with the research topic.

As per the study made by SAMSON BELLETE (2014) on Contributions Of Information And Communication Technology In The Public Sector: The Case Of The Ethiopia Commodity Exchange, ICTs was found to be contributing significantly to the Ethiopian commodities market in its application of various technological ICT support systems that facilitates the daily transaction activities of its own and exporters various operations, ICT also enhanced decision-making capacity, and create an opportunity for a smooth and faster clearing and settlement of transactions.

As per the study made by Yalew Nigussie (2015), on The Impact Of Information & Communication Technology On Ethiopian Private Banks' ",In general, from the hypothesis tested, it can be concluded that adoption of information and Communication Technology has a significant impact on customers" satisfaction. Furthermore, it can be deduced from the linear regression model that there is a strong

positive relationship between adoption of Information and Communication technology and customers‟ satisfaction.

”The study presented by Messay (2007), on Market Information System and the Ethiopia Commodity Exchange , confirmed that the provision of basic market information is a service that aims to increase the efficiency of the ECX and contribute towards overcoming basic issues of market failure based on asymmetrical access to information. As the writer concluded, “Access to spot prices assists [exporters] to make decisions on where to sell their goods and to negotiate for better prices from a position of strength. Traders also use this information to assist in facilitating arbitrage and the distribution of goods.”

2.3 CONCEPTUAL FRAME WORK

Miles and Huberman (1994) defined a conceptual framework as a visual or written product, one that “explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts, or variables—and the presumed relationships among them”. The conceptual framework looks performance of trading as the dependent variables with Electronic trading Application, Network Infrastructure, computer System, and data management systems being the independent variables where Volume of Traded commodity , Traders satisfaction, Market price information Accessibility and Trading efficiency measuring the performance of Trading as presented Below.

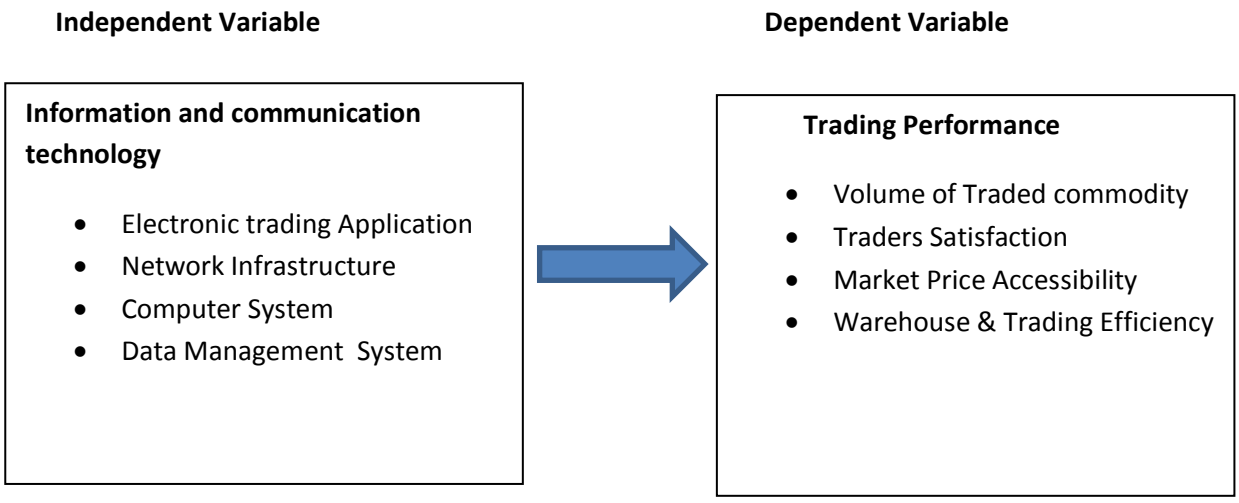


Figure 2. 2 Conceptual Frame work

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION

In chapter three, the Research Approach and Design, Sampling techniques, instruments of Data Collection, procedures of Data collection, and Methods of data analysis are discussed in details. Both primary and secondary data is used to study the effect of information and communication technology on trading performance. Data is gathered from Ethiopia commodity exchange Employees and Traders.

3.2 RESEARCH APPROACH and DESIGN

Research design is a master plan specifying the methods and procedures for collecting and analyzing the required data. The choice of research design depends on objectives that the researchers want to achieve (John, 2007). In this research ,explanatory design was used.

There are three approaches to conduct any research: Qualitative, Quantitative and Mixed approaches. According to Saunders (2009) mixed method approach is the general term for when both qualitative and quantitative data collection techniques and analysis procedures are used in research design. In this study mixed-method approach employed to ensure effectiveness of the research process as the findings of the qualitative data enhance the findings of quantitative one and the vice versa.

Research Approaches on the other hand, are paradigms, research frameworks, which may be either quantitative or qualitative or both (mixed approach (Creswell, 2003).

As noted by Kothari (2004), explanatory research design examines the cause and effect relationships between dependent variables and independent variables. Therefore, since this study examined the cause and effect relationships between information and communication technology and performance of Trading in Ethiopia commodity Exchange, explanatory research design is appropriate.

3.3 SAMPLE AND SAMPLING TECHNIQUES

Ideally one wants to study is the entire population. However, usually it is impossible or unfeasible to do this and therefore one must settle for a sample. According to Black and Champion (1976), sample is a portion of elements taken from a population, which is considered to be representative of the population.

There were 346 full members and 121 Non-Member-Direct Traders in ECX (Abenet, 2018).

The target population was Employees of ECX from four departments and the total size of the population was 260. In addition another target group was from Traders who buy and sell commodities specifically

coffee and Grain using Ethiopia commodity Exchange Information and communication technology services. The total size of the population was 240.

Stratified sampling technique was used to draw four strata from Employee of ECX: IT Department (50), Clearing and settlement (20), warehouse (100), Trading operation Department (90).

In addition, Stratified sampling technique was used to draw four strata from traders: Full member coffee trader(120), full member grain trader(50), Non-Member-Direct coffee Traders(30) and Non-Member-Direct grain Traders(40)

This sampling technique enables the researcher to maintain the balance between the number of samples to be selected and size of each member‘s category (Worku, 2014). Samples were drawn randomly based on the respondents ‘availability and interest to participate in the research.

I used probability sampling using stratified sampling technique because the size of population is distributed in different departments. In addition there were different commodities traded by buyers and sellers.

Assumptions made to determine a rational sample size were:

- Population size is known
- Confidence level used at 95% is acceptable
- Confidence interval (margin of error) at 5% is acceptable

Yamane (1967) suggested simplified formula for calculation of sample size from a population which is an alternative to Cochran’s formula and for a 95% confidence level and p. = 0 5, size of sample

n= N/1+N(e^2)

Where, N is the population size and e is the level of precision

The sample size determination was made using this formula and 140 employee respondents were selected from IT, warehouse, clearing and settlement and trading Departments and 128 traders from full members and Non-Member-Direct respondents were selected from Coffee Buyers ,Coffee sellers , Grain Buyers and Grain sellers . The researcher considered that the sample size is sufficient to make sound conclusion about the population as far as it covers the intended purpose. Moreover, the Information and communication usage is high with in the selected samples group.

3.4 SOURCE AND DATA

Data collection plays an important role in a research as it is the most essential information for a study. Besides, the accuracy of a result is based on the precision of the data and this study used the data collected for analyzing purpose. Basically, data can be categorized into two which are primary data and secondary data. Data can be presented in terms of words, numbers, figures or diagrams. The objective is to study effect of Information and Communication technology on trading performance in Ethiopia commodity Exchange

The study used both primary and secondary sources. The primary sources of data were Employee and traders. The Secondary sources were study papers, ECX historical documents, strategy documents, annual reports, and sources from internet, and Extracted data from ECX database.

In this study, the researcher used a questionnaire consists of closed-ended structured questions and structured interview methods of data collection as a means for gathering the primary data. Questionnaire was self-designed by the researcher based on the research objectives .The questionnaire was used because it has the advantage of participating large respondents over other data gathering techniques; it limits inconsistency and also saves time. The questionnaire had two sections, the first part captured demographic information of the respondent and the second part entailed the effect of Information and communication technology on trading performance. For the second part of the questionnaire, Likert scale for respondents to provide their responses in which, 5 corresponds to "strongly Agree", 4 corresponds to " Agree" , 3 corresponds to "Neutral " , 2 corresponds to "Disagree" and 5 corresponds to "strongly disagree" was used.

In addition, data had been gathered using interview method which was very important to supplement the information gathered thorough questionnaires. The Participants of the interview were the Operation and Information and Technology department staffs and Managers. The researcher was taking notes while interviewing the Participants.

3.5 Validity and Reliability Test

3.5.1 Validity Test

According to Cook and Campbell (1979), validity is defined as the best available approximation to the truth or falsity of a given inference, proposition or conclusion. Sounders (2003) also defined validity as the extent to which data collection method or methods accurately measure what they were intended to measure. If the measurement items in the survey ―adequately cover the content domains or aspects of the concept being measured, an instrument has content validity (Ahire, 1996).

John (2007) categorized validity in to three categories; namely content validity, criterion validity and construct validity. Content validity measures the extent of the instrument to provide adequate coverage of the topic being studied. This measurement could be judgmentally considered to be good if the number of population is highly representative of the universe. Criterion validity refers to the extent to which an instrument is fully, relevant, unbiased, reliable and available to the topic of the study.

On the other hand, construct validity refers to the degree to which a measure actually assesses the theoretical construct it is meant to assess (Fornell, 1981). In the assessment of construct validity, the establishment of discriminant and convergent validation is important (Campbell and Fiske 1959).

In this research, as criterion and content validity are not assessed numerically, but can only be subjectively judged by the researcher (Wong and Aspinwall, 2005),

The following activities were performed:

- The questionnaire was subjected to peer review from colleagues and the supervisor. This was aimed to red flag any potential errors in the research instruments thus ensuring the result‘s validity.
- Data was collected from the reliable sources and
- Survey questions were prepared based on pervious empirical review and literature review to ensure result validity.

3.5.2 Reliability Test

Reliability measures the internal consistency of the items in a scale to check the measuring tool employed on the study was free from error so that the measurement instrument yields a reliable outcome. It also indicates that the extent to which the items in a questionnaire are related to each other and whether a scale is one- dimensional or multidimensional. One of the most commonly used is called Cronbach‘s alpha. The normal range of Cronbach‘s alpha coefficient value ranges between 0- 1 and the higher values reflects a higher degree of internal consistency. Different authors accept different values of this test in order to achieve internal reliability, but the most commonly accepted value is equal or greater than 0.70 to reach internal reliability (Hair, 2003). Hinton, (2014) have also suggested four different points of reliability: excellent reliability ranges (0.90 and above), high reliability (0.70- 0.90), high moderate reliability (0.50-0.70) and low reliability (0.50 and below).

Table 3. 1 Reliability Statistics Employee

Reliability Statistics

Cronbach's Alpha	N of Items
.881	5

Table 3. 2 Reliability Statistics Traders

Reliability Statistics

Cronbach's Alpha	N of Items
.700	5

Table 3. 3 Total Statistics Employee

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Electronic Trading Application	17.2684	1.963	.592	.874
Computer System	17.1201	1.743	.680	.868
Network System	17.0899	1.888	.756	.847
Data Management System	17.2735	1.821	.740	.849
Trading Performance	17.1667	1.885	.861	.828

Table 3. 4 Total Statistics Traders

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Electronic Trading Application	14.2459	3.559	.357	.689
Computer System	14.0545	3.379	.332	.608
Network System	14.1846	3.589	.374	.682
Data Managment system	13.8406	2.891	.567	.599
Trading Performance	14.0252	2.981	.695	.554

As shown in table 3.1 to 3.4 the Cronbach's alpha coefficient values for all constructs in the study were greater than the 0.70 so that it can be concluded that the measurements can be applied for further analysis with acceptable high reliability test result.

3.6 PROCEDURES OF DATA COLLECTION

For this study closed-ended questions were designed in order to call for responses, which narrow down the field of enquiry, since the respondents chooses among fixed responses. They also help the researcher to analyse easier the data since the response scan be directly compared and easily aggravated (Patton, 1990) they are versatile; surveys can be employed among people of all ages and they are replicated from one subject to another (Aaker & Day, 1990; Kotler, 1994) and many questions can be answered in a short time. It should also be noted that close-ended questions could lead to bias since respondents are offered limited alternative replies.

The questionnaire was distributed to the selected ECX Employees by Email and contacting in person. The traders are contacted in person and filled the questionnaire.

I got approval from CEO of Ethiopia commodity Exchange based on cooperative letter written from the St. Mary University in order to gather the data by distributing the questionnaire to the selected respondents.

The technique of personal interviewing is undertaken in order to reach the objectives since it is the most versatile and productive method of communication, enabled spontaneity, and also provided with: "The skill of guiding the discussion back to the topic outlined when discussions are unfruitful while it has the disadvantages of being very costly time consuming and can introduce bias through desires of the respondent to please the interviewer" (Aaker & Day, 1990: 164).

For the purpose of this research structured face to face interviews had been conducted with the ECX operation managers and staffs, IT department Managers and staffs including the chief information officer. The total number of interviewed staffs and managers were twelve in number. The researcher was taking notes during the interview session. The discussion points are attached with Annex part of this research. Volume of traded and deposited commodities data from the Business information department of ECX had been collected using Microsoft Excel. Some of the secondary data collected include ECX 10 years traded commodities categorized by each year, Market price data for different commodities, Employees and trader's data, ECX internal newspaper for different months, 10 year annual financial statements and volume of 10 years deposited Commodities in warehouses categorized by each year.

3.7 METHODS OF DATA ANALYSIS

After the required data was collected, the validation of data was done. And the researcher picked a random sample of completed responses and validates the collected data. The researcher checked whether each respondent was actually interviewed or not , checked whether response had been provided for each question or not , recheck that respondents were chosen as per the research criteria, checked whether the data collection procedure was duly followed and ensure that the respondents were asked the all the questions. After the validation of data conducted the next step was data editing and Data coding in which error in data had been rectified and grouping and assigning of values had been done

Descriptive statistics (Mean) and inferential statistics (Correlation and Regression) analysis had been used to describe relationships among independent and dependent variables. The data had been analysed using statistical software's Statistical Package for the Social Sciences (SPSS).

3.7.1 DESCRIPTIVE STATISTICS

First the researcher used descriptive analysis method to summarize the data and find patterns. Mean, percentage, minimum, maximum, frequency, Std. Deviation and range are the most commonly used descriptive statistics methods to describe the demographic characteristics of the respondents and conducted high level analysis for dependent and independent variables. The objective is to study the effect of information and communication technology on trading performance. Descriptive statistics provide absolute numbers. However, they do not explain the rationale or reasoning behind those numbers therefore I used the inferential statistics method to further analyse the data.

3.7.2 INFERENTIAL STATISTICS

The researcher used Electronic trading Application, Network Infrastructure, Computer System and Data Management System as independent variable and trading performance as dependent variable which has the following control variables as mentioned in the conceptual framework of this study

- Volume of Traded commodity
- Traders Satisfaction
- Market Price Accessibility
- Warehouse & Trading Efficiency

The following inferential statistics methods were used to analyse the relationship between the independent and dependent variables and generalize results and make predictions about a larger population.

3.7.2.1 CORRELATION

Correlation analysis measures the degree of association between two or more variables the researcher used Spearman's rho method to study the relationship between the independent and dependent variable. If a correlation is found, it means that there is a relationship among the variables.

3.7.2.2 REGRESSION

Regression analysis is statistical techniques used extensively to examine causal relationships between variables

In regression analysis, a single dependent variable, **Y**, is considered to be a function of one or more independent variables, **X**1, **X**2, and so on. In this study the dependent variable which is Trading performance is represented by TP and independent variables are represented as follows

ETA: Electronic trading Application

NT: Network Infrastructure

CS: Computer System

DBMS: Data management system

TP: Trading performance

3.7.2.2.1 The Multiple Linear Regression Equation

The multiple linear regression equation is as follows:

$y = \beta 0 + \beta 1x1 + \beta 2x2 + \cdots \beta pxp + e$

$$\hat{Y} = b_0 + b_1 X_1 + b_2 X_2 + \ldots + b_p X_p$$

where equation image indicator is the predicted or expected value of the dependent variable, X1 through Xp are p distinct independent or predictor variables, b0 is the value of Y when all of the independent variables (X1 through Xp) are equal to zero, and b1 through bp are the estimated regression coefficients. Each regression coefficient represents the change in Y relative to a one unit change in the respective independent variable. In the multiple regression situations, b1, for example, is the change in Y relative to

a one unit change in X1, holding all other independent variables constant (i.e., when the remaining independent variables are held at the same value or are fixed).

Using the above Equation, the researcher inserted the independent and dependent variables of this study and we get the following formula

$$TP = b_0 + b_1 (ETA) + b_2 (NT) + b_3 (CS) + b_4 (DBMS) +$$

Application of this statistical procedure to dependent and independent variables produces an equation that "best" approximates the functional relationship between the data.

The researcher used further Regression statistics such as ANOVA, Coefficient of Determination and Correlation Coefficient which are used to analyse the relationship between the variables, how strong the correlation is between the two variables and the strength of the correlation between to variables

CHAPTER FOUR: ANALYSIS, DISCUSSION AND PRESENTATION OF RESULT

4.1 INTRODUCTION

The purpose of this chapter is to present results and analysis of data involved in this study. The study aimed to identify the effect of information and communication technology on trading performance of Ethiopia commodity Exchange. In this chapter the Normality of collected data , details of the demographic characteristics of the respondents , interpretation of the summary statistics results of key variables, illustration and interpretations of the correlation analysis among basic variables, and a detail interpretation was made based on the regression results of dependent and independent variable.in addition results from interview analysis has been discussed.

4.2 QUANTITATIVE ANALYSIS RESULTS

The research objective was to study the effect of information and communication technology on trading performance in Ethiopia Commodity Exchange.in this part the results of the Demographic characteristics of the respondents which is part one of the distributed questionnaire and the effect of information and technology on trading performance which is part two of the questionaries' is discussed in detail. The first part of the questionnaire result is analysed using descriptive statistics and part two of the questionnaire result is analysed using inferential statistics methods.

4.3 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

The respondents of the questionnaire are categorized into two major Groups. The first targeted Groups are the staffs or permanent Employee of Ethiopia commodity Exchange and the second target groups are Members or Traders of the Exchange. Accordingly the following are the frequency distribution of each respondent by Age, Sex, position,

4.3.1 RESPONDENT'S STATISTICS BY SEX AND AGE

Respondents were selected to represent all age and sex group so as to avoid any bias on information and technology usage due to age and sex demographic factors. The data shown in the below Table 4.2 depicts the Distribution of the ECX Employees respondents categorized by their sex. Accordingly 78.6 % of the respondents were male employees and the rest 21.4 % were Female employees.

Table 4. 1 Table Employee by Sex

		Frequency	Percent
Valid	Male	110	78.6
	Female	30	21.4
	Total	140	100.0

Table 4. 2 Employee by Age

		Frequency	Percent
Valid	<25	8	5.7
	25-35	82	58.6
	36-45	45	32.1
	46-55	5	3.6
	Total	140	100.0

Table 4.3 and Table 4.4 show ECX Traders or member's respondents categorized by sex and age respectively. Accordingly 69.5 % of the respondents were male traders and the rest 30.5 % were female traders. Most of the respondent's age group was between 26 and 35.

Table 4. 3 Traders by Sex

		Frequency	Percent
Valid	Male	89	69.5
	Female	39	30.5
	Total	128	100.0

Table 4. 4 Traders by Age

		Frequency	Percent
Valid	<25	26	20.3
	26-35	66	51.6
	36-45	25	19.5
	46-55	7	5.5
	>56	4	3.1
	Total	128	100.0

4.3.2 RESPONDENT STATISTICS BY POSITION

As can be seen in Table 4.5 Specialists cover 40 % of the overall respondents followed by Associates 24.3%, Managers 21.4 % , Officers 10 % , juniors 2.9 % and D/CEO 1.4%.As compare to their total number, the participation of the senior and middle management staffs were very high in Number.

Table 4. 5 Participant Employees by Position

		Frequency	Percent
Valid	D/CEO	2	1.4
	Officer	14	10.0
	Manager	30	21.4
	Specialist	56	40.0
	Associate	34	24.3
	Junior	4	2.9
	Total	140	100.0

In Ethiopia commodity Exchange one Trader can involve either in selling or buying of commodities or both buying and selling of commodities. As can be seen in Table 4.6 from the participants 49.2 % were sellers, 32.8% were Buyers and 18 % were both Buyer and sellers.

Table 4. 6 Participant Traders by Position

		Frequency	Percent
Valid	seller	63	49.2
	Buyer	42	32.8
	seller and buyer	23	18
	Total	128	100.0

4.3.3 RESPONDENTS BY EDUCATION AND EXPERIENCE

When we look at respondents by experience and educational level, there was good representation of respondents from all groups. Out of the 140 respondents of ECX staffs 12.9 % were Diploma Holders, 58.6 were First degree Holders and the rest 28.6% were Master's degree Holders as shown in Table 4.7. The percentage of their experience is shown in Table 4.8. The longer year of experience indicates better commitment to the organization and knowledge of the organization's culture and practice and consequently developing a positive attitude to perform activities that build the organizational image.

Table 4. 7 Participant Employees by Education

		Frequency	Percent
Valid	Diploma	18	12.9
	First Degree	82	58.6
	Master's degree	40	28.6
	Total	140	100.0

Table 4. 8 Participant Employees by year of Experience

		Frequency	Percent
Valid	1-3yr	40	28.6
	4-6yr	33	23.6
	7-10yr	52	37.1
	>10yr	15	10.7
	Total	140	100.0

The Trader participants were 128 in number and their education and years of service is shown in Table 4.9 and Table 4.10 Respectively. The degree and master holders who participated in this research covered 67.2 % of the respondents. 56% of the respondents had experience in the sector for more than 4 years.

Table 4. 9 Participant Traders by Education

		Frequency	Percent
Valid	secondary School	11	8.6
	Diploma	31	24.2
	First Degree	58	45.3
	Master degree	28	21.9
	Total	128	100.0

Table 4. 10 Participant Traders by their experience

		Frequency	Percent
Valid	1-3	55	43.0
	4-6	27	21.1
	7-10	26	20.3
	>10	20	15.6
	Total	128	100.0

4.4 INTERPRETATION OF THE SUMMARY STATISTICS RESULTS OF KEY VARIABLES

In this part the researcher analysed the results found using Descriptive, correlation and regression Analysis.

4.4.1 DESCRIPTIVE STATISTICS

In this section the summary statistics for each variable of the study have been discussed. The summary statistics for the variables are presented in Table 4.11. The dependent variable Trading performance which was described in this study by Volume of Traded commodity, Traders Satisfaction, Market Price Accessibility and Warehouse & Trading Efficiency variables

The independent variable Information and communication technology which was described in this study by Electronic trading Application ,Network Infrastructure ,Computer System and Data Management System

The descriptive table included mean, standard deviation and Number of respondents of both of dependent and independent variables of the study.

Table 4. 11 Response of Employee

	N	Mean	Std. Deviation
Trading Performance	140	4.3130	.34609
Electronic Trading Application	140	4.2112	.41428
Computer System	140	4.3595	.47490
Network System	140	4.3898	.38003
Data Management System	140	4.2061	.41527
Valid N (listwise)	140		

As shown in Table 4.11 the mean value of trading performance was 4.31 with standard deviation of 0.346. The mean value for The Electronic Application, computer system, Network system and data management system was 4.21, 4.36, 4.39, and 4.20 respectively. The result showed that the independent variables average result or mean was high and similarly Volume of Traded commodity, Traders Satisfaction, Market Price Accessibility and Warehouse & Trading Efficiency which were measures of trading performance was also high.

Table 4. 12 Response of Traders

Descriptive Statistics

	N	Mean	Std. Deviation
Trading Performance	128	3.5625	.59588
Electronic Trading Application	128	3.3418	.61548
Computer System	128	3.5332	.71635
Network System	128	3.4031	.58806
Data Managment system	128	3.7471	.71083
Valid N (listwise)	128		

As shown in Table 4.12 the mean value of trading performance was 3.56 with standard deviation of 0.59 The mean value for The Electronic Application, computer system, Network system and data management system was 3.34, 3.53, 3.4, and 3.74 respectively. The result showed that the independent variables average result or mean was above the average and similarly Volume of Traded commodity, Traders Satisfaction, Market Price Accessibility and Warehouse & Trading Efficiency which were measures of trading performance was also high

4.4.2 CORRELATION ANALYSIS

Correlation is a way to index the degree to which two or more variables are associated with or related to each other. The sample size is the key element to determine whether or not the correlation coefficient is different from zero or statistically significant. The values of the correlation coefficient are always between -1 and +1. A correlation coefficient of +1 indicates that the two variables are perfectly related in a positive linear sense; while a correlation coefficient of -1 indicates that two variables are perfectly related in a negative linear sense. A correlation coefficient of 0, on the other hand indicates that there is no linear relationship between two variables (Brooks, 2008).

The correlation matrix in table 4.14 predicts the likely relationship among independent and dependent variables of this study.

Table 4. 13 Dependent and Independent Variables Correlation Matrix : employee

Correlations

			Trading Performance	Electronic Trading Application	Computer System	Network System	Data Management System
Spearman's rho	Trading Performance	Correlation Coefficient	1.000				
		Sig. (2-tailed)	.				
		N	140				
	Electronic Trading Application	Correlation Coefficient	.519**	1.000			
		Sig. (2-tailed)	.000	.			
		N	140	140			
	Computer System	Correlation Coefficient	.643**	.466**	1.000		
		Sig. (2-tailed)	.000	.000	.		
		N	140	140	140		
	Network System	Correlation Coefficient	.780**	.424**	.557**	1.000	
		Sig. (2-tailed)	.000	.000	.000	.	
		N	140	140	140	140	
	Data Management System	Correlation Coefficient	.775**	.423**	.569**	.706**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	.
		N	140	140	140	140	140

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

The **Spearman's rho** result based on Employee Respondents in Table 4.13 show that Electronic trading Application, Network Infrastructure, Computer System and Data Management System were positively correlated with trading performance.

Trading performance is significantly positively correlated with Data management system with correlation value (r Value) of .775 with significance value of .000(P value). Trading performance is significantly positively correlated with Network System with correlation value (r Value) of .780 with significance

value of .000(P value). Similarly, trading performance is significantly positively correlated with computer system with correlation value (r Value) of .643 with significance value of .000(P value).Trading performance is also moderately positively correlated with Electronic trading Application system with correlation value (r Value) of .519 with significance value of .000(P value)

Table 4. 14 Dependent and Independent Variables Correlation Matrix : Traders

Correlations

			Trading Performance	Electronic Trading Application	Computer System	Network System	Data Managment system
Spearman's rho	Trading Performance	Correlation Coefficient	1.000				
		Sig. (2-tailed)	.				
		N	128				
	Electronic Trading Application	Correlation Coefficient	.413**	1.000			
		Sig. (2-tailed)	.000	.			
		N	128	128			
	Computer System	Correlation Coefficient	.359**	.180*	1.000		
		Sig. (2-tailed)	.000	.042	.		
		N	128	128	128		
	Network System	Correlation Coefficient	.395**	.105	.091	1.000	
		Sig. (2-tailed)	.000	.240	.307	.	
		N	128	128	128	128	
	Data Managment system	Correlation Coefficient	.557**	.304**	.291**	.345**	1.000
		Sig. (2-tailed)	.000	.000	.001	.000	.
		N	128	128	128	128	128

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

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

The **Spearman's rho** result based on Trader Respondents in Table 4.14 shows that Electronic trading Application, Network Infrastructure, Computer System and Data Management System were positively correlated with trading performance.

Trading performance is moderately positively correlated with Data management system with correlation value (r Value) of .557 with significance value of .000(P value)

Trading performance is moderately positively correlated with Network System with correlation value (r Value) of .395 with significance value of .000(P value)

Trading performance is moderately positively correlated with computer system with correlation value (r Value) of .359 with significance value of .002(P value)

Trading performance is moderately positively correlated with Electronic trading Application system with correlation value (r Value) of .413 with significance value of .000(P value)

In general, even though the correlation analysis shows the direction and degree of associations between variables, it does not allow the researcher to make cause and effect inferences regarding the relationship between the identified variables. According to Brooks (2008), if it is stated that y and x are correlated, it means that y and x are being treated in a completely symmetrical way. Thus, it is not implied that changes in x cause changes in y, or indeed that changes in y cause changes in x rather, it is simply stated that there is evidence for a linear relationship between the two variables, and that movements in variables are on average related to an extent given by the correlation coefficient. Thus, in examining the effects information and communication technology on trading performance, Regression analysis which is discussed in the next section of the paper gives assurance to overcome the shortcomings of correlation analysis.

4.4.3 REGRESSION ANALYSIS

A regression model can be viewed of as a type of moving average. The regression equation attempts to explain the relationship between the independent and dependent variables through linear association. For a particular value of independent variable, the regression model provides us an estimated value of dependent variable.

The researcher conducted regression Analysis using SPSS in order to study the effect of information and communication technology on trading performance.

4.4.3.1 REGRESSION MODEL SUMMARY

To measure how strong the correlation is between the two independent and dependent variable, the researcher determined the amount of the total variation in trading performance that is associated with the regression model. This ratio, coefficient of determination is represented by the symbol r2. The value of

the coefficient of determination ranges from 1.00 to 0.00. The regression summary model is shown in the below table.

Table 4. 15 Regression Model summary Employee

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.875[a]	.766	.759	.16994	.766	110.378	4	135	.000

a. Predictors: (Constant), Data Management System, Electronic Trading Application , Computer System, Network System

In the regression Model summary result the coefficient of determination is 0.759 which shows that 75.9 % of variation in trading performance is due to the independent variables which are data management system, Electronic Trading application, Computer system and Network system.
24.1 % are other factors which are not mentioned with in this research.
In other words information and communication technology which is described by the above independent variables affect the trading performance by 75.9%

Table 4. 16 Regression Model summary Traders

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.702[a]	.492	.476	.43142	.492	29.820	4	123	.000

a. Predictors: (Constant), Data Managment system , Computer System, Electronic Trading Application, Network System

In the regression Model summary result the coefficient of determination is 0.476 which shows that 47.6 % of variation in trading performance is due to the independent variables which are data management system, Electronic Trading application, Computer system and Network system.

52.4 % are other factors which are not mentioned with in this research. In other words information and communication technology which is described by the above independent variables affect the trading performance by 47.6%

4.4.3.2 ANALYSIS OF VARIANCE

Analysis of variance is used to test the significance of the variation in the dependent variable that can be attributed to the regression of one or more independent variables. Employment of this statistical procedure produces a calculated F-value that is compared to critical F-values for a particular level of statistical probability. Obtaining a significant calculated F-value indicates that the results of regression and correlation are indeed true and not the consequence of chance.

Table 4. 17 Analysis of Variance employee

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.750	4	3.188	110.378	.000[b]
	Residual	3.899	135	.029		
	Total	16.649	139			

a. Dependent Variable: Trading Performance

b. Predictors: (Constant), Data Management System, Electronic Trading Application , Computer System, Network System

As shown in Table 4.18, the model has an F value of 110.378 and P value of 0.000 and hence the regression model is statistically significant.

The F-test is highly significant, thus we can assume that the model explains a significant amount of the variance in trading performance rate.

Table 4. 18 Analysis of Variance Traders

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.201	4	5.550	29.820	.000[b]
	Residual	22.893	123	.186		
	Total	45.094	127			

a. Dependent Variable: Trading Performance

b. Predictors: (Constant), Data Managment system , Computer System, Electronic Trading Application, Network System

As shown in Table 4.19, the model has an F value of 29.820 and P value of 0.000 and hence the regression model is statistically significant. The F-test is significant, thus we can assume that the model explains a significant amount of the variance in trading performance rate

4.4.3.3 COEFFICIENTS

The next table shows the multiple linear regression estimates including the intercept and the significance levels. An unstandardized coefficient represents the amount of change in a Trading performance due to a change of 1 unit of independent variable.

Table 4. 19 Regression coefficient Employee

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.553	.185		2.986	.003	.187	.920
	Electronic Trading Application	.115	.043	.138	2.696	.008	.031	.199
	Computer System	.149	.040	.205	3.711	.000	.070	.229
	Network System	.302	.057	.332	5.317	.000	.190	.415
	Data Management System	.308	.051	.370	6.048	.000	.207	.409

a. Dependent Variable: Trading Performance

4.4.3.4 REGRESSION EQUATION

The regression equation based on table 4.19 can be written as follows:

TP = 0.553 + 0.115*ETA + 0.149 *CS + 0.302*NS + 0.308*DBMS

Where

ETA: Electronic trading Application

NT: Network System

CS: Computer System

DBMS: Data management system

TP: Trading performance

The equation above explained as follows:

An increase in data management system by 1% results in increase of trading performance by 30.8% with a significant value of 0.000,

The second determinant of trading performance is Network System, in which an increase in Network System by 1% results in increase of trading performance by 30.2% with a significant value of 0.000,

The third determinant of trading performance is computer System, in which an increase in computer System by 1% results in increase of trading performance by 14.9% with a significant value of 0.000.

The Fourth determinant of trading performance is Electronic trading Application, in which an increase in Electronic Trading Application system by 1% results in increase of trading performance by 11.5% with a significant value of 0.008.

Table 4. 20 Regression coefficient Traders

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.235	.322		.730	.467	-.402	.872
	Electronic Trading Application	.225	.066	.233	3.430	.001	.095	.355
	Computer System	.175	.056	.211	3.127	.002	.064	.286
	Network System	.239	.072	.236	3.344	.001	.098	.381
	Data Managment system	.304	.063	.363	4.848	.000	.180	.429

a. Dependent Variable: Trading Performance

The regression equation based on Table 20 can be written as follows:

TP = 0.235 + 0.225*ETA + 0.175 *CS + 0.239*NS + 0.304*DBMS

The following is description of the regression equation result

An increase in data management system by 1% results in increase of trading performance by 30.4% with a significant value of 0.000,

The second determinant of trading performance is Network System, in which an increase in data management system by 1% results in increase of trading performance by 23.9% with a significant value of 0.001,

The third determinant of trading performance is Electronic trading Application, in which an increase in Electronic Trading Application system by 1% results in increase of trading performance by 22.5% with a significant value of 0.001.

The Fourth determinant of trading performance is computer System, in which an increase in computer System by 1% results in increase of trading performance by 17.5% with a significant value of 0.002.

4.4.3.5 HYPOTHESIS TESTING

The **Spearman's rho** result based on Employee Respondents in Table 4.14 shows all the independent variables have been correlated positively with the dependent variable. Trading performance is significantly positively correlated with Data management system and Network system, Trading performance is also moderately positively correlated with computer system and Electronic Trading Application.

Similarly, The **Spearman's rho** result based on Trader Respondents in Table 4.15 shows that Electronic trading Application, Network Infrastructure, Computer System and Data Management System are positively correlated with trading performance. However the correlation significance is different from the Employee data in which Trading performance is moderately positively correlated with Data management system, Network system, computer system and Electronic Trading Application.

From Table 4.14 and Table 4.15 it is clearly shown that all the variables have significance value which is less than 0.05, and this indicates that the correlation is statistically significant. The correlation coefficient shows the association between the independent and dependant variables. It does not explain the amount of variation explained by the factors identified as independent variables

The following section presented with the summary of the major findings and test of hypothesis constructed based on the regression Analysis result:

Based on regression model summary result of Employee the value of R2 and adjusted R2 which is 76.6.% and 75.9% respectively shows the changes on independent variables explained 75.9% of changes on the dependent variable trading performance. From the above values it can be indicated that the explanatory power of selected variables is good while explaining the effect on the dependent variable.

Based on regression model summary result of Traders the value of R2 and adjusted R2 which is 49.2 **%** and 47.6% respectively shows the changes on independent variables explained 47.6% of changes on the dependent variable trading performance.

Based on the regression coefficient result from employee data, the regression equation based on table 4.19 can be written as follows:

TP = 0.553 + 0.115*ETA + 0.149 *CS + 0.302*NS + 0.308*DBMS (regression Equation based on Employee Data)

Based on the regression coefficient result from Traders data, the regression equation based on table 4.20 can be written as follows:

TP = 0.235 + 0.225*ETA + 0.175 *CS + 0.239*NS + 0.304*DBMS (regression Equation based on Traders Data)

From the two regression equation it is shown that a % increase in the independent variables leads to trading performance increase by a certain units which are described in detail under the tables 4.19 and 4.20.

Therefore based on this the **researcher found the following summarized Hypothesis test result based on Employees data and traders data.**

As per the regression result we can get the following summarized Hypothesis test result based on Employees data

Table 4. 21 Hypothesis test result using Employee Response

Hypothesis	Sig value	Coefficients	Status	Remark
Hypothesis H1: There is significant relationship between Electronic trading Application and performance of Trading in Ethiopia Commodity Exchange	**.008**	**0.115**	**Accepted**	**Shows Significant positive relationship**
Hypothesis H2: There is significant relationship between Computer system and performance of Trading in Ethiopia Commodity Exchange	**.000**	**0.149**	**Accepted**	**Shows Significant positive relationship**
Hypothesis H3: There is significant relationship between Network Infrastructure and performance of Trading in Ethiopia Commodity Exchange	**.000**	**0.302**	**Accepted**	**Shows Significant positive relationship**
Hypothesis H4: There is significant relationship between Data management system and performance of Trading in Ethiopia Commodity Exchange	**.000**	**0.308**	**Accepted**	**Shows Significant positive relationship**

Table 4. 22 Hypothesis test result using Traders Response

Hypothesis	Sig value	Coefficients	Status	Remark
Hypothesis H1: There is significant relationship between Electronic trading Application and performance of Trading in Ethiopia Commodity Exchange	**.001**	**0.225**	**Accepted**	**Shows Significant positive relationship**
Hypothesis H2: There is significant relationship between Computer system and performance of Trading in Ethiopia	**.002**	**0.175**	**Accepted**	**Shows Significant positive relationship**

Commodity Exchange				
Hypothesis H3: There is significant relationship between Network Infrastructure and performance of Trading in Ethiopia Commodity Exchange	**.001**	**0.239**	**Accepted**	**Shows Significant positive relationship**
Hypothesis H4: There is significant relationship between Data management system and performance of Trading in Ethiopia Commodity Exchange	**.001**	**0.304**	**Accepted**	**Shows Significant positive relationship**

Therefore, from the regression result we can conclude that

Hypothesis H1**: There is significant relationship between Electronic trading Application and performance of Trading in Ethiopia Commodity Exchange**

Hypothesis H2: There is significant relationship between Computer system and performance of Trading in Ethiopia Commodity Exchange

Hypothesis H3: There is significant relationship between Network Infrastructure and performance of Trading in Ethiopia Commodity Exchange

Hypothesis H4: There is significant relationship between Data management system and performance of Trading in Ethiopia Commodity Exchange

4.5 INTERVIEW RESULTS

In this part of the research the interpretation of the results of the interview question has been presented briefly. The major respondents of this interview questions were Information technology and operation department Managers and staffs and the responses are presented after each interview questions

4.5.1 ECX AND ITS INFORMATION AND COMMUNICATION TECHNOLOGY DEPARTMENT

Question No 1. What are the major Objectives of Information and communication technology (ICT/IT) department? How much is the dependence of ECX business process on information and communication technology services?

Response:

The following are major objectives of Information and communication technology (ICT/IT) department.

- Providing Information system that reduce cost and generate revenue
- Enhance IT services that elevate customer satisfaction and accommodate future business expansion
- Boost a culture of Excellence, innovation, personal empowerment, and loyalty.

ECX Information and technology Department is the backbone to the exchange. Most processes are automated by this department. The exchange is highly dependent on IT since its inception.

Question No 2: How is the structure of the Information and communication technology department Organized?

Response:

ECX IT department has 4 divisions at the time of this study which are led by chief information officer. The Divisions are Infrastructure and support Division, Application and Maintenance Division, Business information System Division and Security and quality assurance Division. The IT department is directly report to chief executive officer of ECX.

The main Functions of the Department and Divisions are as follows:

Chief information Officer

- The purpose of the Department is to lead IT Department, coordinate activities of Application development & maintenance, Business Information Systems, IT Security & QA and IT

infrastructure & support divisions. Prepare annual work plan and budget for the Department. Ensure that IT supports are provided to all users; security measures are in place and exhaustive testing of all assigned applications is conducted. Also prepare periodic performance reports of the Department.

Infrastructure and support Division

- The Division has Manager ,Network Administrators, system Administrators , IT support Specialists ,Storage Administrators, Datacentre Administrators and Database Administrators
- The major purpose of the Division is to plan, manage, coordinate, monitor and supervise all activities of the ECX IT Infrastructure and support department; to maximize ECX's network services uptime through planning, proactive measures and maintenance of corporate IT infrastructure; to provide tier III advanced technical support for overall IT Infrastructure which encompasses LANs, WLANs, WANs , Voice Networks ,Systems, Servers, Database ,SAN and Data Centre infrastructures in Head Quarter (HQ), Disaster Recovery (DR) site, HQ Trading Centre and Regional Trading Centres.
- IT provides IT Infrastructure and Application support to End users, Manages different IT incidents ,problems and projects

Application Development and maintenance Division

- The Division has Manager ,Application Developers
- The purpose of the Division is to plan, manage, coordinate and supervise all activities related to the design, development, implementation, maintenance and enhancement of application software and data warehousing system; to provide tier III advanced technical support for all business and corporate applications software and a database which encompasses support and maintenance of headquarter and regional trading centres application software.

Business Information System

- The Division has a manager ,BIS Specialists and Data warehouse specialists
- The purpose of the Division is to plan, organize, coordinate, direct and control the overall activities of the division; to disseminate accurate, complete and timely market data through various channels; to develop and implement a market data procedure, process, and system; to devise annual plan of the Division and ensure the implementation of work plan; to prepare

periodic market outlook reports; conduct market data related analysis including price, volume, and economic trends and researches

IT security and Quality Assurance Division

- The Division has a manager , security specialists and Quality specialist
- The purpose of Division is to plan, manage, coordinate and supervise all activities that are performed within software Quality Assurance & Testing department; to manage software quality tasks and projects from initiation to full implementation; to ensure innovative solutions are implemented at all times; to lead the designing, developing, executing, and maintaining test plans, testing cases and methodologies that ensure exhaustive testing of all assigned applications; and to ensure the implementation of the work plans and prepare periodic reports
- It controls the integrity of the Exchange information technologies by Applying different IT security measures. It controls the ECX IT infrastructure from internal and external threats.

4.5.2 INFORMATION AND COMMUNICATION TECHNOLOGY SERVICES AND IT INFRASTRUCTURE IN ECX

4.5.2.1 ECX DATACENTRE

Question No 3 Does ECX has its own Datacentre? If yes, how do you manage it, what type of IT equipment's managed within the datacentre?

Response:

Data centre infrastructure refers to the core physical or hardware-based resources and components – including all IT infrastructure devices, equipment and technologies – that comprise a data centre. It is modelled and identified in a design plan that includes a complete listing of necessary infrastructure components used to create a data centre. Ethiopia Commodity exchange established its own datacentre which includes of the following items

- A data centre infrastructure which includes Servers, Computers, Networking equipment, such as routers , switches, Security, such as firewall , biometric security system, Storage, such as storage area network (SAN) , backup/tape storage, Data centre management software/applications
- It also include non-computing resources, such as: Power and cooling devices, such as air conditioners , generators, Physical server racks/chassis, Cables ,Internet backbone

In order to mitigate risk due to disaster, ECX has established another Datacentre as a recovery site in order to smoothly run its Business operation however the Disaster recovery site is not functional for various reasons.

The smooth running of ECX datacentre is mandatory as any interruption to the datacentre leads to the interruption of trading, warehouse, Clearing and settlement and other activities of the exchange because the exchange system is highly dependent on Information technology services.

4.5.2.2 ECX NETWORK SYSTEM

Question No 4. How is connectivity with Branch offices, trading centres and other stakeholders managed?

Response:

In Ethiopia commodity exchange there are two main types of connectivity

- Local area Network : a network which connects users to use systems ,resources and other IT services locally
- Wide Area Network : Connects ECX Branches offices and trading centres to the central Datacentre in order to access corporate IT resources and Business Application

ECX leased Data Line and internet services both wired and wireless service, from Ethio telecom for connectivity among its Datacentre, Branch offices and trading centres.

The smooth running of ECX Network system is mandatory as any interruption to the network system leads to the interruption of trading, warehouse, Clearing and settlement and other activities as the exchange system is highly dependent on Information technology services.

4.5.2.3 ECX DATA MANAGEMENT SYSTEM,

Question No 5 What type of Databases do you use for storing data? How do you perform Data mining activities? What type of computer systems used by ECX to disseminate Data?

Response:

A database management system (DBMS) is a software package designed to define, manipulate, retrieve and manage data in a database. A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data. A DBMS relieves users of framing programs for data maintenance. Fourth-generation query languages, such as SQL, are used along with the DBMS package to interact with a database. Proper database management

systems help increase organizational accessibility to data, which in turn helps the end users share the data quickly and effectively across the organization.

A management system helps get quick solutions to database queries, thus making data access faster and more accurate.Ethiopia commodity exchange uses MySQL and SQL Server for its Data management system. A DBMS always provides data independence. Any change in storage mechanism and formats are performed without modifying the entire application.

In Ethiopia commodity exchange daily traded commodities data ,market price dissemination data, membership data , warehouse data ,clearing and settlement data , Human resource data , customer relationship data , Finance data and other business Applications data are stored in MySQL and SQL server.

The smooth running of ECX database is mandatory as any interruption to the database leads to the interruption of trading, warehouse, Clearing and settlement and other activities of the exchange because the exchange system is highly dependent on Information technology services.

4.5.2.4 ECX COMPUTER SYSTEM

A computer system allows users to input, manipulate and store data. Computer systems typically include a computer, monitor, keyboard, mouse and other optional components. All of these components also can be integrated into all-in-one units, such as laptop computers.

At the time of this study in Ethiopia commodity exchange uses computers at its trading centres, Branch offices and other offices to access corporate resources and business application. Traders (buyers and sellers) use computers which are installed and configured to access the Electronic trading application in the trading centres.

The malfunction of these computers during trading period interrupts the trading activity of Buyer or seller as there is only specific trading period for one commodity contract.

Ethiopia commodity exchange uses price tickers, Kiosks and LED TV to Display real time market price information for traders. Traders might not get real time market price data during the interruption of these systems.

4.5.2.5 BUSINESS APPLICATION OF ETHIOPIA COMMODITY EXCHANGE

Question No 6 Would you mention the number, Function and list of major Application ECX uses for its business activities? What is the scalability, flexibility, user friendly, manageability and other characteristics of the Applications? What type of Information and communication technology services ECX uses to conduct trading activities?

Response :

Business Application is software that is used for business purposes. The term is often used more specifically for software that helps a business to accomplish specific goals through the applied principles that the software supports.

Ethiopia commodity exchange Develops in house and outsourced different Applications for internal and external use. Some of the in house developed business applications and its usage are:

Trading Platform: The main part of this system is the trade engine. The trade engine contains order management, session control, matching engine, and trade executor. There are three systems that work with the trade engine. The outcry system is used by entering ticket that buyer and seller agreed and send it to the trade engine to process and execute. The e-Trade system is used by letting the members enter their orders to the trade engine for processing, matching, and execution. The e-Auction system is used by letting the members enter their orders send it to its e-Auction engine for processing and matching and send it to the trade engine for further processing and execution. Traders should trained and pass the exam on this application before allowed to trading using this plat form.

Electronic trading Application: it is application system which is developed by internal ECX developers and the main function is to conduct buying and selling of specific commodities electronically.

E-Auction Application System: it is application system which is developed by internal ECX developers and the main function is to conduct buying and selling of specific commodities electronically

Membership Application system: it is also developed internally to register member /traders /clients information. This system used to register members, clients, agreement, license, tax status etc. It is a web based ASP.NET with backend SQL Server system.

Central depository Application System: it is also developed internally to manipulate deposited commodities this system is used to manage Warehouse Receipt and Pick up Notice. It is a web based ASP.NET with backend SQL Server system..

Warehouse Application system: it is also developed internally to register arrival of commodities, to electronically create good receiving notice, Good issuance Notice, pick up notice, to register commodity grading results. This system is used to manage the deposit and delivery of commodity. It is a web based ASP.NET with backend SQL Server system.

Clearing and settlement system: it is also developed internally and used for clearing and settlement activities with different banks electronically. This system is used to clear (Calculate the trade value, tax, fee etc.) and settle (based on the total generated by clearing process, it produce bank instruction to transfer fund between buyer and seller and between banks) daily trades.

Web site: it is developed internally and used for displaying news, market data information and other online.

And ECX outsourced SMS, IVR, CRM, Finance, HRIS, and Helpdesk Application systems

The smooth running of ECX Business Application system is mandatory as any interruption to the Business Applications lead to the interruption of trading, warehouse, Clearing and settlement and other activities of the exchange because the exchange system is highly dependent on Information technology services.

4.5.3 MARKET PRICE DISSEMINATION TOOLS

Question No 7 What type of Information and communication technology services ECX uses to disseminate market data information?

Response:

Market participants in Ethiopia now have access to reliable market data through various sources provided by the exchange, including a mobile push service that delivers up-to-date daily market information to farmers and agro-processors via text message and interactive voice response services offered in Amharic, Oromoiffa, Tigrigna, and English. The establishment of the ECX has contributed to a substantial improvement in the information infrastructure for commodities traded at the exchange: traders can now receive market information via SMS, Interactive Voice Response, Internet, other media (radio, television

and newspaper), or via electronic tickers placed in rural markets that display real time prices of all commodities traded on the platform. The exchange is associated with a comprehensive system for disseminating information about market prices to more peripheral regional markets in the country.

The Exchange information and technology department outsourced and in-house developed Applications and Set up IT infrastructure to provide the market Dissemination tools.

4.5.4 WAREHOUSES, CLEARING AND SETTLMENT, TRADING CENTRES

Question No 8 would you mention briefly end to end process of warehouses, clearing and settlement activities and operation of trading centre? What is the contribution of IT in these business processes?

Response:

The warehouses provide services in terms of information, storing facilities and quality controls. More specifically, the availability of ECX warehouses in surplus areas implies that commodities are now controlled, graded and stored locally until they have been sold through an electronic system in Addis Abeba. This implies that traded commodities no longer need to be brought to the auctions centres in Addis Abeba or Dire Dawa for sales. In an attempt to shorten the supply chain, primary transaction centres have been established as designated trading places where smallholder producers and cooperatives on the one hand and coffee suppliers (agrabies) on the other hand trade red cherry and sun dried coffee. When the ECX was initiated in April 2008, just one warehouse was in use. However, this figure quickly rose to include 24 warehouses location during this research study.

ECX has a comprehensive legal framework and an advanced system for clearing and settlement of contracts in order to guarantee payment and delivery, for example by requiring all trading members to have prepaid credit accounts. Buyers start the business process by depositing money in Pay-In account and end with commodity pick up at warehouse, and Sellers start operation by depositing the commodity in warehouse and ends up when the sales proceed credited in their account. The following table shows the Full Transaction of ECX trading activities.

Clearing and settlement Division performs the following major activities using information technology services

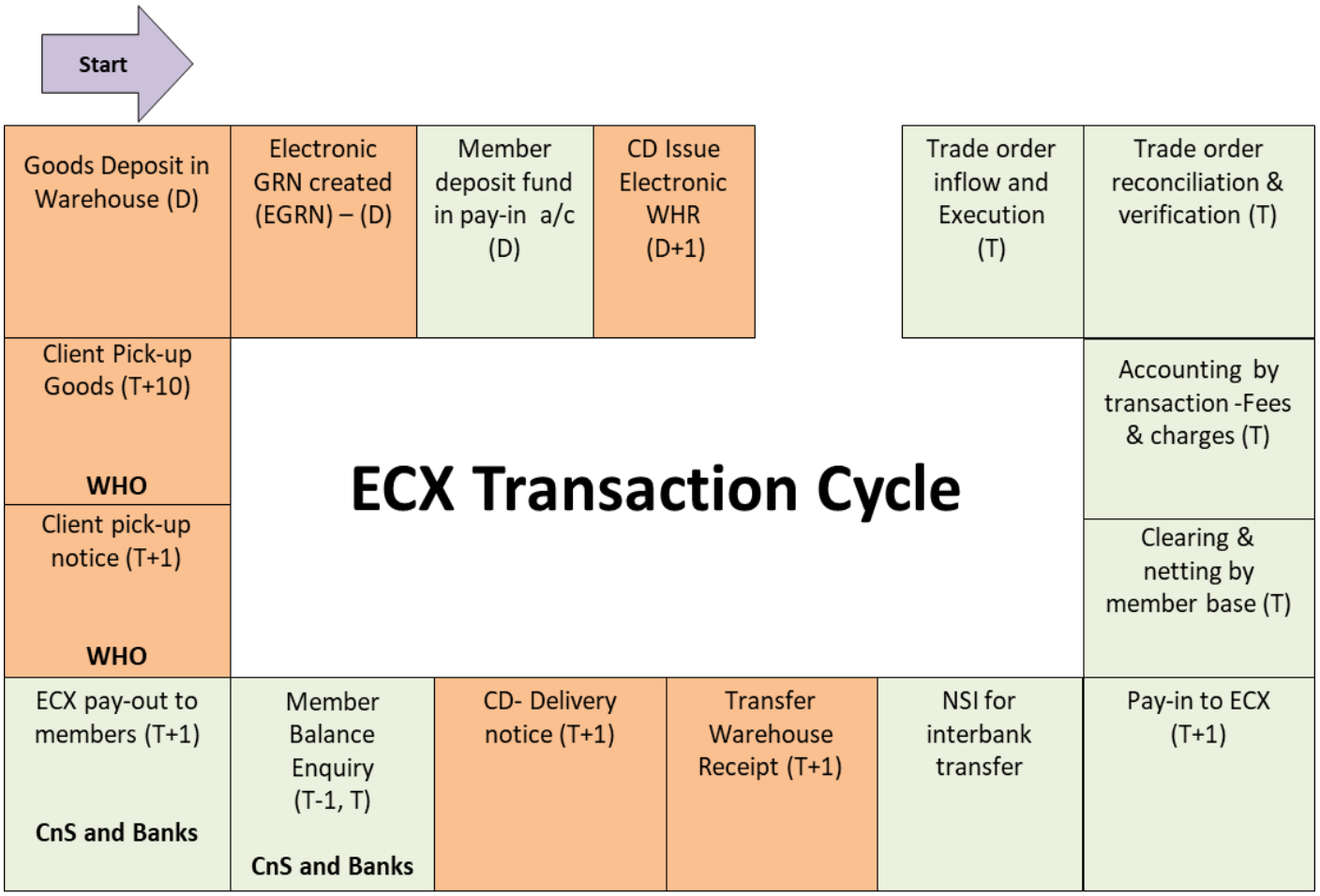
- **Clearing**
  - Establish who owes, what, how much, to whom on a member and client net basis
  - Tell the members their **net** cash obligation/rights

- **Settlement**
  - Transfer of cash funds-Banks
  - Transfer of commodity ownership (Title Transfer)

ECX clearing and settlement Division communicates with different Banks using Web based application system, Email with a VPN connectivity with each Banks. The exchange's secured payment system is digitally linked to the warehouse operator, financial institutions, tax administration agency, and more than 16,000 traders. The exchange's clearinghouse has cleared more than $6 billion worth of transactions so far without default.

Ethiopia's exchange is also expanding its activities throughout the country's major agriculture producing areas. The goal is to open more trading centres in order to increase liquidity and accessibility to both commercial and smallholder farmers. The exchange's second trading centre, built in Hawassa, Began operations by the end of 2017 and third trading centre in Humera has started operation in February 2019.there is also a plan to start trading centres in Gondar, Nekempte and Jimma by the year 2020. The exchange's trades are now made electronically. At the time of this study the number of Branches which mainly provide warehouse and quality services increases to 24 including the recently opened Metu Branch and there is also a plan to open the 25 Branch in Tepi by the end of 2019.

Figure 4. 1 ECX Transaction Cycle



4.5.5 CHALLENGES OF INFORMATION AND TECHNOLOGY SERVICES

Question No 9 Do you frequently face interruption of IT system? If so, how do you manage it? What are the challenges of ICT SERVICES?

The following are the Major challenges faced by Information and technology department

- High turnover rate of staffs due to very low salary and other benefit schemes
- Frequent interruption of Telecom services
- Unavailability of telecom services in some areas
- Power outage and Fluctuation
- Unavailability of power in some areas
- Rapid changing of technology
- Delay in internal procurement process for purchasing of new items and services
- Outdated software system and old IT infrastructure
- Lack of spare items

- Lack service providers for some services
- Frequent business requirement change
- Frequent change of trading Models
- Unknown errors in the business Application
- Lack of proper documentation

4.5.6 VOLUME OF TRADED COMMODITIES

The following table s shows the Type, volume and value of traded commodities since ECX establishment. The Data had been provided by ECX information communication and technology Department.

Table 4. 23 Volume of traded commodities by each year

Year	2008	2009	2010	2011	2013
Commodity	Total Volume in Ton	Total Volume in Ton	Total Volume in Ton	Total Volume in Ton	Total Volume in Ton
Coffee	4,138	170,359	268,926	188,627	255,132
Green Mung Bean					
Haricot Beans				24,143	80,030
Maize	985	20	5,257	1,829	379
Pea Beans	575		18,179	19,267	
Sesame		335	64,641	249,355	310,204
Soya Beans					
Wheat	675		5		
Grand Total	**6,373**	**170,714**	**357,007**	**483,221**	**645,745**

Year	2014	2015	2016	2017	2018
Commodity	Total Volume in Ton	Total Volume in Ton	Total Volume in Ton	Total Volume in Ton	Total Volume in Ton
Coffee	242,652	252,886	253,025	319,399	313,180
Green Mung Bean	146		20	441	7,742
Haricot Beans	50,747	41,435	38,073	33,636	53,406
Maize					
Pea Beans					
Sesame	281,974	333,216	378,758	319,504	331,613
Soya Beans					

Wheat	40				
Grand Total	**575,559**	**627,537**	**669,877**	**672,980**	**705,941**

The secondary data shown in Table 4.23 shows the Volume of traded commodities for last 10 years and the data shows increment in volume of traded commodities.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

The basic intent of this chapter was to present the overall overviews of the research by summing up the main findings of the analysis part and give future research directions. Accordingly, the chapter starts with its discussion by briefly sum up the overviews of the study and its main findings. The previous chapter presented the analysis of the findings and discussions of the study. The purpose of this chapter is to discuss the summary of findings, conclusions and recommendations. Accordingly, the chapter is organized in three sections, the first section presents the summary of findings, the second section presents the conclusions and the third section presents the recommendations provided based on the findings of the study.

The main purpose of this study was to assess the effect of information and communication technology on performance of trading in case of Ethiopia Commodity exchange. The following section provides summary of results obtained from the analysis made on both qualitative and quantitative research method used: the summary of the findings were presented as per the research question

Research question 1: Does ECX information and communication technology service helps Traders in easily accessing trading platform and commodity market Price?

- Members and clients of the Exchange are able to get real time market information using SMS and IVR systems easily. The Volume disseminated Market data information increases after the usage of information technology services. LED TV and Price displays are also other Means of Market Data dissemination systems.

Research question 2: To what Extent the usage of information and communication technology is crucial to ECX end to end trading process?

- The core functions of Ethiopia commodity Exchange are Trading, warehouse operation and clearing and settlement operation which work interdependently among each other. Ethiopia commodity exchange generates its main income from trading fee which is 0.4% of the trading/transaction value payable by sellers and buyers, handling and product certification fee which 3.50 birr per bag from both buyers and sellers and warehouse storage charge o.16 birr per bag per day. In addition ECX generated income from Market data dissemination system and E-trading Application training fees. Ethiopia commodity exchange is highly dependent on information and communication technology services to smoothly, accurately, efficiently and effectively run its day to day core functions and other Transactions.

- The average descriptive statistics for trading performance (dependent variable) result showed that, the mean score was above the midpoint (3.00) of the Likert scale which was 4.31. This respondents 'overall rating came from the following variables namely: Volume of Traded commodity , Traders satisfaction, Market price information Accessibility and Trading efficiency
- The results of the descriptive statistics of the independent variables showed that, the mean scores, and Network system and computer system were 4.38 and 4.36 which were the highest and second highest ratings respectively. The mean score of Data Base management system and E-trading Application was also above the mid-point rating with values of 4.2 and 4.21 respectively.
- The correlation matrix indicates that the four independent variables were positively correlated with trading performance. Trading performance is significantly positively correlated with Data management system with correlation value (r Value) of .775 with significance value of .000(P value). Trading performance is significantly positively correlated with Network System with correlation value (r Value) of .780 with significance value of .000(P value). Similarly, trading performance is significantly positively correlated with computer system with correlation value (r Value) of .643 with significance value of .000(P value).Trading performance is also moderately positively correlated with Electronic trading Application system with correlation value (r Value) of .519 with significance value of .000(P value)
- The regression model summary (R = 0.759) indicated that the linear combination of the four independent variables (data management system, Electronic Trading application, Computer system and Network system) strongly predict the dependent variable (trading performance). 75.9 % of variation in trading performance is due to the independent variables which are data management system, Electronic Trading application, Computer system and Network system. 24.1 % are other factors which are not mentioned with in this research
- The other major finding of the regression analysis result was that the four independent variables (data management system, Electronic Trading application, Computer system and Network system) influenced trading performance of ECX significantly at 95% confidence interval with a sig. value of 0.000, 0.008, 0.000 and 0.000 respectively. Accordingly, the study model fit regression equation became **TP = 0.553 + 0.115*ETA + 0.149 *CS + 0.302*NS + 0.308*DBMS**
- From the regression output the information and communication technology variables under this study have a significant relationship with performance of trading in Ethiopia commodity exchange statistically.

Research question 3: What is the effect of information and communication technology service in improving Volume of commodity being traded by Traders?

- Usage of Information and communication Technology service enhances the Volume of Traded commodities with in the exchange, efficiency of warehouse and clearing and settlement activities, the accessibility of Trading centres, dissemination of Market price information and satisfaction level of customers.
- Information and communication technology services benefit the introduction of new type of commodities to be easily traded within the exchange platform.

Research question 4: What is the satisfaction level of Members and Traders in Trading using ECX Information and communication technology trading platform?

- Information and communication technology services enable the exchange to establish more trading centres other than Addis Ababa. The trading centres which are established in Hawassa and Humera are functioning similar to Addis Ababa Trading centre because of the well-established IT infrastructure and Network connectivity and accessibility of trading Application in real time manner. More traders can be involved in using these trading centres and the traders will not miss trading sessions if they travel to these areas by chance.
- Members and traders showed high interest in usage of ECX trading information and communication technology platforms.

Research question 5: Does ECX information technology service improve the warehousing and clearing & settlement efficiency?

- Information and communication technology enhances the reliability accuracy, and efficiency of clearing and settlement activities in which the Exchange easily conduct clearing and settlement transactions without default using secured connectivity among Fifteen Large commercial Banks in Ethiopia.
- Information and communication technology services enhances the efficiency ,accuracy and reliability of warehouses in terms of volume of deposited Commodities , Logistics , expansion and accessibility to the market stakeholders.

The following were also additional findings of the study

- Most of the Business Applications including Electronic trading application is developed by using internal staffs.
- Currently, ECX uses old and obsolete technologies for its IT infrastructure and Business Application.

- Frequent interruption of Telecom services, Unavailability of telecom services in some areas, Power outage and Fluctuation, Unavailability of power in some areas are some of major challenges in usage of information and communication technology services in in Ethiopia commodity exchange. High turnover rate of information and technology staffs, lack of competitive salary scale to attract skilled Information and technology professionals are the other challenges of information technology department.

5.1 CONCLUSIONS

This study investigates the effect of information and communication technology on performance of trading in case of Ethiopia Commodity exchange. Ethiopia commodity exchange has its own Information and communication Department to manage IT infrastructure and Application services. The exchange activities are highly dependent on information and communication technology services.

The study found that Ethiopia commodity exchange uses information and communication technology services to a large extent and information and communication technology has significant relationship with the performance of Trading. The information technology variables used in this research E-trading Application, Network system and Data base management system has positive significant effect on trading efficiency , volume of traded commodities , Market Data dissemination efficiency , warehouse efficiency and accessibility , Volume of deposited commodities, Accessibility of trading centres ,customer satisfaction and clearing and settlement efficiency.

Frequent Application system interruption during trading session leads to traders and other user's dissatisfaction and also frequent power and telecommunication service interruption leads system failure that directly leads to customer dissatisfaction.

Finally, the study confirmed the existence of a positive and significant relationship between information technology and trading performance.

5.2 RECOMMENDATIONS

The following are major recommendation provided by the researcher based on the Findings of this study

- Information and communication technology is the backbone of ECX operation and ECX business processes cannot run efficiently, accurately and effectively without the usage of Information and communication technology services , therefore ECX management and other government bodies should consider IT as one of their core functions.

- In order to improve the performance of trading functionality more investment in information and communication technology services should be applied.

- Ethiopia commodity exchange should adopt best IT service management practices to effectively and efficiently manage IT resources and projects.IT Incident, problem, change and knowledge management systems should be in place.

- Ethiopia commodity exchange should work on different benefit packages to minimize IT Staffs turnover rate and to attract Skilled IT staffs from the market

- Ethiopia commodity exchange should consider outsourcing of Business application development and usage of Cloud technology in the future.

- Ethiopia commodity exchange should have business continuity plan for its information and communication technology services in order to sustain its Business operation. IT disaster recovery site should be functional.

- Ethiopia commodity exchange information technology services should be designed by considering future scalability, flexibility, security and performance.

- The currently deployed technologies for Application software, Database, Network system, Data centre and other information and communication technology services needs to upgraded to latest versions in order to increase maintainability, scalability, security ,flexibility, performance ,efficiency and customers satisfaction.

- In order to increase the satisfaction of level of Traders, Ethiopia commodity exchange should enhance the functionality of its E-trading Application by fully accommodating the requirements of users and permanently solve frequently occurring system Incidents. The application system should use latest technologies. The e-trading platform needs improvement.
- Most of the Price displays which are erected in different regions of Ethiopia are not functioning and use outdated Technology therefore it is advisable to use other means of Market data dissemination tools by replacing them.

- All the factors that lead to the interruption of information and communication technology services should be clearly identified and should get solution as fast as possible. Usage of redundant telecom services to mitigate data line and internet connectivity interruption, usage of generator and solar technologies to mitigate power outage and fluctuation is important for smooth operation of the exchange Business activities.

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5.3 Areas for further research

Due to constraint in time and scope the researcher used and focused only on Employee and Traders of Ethiopia commodity exchange. Further study can be done on effect of information and communication technology on performance of farmer's who are engaged in producing Agricultural commodities which are traded using Ethiopia commodity exchange Platforms. ICT effect on Supply chain of the agricultural commodities in Ethiopia is another area of research to be studied further.

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APPENDICES

Appendix A:

St. Mary University

School of Graduate Studies

Faculty of Business Administration

Research Questionnaire (For Ethiopia Commodity Exchange Staffs only)

Dear Respondent,

My name is Kumssa Cherinet; I am Graduating this year with Master in business Administration.

This questionnaire is designed to study "**EFFECT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON TRADING PERFORMANCE: A CASE STUDY IN ETHIOPIA COMMODITY EXCHANGE"** as a requirement for the partial fulfilment for the award of Masters of Business Administration at St. Mary's University. Information received from you would be used for my own academic purposes and treated with confidentiality. Hence, I would kindly request you to respond to the subsequent questions. Your co-operation in providing your honest reflection will be very much appreciated

THANK YOU FOR YOUR ASSISTANCE!

General Guidelines

- **Please put "√" for your choice in the box provided.**
- **Open- ended questions are answered by writing on the space provided. If the space is not sufficient, please use the back page of the questionnaire.**

i. General Information

1. General Information

1.1 Your gender: ☐ Male Female ☐

1.2 What is your age category?

☐ Below 25 yrs ☐ 25 – 35 yrs ☐ 36 – 45yrs

☐ 55yrs ☐ 56 and above

1.3 Your marital status: ☐ Married ☐ Single ☐ Divorced ☐ Widowed

1.4 Your education level:

☐ Diploma ☐ First Degree ☐ Master's Degree ☐ PHD

1.5 Please Indicate your years of experience in Ethiopia commodity exchange

☐ 1-3 Years ☐ 7- 10 Years

☐ 4-6 Years ☐ >10 years

1.6 Please indicate your position in Ethiopia Commodity Exchange

☐ **CEO** ☐ **Officer** ☐ **Specialist**

☐ **D/CEO** ☐ **Manager** ☐ **Associate**

Any Other, Please specify _____

ii. Information and communication technology in ECX

2. **Are you frequent user of information and communication technology services?**

   ☐ **Yes** ☐ **No**

3. **What type of information and communication technology services are used by ECX?**

☐ **Business Application /Software's (Trading Application, CRM, ERP, and any other in house developed or outsourced Applications)**

☐ **computer System (Desktop computers ,Laptops, Price displays ,Copiers ,printers ,Scanners ,LED TV ,Mobile phones , Kiosks , servers ,Router ,Switch, Datacentre Equipment's ,Tablets and any other IT items)**

☐ **Networking (Local and Wide Area network, VPN, ADSL, EVDO and any other telecommunication Infrastructure)**

☐ **SMS system** ☐ **Telephone (PABX)** ☐ **Website**

☐ **Database** ☐ **IVR system**

☐ **Internet** ☐ **Email System**

Any other, please specify _____

iii. Effect of Information and communication technology on trading performance

Please rate the following statements by ticking („√") against its corresponding lines.

No	Information and communication technology	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Electronic trading Application						
1.	The E-trading/Auction Application enhances the efficiency of ECX trading activities					
2.	The E-trading/Auction application is easily scalable to accommodate new commodities into ECX					
3.	The E-trading/Auction application is easy to use and has user friendly interface					
4.	The volume of traded commodities					

	increase after the usage of e-trading/Auction application					
5.	**The traders are interested in using E-trading /Auction Application**					
6.	**The e-trading /Auction system enables easily accessibility of trading platform**					
7.	**The e-Trade /Auction application works with minimum interruption**					
8.	**The interruption in E-trade/auction Application affects the trading performance**					
Computer System						
9.	**The computer system increases the efficiency of trading Activities in ECX**					
10.	**The computer system helps to easily disseminate market data information**					
11.	**Traders are interested in using computer system of ECX**					
12.	**The computer system interruption greatly affects the performance of trading and warehouse services**					
Network Infrastructure						
13.	**It is not possible to trade without availability of Network system**					
14.	**The Network system helps traders to trade from regional trading centres.**					
15.	**The Network system helps Branch offices to easily communicate with HO.**					
16.	**ECX network system helps to connect to different Banks**					
17.	**ECX network system helps to transfer real time pay in and pay out information**					
18.	**Connectivity to Branch and regional trading centres will not be possible without established network system of ECX**					
19.	**The efficiency of warehouse and clearing and settlement services system decrease during network system interruption**					
20.	**The efficiency of warehouse system decreases during Application system interruption**					

21.	**The network system helps warehouses to access other Information technology services**					
Data Management System						
22.	**SMS system helps to get real time access to Market Data Information**					
23.	**Data can easily be retrieved from ECX Databases for decision support system.**					
24.	**IVR system helps to get real time access to Market Data Information**					
25.	**Price display system helps to get real time access to Market Data Information**					
26.	**ECX Data management System helps me in easily retrieving different reports**					
Trading Performance						
27.	**ECX Information and communication services helps to increase the number of warehouses**					
28.	**ECX Information and communication technology services enhances the Accessibility of Market price**					
29.	**ECX Information and communication technology services helps in easily accessibility and number of trading centres**					
30.	**ECX information and communication technology enables me to easily get Data**					
31.	**ECX information and communication technology enhances the reliability accuracy, and efficiency of clearing and settlement activities**					
32.	**ECX information and communication technology helps to increases The volume of disseminated data**					
33.	**ECX information and communication technology helps to enhance the Efficiency, reliability and accuracy of ECX transactions**					
34.	**ECX business transaction are highly dependent on Information**					

	and communication technology					
35.	**Information and communication technology services enhances the performance of Trading**					
36	**ECX information and communication technology enables to trade and deposit more volume of commodity**					
37	**ECX information and communication technology enhances the reliability accuracy, and efficiency of clearing and settlement activities**					
38	**ECX information and communication technology helps to increases The volume of disseminated data**					
39	**ECX information and communication technology helps to enhance the Efficiency, reliability and accuracy of ECX transactions**					
40	**ECX business transaction are highly dependent on Information and communication technology**					

Appendix B

Research Interview Guide (For the Ethiopia Commodity Exchange Information technology and operation department)

St. Mary University

School of Graduate Studies

Faculty of Business Administration

Dear Respondent,

This interview questionnaire is designed to study "**EFFECT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON TRADING PERFORMANCE: A CASE STUDY IN ETHIOPIA COMMODITY EXCHANGE"** as a requirement for the partial fulfilment for the award of Masters of Business Administration at St. Mary's University. Information received from you would be used for my own academic purposes and treated with confidentiality. Hence, I would kindly request you to respond to the subsequent questions. Your co-operation in providing your honest reflection will be very much appreciated

THANK YOU FOR YOUR ASSISTANCE!

1. **What are the major Objectives of Information and communication technology (ICT/IT) department? How much is the dependence of ECX business process on information and communication technology services? How is the structure of the Information and communication technology department Organized?**
2. **How is the structure of the Information and communication technology department Organized?**
3. **Does ECX have its own Datacentre? If yes, how do you manage it, what type of IT equipment's managed within the datacentre? Does ECX have its own Datacentre? If yes, how do you manage it, what type of IT equipment's managed within the datacentre?**
4. **How is connectivity with Branch offices, trading centres and other stakeholders managed?**
5. **What type of Databases do you use for storing data? How do you perform Data mining activities? What type of computer systems used by ECX to disseminate Data?**
6. **Would you mention the number, Function and list of major Application ECX uses for its business activities? What is the scalability, flexibility, user friendly, manageability and other characteristics of the Applications? What type of Information and communication technology services ECX uses to conduct trading activities?**
7. **What type of Information and communication technology services ECX uses to disseminate market data information?**
8. **Would you mention briefly end to end process of warehouses, clearing and settlement activities and operation of trading centre? What is the contribution of ICT in these business processes?**
9. **Do you frequently face interruption of IT system? If so, how do you manage it? What are the challenges of ICT SERVICES? What are the major Information and communication technology services provided by your department?**

ለኢትዮጵያ ምርት ገበያ ተገበያዮች የተዘጋጀ መጠይቅ

ውድ መላሻችን

ስሜ ኩምሳ ቸርነት ይባላል በቢዝነስ አድሚኒስትሬሽን የሁለተኛ ዲግሪዬን በቅድስት ማርያም ዩኒቨርሲቲ የምከታተል ስሆን የመመረቂያ ምርምር ፅሁፌን የኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂን በኢትዮጵያ ምርት ገበያ ግብይት ስርአት ላይ መጠቀማችን ያስከተለውን/የሚያስከተለውን ውጤት በሚል ርዕስ እየሰራሁ እገኛለሁ ለዚህም ምርምር ግብአት ይሆነኝ ዘንድ ይህን መጠይቅ አዘጋጅቻለሁ እናም ከዚህ በታች ላሉትን ጥያቄዎች መልስ እንድትሰጡኝ በትህትና እጠይቃለሁ የምትሰጡትንም ምላሽ ከዚህ የምርምር ስራ በስተቀር ለምንም አይነት አገልግሎት እንደማይውልና በሚስጥር እንደሚቀመጥ ማስገንዘብ ፈልጋለሁ

ለምታደርጉልኝ ማንኛውም አይነት ትብብር ምስጋና አቀርባለሁ

መጠይቁን ለመመሙላት የሚከተሉትን መመሪያዎች ይከተሉ

ለጥያቄዎቹ ምላሽ ሲሰጡ ሳጥኖቹ ውስጥ "√" ምልክትን ያስቀምጡ

ማብራሪያ ለሚፈልጉ ጥያቄዎች ከጥያቄው ቀጥሎ በተቀመጠው ክፍት ቦታ ላይ መልስዎን ይጻፉ ቦታው ካልበቃዎት ከጀርባ ያለውን ክፍት ቦታ ለመልስዎ ይጠቀሙ

አጠቃላይ መረጃ

ፆታ ☐ ወንድ ☐ ሴት

የእድሜ ክልል ☐ ከ25 በታች ☐ 35-44 ☐ 36 - 45

☐ 46- 55 ☐ 56 እና ከዚያ በላይ

የትዳር ሁኔታ ☐ ያገባ/ች ☐ ያላገባ/ች ☐ የፈታ/ች
☐ ያገባት/ችው የሞተችበት/ባት

የትምህርት ደረጃ ☐ ሁለተኛ ደረጃ ☐ ዲፕሎማ ☐ የመጀመሪያ ዲግሪ

☐ ሁለተኛ ዲግሪ ☐ ሶስተኛ ዲግሪ

ከተጠቀሱት ውጭ————————

በኢትዬጵያ ምርት ገበያ ውስጥ በመገበያየት ምን ያህል ጊዜ ቆይተዋል ?

☐ 1 -3 ዓመት ☐ 4 -6 ዓመት ☐ 7 - 10 ዓመት ☐ ከ 10 በላይ

በኢትዬጵያ ምርት ገበያ ሲገበያዩ መደብዎት የትኛው ነው?

☐ ሻጭ ☐ ገዢ ☐ ሁለቱም ከተጠቀሱት ውጭ————————

በኢትዬጵያ ምርት ገበያ ሲገበያዩ የሚሸጡት ወይም የሚገዙት ምርት የቱ ነው?

☐ ቡና ☐ ሰሊጥ ☐ ሽምብራ ☐ አኩሪ አተር ☐ ቦለቄ

☐ ማሾ ☐ በቆሎ ከተጠቀሱት ውጭ——

የኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂን በኢትዮጵያ ምርት ገበያ

የኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂን አገልግሎት ተጠቃሚ ኖት?

☐ አዎ ☐ አይ

በኢትዬጵያ ምርት ገበያ ለመገበያየት የትኛውን የኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂን አገልግሎት ይጠቀማሉ?

☐ ለግብይት አገልግሎት ሲባል የበለፀጉ ሶፍትዌሮችን

☐ የተለያዩ የኮምፒውተር አይነቶች (ዴስክቶፕ ላፕቶፕ ታብሌት ኪዮስክ ወዘተ)

☐ የኔትዎርክ አገልግሎት (ኢቪዶ ቪፒን ኤዲኤሴል ወዘተ)

☐ አጭር የጽሁፍ መልእክት ☐ ☐ የመረጃ ቋት ኢንተርኔት

☐ ስልክ (ፒቢኤክስ) ☐ አይ ቪር ☐ ዊብ ሳይት ☐ ኢሜል

ከተጠቀሱት ውጭ————————

የኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂን አገልግሎትን መጠቀም በግብይት ላይ ያመጣው ለውጥ

ለጥያቄዎቹ ምላሽ ሲሰጡ ሳጥኖቹ ውስጥ "√" ምልክትን ይጠቀሙ

ተ.ቁ	የኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂ አገልግሎት	በጣም እስማማለሁ	እስማማለሁ	ገለልተኛ	አልስማማም	በጣም አልስማማም
የኤሌክትሮኒክ የግብይት ሲስተም						
1	የኤሌክትሮኒክ የግብይት ሲስተም ለአጠቃቀም ይመቻል					
2	የኤሌክትሮኒክ የግብይት ሲስተም ብዙ እንድገዛ/እንድሸጥ አስችሎኛል					
3	የኤሌክትሮኒክ የግብይት ሲስተም በመጠቀሜ ደስተኛ ነኝ					
4	የኤሌክትሮኒክ የግብይት ሲስተም በፈለኩት ቦታ ማግኘት እችላለሁ					
5	የኤሌክትሮኒክ የግብይት ሲስተም ብዙ የመቆራረጥ ችግር የለበትም					
6	የኤሌክትሮኒክ የግብይት ሲስተም ብዙ የመቆራረጥ ችግር ስላለበት የፈለግኩውን ያህል እንዳንገዛና እንዳንሸጥ አድርጎናል					
ኮምፒውተር ሲስተም						

1	የኮምፒውተር ሲስተሙ የግብይት ፍላጎታችንን ለማሟላት እገዛ ያደርግልናል					
2	የኮምፒውተር ሲስተሙ የግብይት መረጃን በቀላሉ ለማሰራጨት ያስችለናል					
3	የኮምፒውተር ሲስተሙ መቆራረጥ ለግብይታችን በፈለግነው መንገድ ቀልጣፋ ዕንዳይሆን አድርጎናል					
4	የኢትዬጵያ ምርት ገበያ ኮምፒውተር ሲስተም በመጠቀማችን በጣም ደስተኛ ኖት					
5	የኮምፒውተር ሲስተሙ መቆራረጥ በግብይት ላይ እና በመጋዘን ላይ የምናገኘውን አገልግሎት ጥራቱን ያልጠበቀ እንዲሁን አድርጎታል					
ኔትዎርክ ሲስተም						
1	የኔትዎርክ አገልግሎት ሳይኖር መገበያየት ይቻላል					
2	የኔትዎርክ አገልግሎት ከክልል የግብይት ማዕከላት መገበያየት እንዲችሉ አስችሎታል					
3	ከተለያዩ ባንኮች ጋር					

	ለመገናኘት የኔትዎርክ ሲስተሙ ጥሩ ግልጋሎት እየሰጠ ይገኛል					
4	የኔትዎርክ ሲስተሙ ከባንኮች ጋር የፔይ ኢን እና ፔይ አውት ትዕዛዞችን ከባንኮች ጋር ለመለዋወጥ አስችሏል					
5	የኔትዎርክ ሲስተም መቆራረጥ ምርትዎን መጋዘን ለማስቀመጥ ሲመጡ ችግር አልፈጠረም					
6	በመጋዘን አካባቢየኔትዎርክ እና አፕሊኬሽን መቆራረጥ ከምርት ገበያው በምናገኘው አገልግሎትላይ ለእንግልት ዳርጎናል					
7	የኔትዎርክ ሲስተሙ የኢትዮጵያ ምርት ገበያ በኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂ ዘርፍ ከሚሰጣቸው አገልግሎቶች በተጨማሪ ሌሎች አገልግሎቶችንም ለመስጠት አስችሎአል					
ዳታ ማናጅመንት ሲስተም						
1	የአሮጮር ጽሁፍ መልእክት አገልግሎት					

	ትኩስ የግብይት መረጃዎችን እንድናገኝ አስችሎናል					
2	የአይቪር ሲስተሙ ትኩስ የግብይት መረጃዎችን እንድናገኝ አስችሎናል					
3	የግብይት ዋጋ ማሰራጫ ሲስተሙ ትኩስ የግብይት መረጃዎችን እንድናገኝ አስችሎናል					
የግብይት ፐርፎማንስ (አፈፃፀም)						
4	የኢትዬጵያ ምርት ገበያ በኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂ ዘርፍ የሚሰጠው አገልግሎት በመጋዘኖች ላይ የሚሰጡን አገልግሎቶች በቀላሉ እንድናገኝ አስችሎናል					
5	የኢትዬጵያ ምርት ገበያ በኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂ ዘርፍ የሚሰጠው አገልግሎት ስለገበያ ዋጋ መረጃን በቀላሉ እንድናገኝ አስችሎናል					
6	የኢትዬጵያ ምርት ገበያ በኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂ ዘርፍ የሚሰጠው					

	አገልግሎት በተለያዩ የግብይት ማእከላት የሚሰጡ ግልጋሎቶችን በቀላሉ እንድናገኝ አስችሎናል					
7	የኢትዬጵያ ምርት ገበያ በኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂ ዘርፍ የሚሰጠው አገልግሎት በክፍያና ርክክብ ዘርፍ የሚሰጡ አገልግሎቶችን ተአማኒነትና ትክክለኛነት አረጋግጧል					
8	የኢትዬጵያ ምርት ገበያ በኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂ ዘርፍ የሚሰጠው አገልግሎት ገበያውን መሰረት አድርገው የሚሰራጩ መረጃዎችን በቀላሉ ለማግኘት አስችሎናል					
9	የኢትዬጵያ ምርት ገበያ በኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂ ዘርፍ የሚሰጠው አገልግሎት በአባላቱ የመግዛትና የመሸጥ ስርአት ውስጥ ቀልጣፋነትና					

	ተአማኒነትን አረጋግጧል					
10	የኢትዬጵያ ምርት ገበያ ቢዝነስ በኢንፎርሜሽን እና ኮሚዩኒኬሽን ቴክኖሎጂ ላይ የተመሰረተ ነው					