THE EFFECT OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) ON SUPPLY CHAIN PERFORMANCE OF THE BEVERAGE FIRMS IN ADDIS ABABA

BY: YARED TATEK

(GSE/7075/09)

A THESIS SUBMITTED TO THE SCHOOL OF COMMERCE ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

DEPARTMENT OFLOGISTICS ANDSUPPLY CHAIN

MANAGEMENT SCHOOL OFCOMMERCE

ADDIS ABABA UNIVERSITY

ADVISOR: MENGISTU BOGALE (PhD)

JUNE, 2019

ADDIS ABABA, ETHIOPIA

SCHOOLOF GRADUATE STUDIES

THE EFFECT OF INFORMATION COMMUNICATION TECHNOLOGY ON SUPPLY CHAIN PERFORMANCE OF THE BEVERAGE FIRMS IN AND AROUND ADDIS ABABA

BY: YARED TATEK

SCHOOLOFCOMMERCE

DEPARTMENTOF LOGISTICSAND SUPPLYCHAIN MANAGEMENT

APPROVEDBY THECOMMITTEEOFEXAMINERS:

1.	_____	_____	_____
	Department Head	Signature	Date
2.	_____	_____	_____
	Advisor	Signature	Date
3.	_____	_____	_____
	Internal Examiner	Signature	Date
4.	_____	_____	_____
	External Examiner	Signature	Date

DECLARATION

This is to certify that Yared Tatek has carried out this research work on the topic entitled the "effect of information communication technology on supply chain performance of the beverage firms in Addis Ababa" is my own I dare to say original research work that has not been produced by others in any other universities for any other requirements in any form. To this end I acknowledged all sources of information that I used to produce the study appropriately and perfectly.

Declared By: Name:

_____

Signature: _____

Date: _____

Confirmed By:

Advisor:

Name: _____

Signature _____

DEDICATION

Dedicate this work to my entire family, all my lecturers and classmate for their support, encouragement and patience during the entire period of my study and their continued prayers towards successful completion of my study.

ACKNOWLEDGEMENT

I remain grateful in gratitude to my supervisor Dr Mengistu Bogale whose support, advice, supervision, dedication and time have contributed to successful completion of my work, I also wish to express my sincere to my family and friends who has been my source of encouragement and support throughout my studies. Thanks, the almighty God for his guidance and wisdom which enabled me to undertake this project.

List of Tables

List of Acronyms

- **ICT**-Information communication technology
- SCM- Supply chain management
- SCPM-Supply chain performance Management
- VMI-Vender managed Inventory
- WMS-Warehouse Management System
- PMS -Performance Management system
- IMP-Industrial Marketing & Purchasing
- EBS-Enterprise Business support
- EDE-Electronic Data exchange
- ERP-Enterprise Resource Planning
- SAP-System Application Program
- DCM -Demand Chain Management
- CRM-customer R/ship Management
- RFID-Radio frequency Identification
- POS- post of sale
- WMS warehouse management system
- DRP- Distribution requirement planning
- IOS-Inter organizational system
- IMP-Industrial Marketing Purchase
- EBS -Enterprise Business System
- MRP- Material requirement planning

Contents

Abstract

The study investigated the effect of information communication technology (ICT) on the supply chain performance of beverage firms operating in and around Addis Ababa. The study employed Purposive sampling technique where by only five beverage firms are targeted which are homogenous in nature where by deeply explore the views of a group of respondents with same characteristic: Namely, *Meta Abo Brewery Sh.Co, Habesha Brewery Sh.Co, BGI Plc from Breweries and* East Africa *Bottling, Moha soft Drinks from soft drinks companies. As the case beverage firms of this study are expected implementing modern ICT in their operation and had been in the business longer time in and around Addis Ababa. The targeted respondents within each firm are ICT Manager, supply chain Manager, procurement Manager, Procurement officers, operation Manger who are engaged with supply chain function. Data were analyzed using the multi-regression Analysis. The study discovered that information communication technology has positive influence on supply chain performance of the beverage firms. It has been observed that the use of information communication technology improves supply chain performance as it enhances the efficiency of procurement and risk management. The study therefore recommends that deployment of ICT in supply chain is necessary and should therefore be encouraged because there are inherent advantages such as accuracy in forecasting during production scheduling, good business to business collaboration and effective management of risks. Therefore the beverage firms should build an effective information communication technology that can improve supply chain performance so as to response rapidly to unexpected demand of customers.*

Key words: information communication technology (ICT, supply chain performance.

CHAPTER ONE : INTRODUCTION

I was inspired to do this research the effect of ICT on supply chain performance because Supply chain management software is designed to manage and enhance the exchange of information of across various key supply chain partners to attain such outcomes as just-in-time procurement, reduction of inventory, increase of manufacturing efficiency and to meet customer needs in a timely fashion.

1.1 Background of the study

Global competition, new technology and increasing customer demand are pushing organization to reconsider how they can take advantage of information communication technology (ICT) capabilities to better manage their supply chain performance(Fasanghari, 2008). Businesses especially those in the **beverage sector** operate in a complex and competitive environment, characterized by changing conditions and highly unpredictable economic climate and information technology trends.

According to David Frderic Ross (2011)the deployment of information technology has become an absolute requirement for success in today's business environment. Several factors are driving this movement. First, firms have had to turn to computerized applications in order to deal with the gradually complex requirements of doing business in fast –paced global environment. Second, customers and suppliers have continued to demand rapid response and full information visibility, online, in real-time. Last, the integrative power of the internet is requiring supply chains to have the ability to rapidly transfer transaction information and marketplace intelligence from buyer to supplier.

(Soliman & Janz, 2004) describes Inter organizational information systems (IOIS) provide organizations with capabilities to improve linkages between trading partners along the supply chain. Electronic data interchange (EDI) is a traditional form of IOIS. EDI allows electronic communication of business information with trading partners across a company's borders: it permits organizations to generate electronic purchase orders, invoices, bills of lading, and a variety of other documents and sends the instantly to trading partners anywhere in the world.

Information exchange also enables managers in coordinating activities across the supply chain, speed up effective decision making, and facilitate firms to achieve common goals in the context of exchanging information between customers and suppliers, the quality of information is emphasized as it is an important component for organizational success. Information flow among the supply chain members may have a different reaction or effect on the different levels of supply chain. Organizations

in the upstream supply chain depend on the information provided by the downstream members to schedule production activities(Ramayah& Omar, 2010).

Information is a key supply chain driver because it serves as the superglue that allows the other supply chain drivers to work together with goal of creating an integrated coordinated supply chain. Without information, a manager cannot know what customer want, how much inventory is in stock, and when more products should be produced or shipped, in short, without information, a manager can only make decisions blindly. Therefore, information makes the supply chain visible to manager. With this visibility, a manager can make decisions to improve the supply chain's performance(*Sunil Chopra, Peter Meindl 2007*).

Supply chain consists of a network of partners and various channels operating throughout the organization which the supply chain of headquarters, and its management entails integrating activities through improving chain relationship in order to access stable competitive (Jayaram & Vickery, 2000)

(Pedro M. Reyes, 2005) describe the supply chain as a network of entities where companies must capture "moments of information ," in order for the linked companies to better respond to changes .Supply chain management is the management of all internal and external processes or functions to satisfy a customer's order(from raw materials through conversion and manufacturing through shipment).

Effective supply chain management is critical to ensure coordination and integration of material flows, information flows and financial flow in a network consisting of customers, suppliers' manufacturers and distributors. Researchers established that information flow is an essential mechanism o coordinate the activates of companies or processes in the supply chain. Information flow across the supply chain refers to the level of information sharing and quality of information exchange between members of the supply chain. Information sharing and information quality are recognized as key elements in supply chain management practices and in coordinating activities in the supply chain (Ramayah& Omar, 2010)

Information communication technology is essentially and governing term which encompasses any communication application or device such as cellular phones, television, computer software and

hardware, software satellite systems and so on in addition to their various application such as wireless communication and video conferencing (Jayaram & Vickery, 2000).

ICTs are all those electronics technologies that are capable of accepting data in forms such as texts, Voice, graphics, or videos for processing to produce information for decision making (Kim, 2006) also defines ICTs as technologies and tools that people use to share, distribute, and gather information to communicate one another, one to one or in groups, through the use of computers and interconnected net- works.

In its various forms, ICT affects many of the processes of business and how Individuals live, work and interact, and the quality of the natural and built environment. The use of technologies such as ERP systems, electronic payment systems and bar coding is on the rise as many companies seek ways to track their supply chain distributions (Gunasekaran, Patel, &McGaughey, 2004)

Besides, there has been a rapid development in the use of ICT in SCM and Manufacturing firms. Many organizations are adopting ICT solution in a range of operational areas. Such solution continues to provide new ways and opportunities in storage, processing, distribution and exchange of information within companies and with suppliers and customers across the supply chain. In SCM, ICT has been an important enabler of information sharing by eliminating the bullwhip –effect (Ravichandran, Lertwongsatien, &Lertwongsatien, 2005).

Therefore, the purpose of this paper is to investigate the effect of information communication technology (ICT) on the supply chain performance of the beverage firms in Ethiopia that consisting of 5 main dimensions (Procurement, Production scheduling, Inventory control business to business collaboration, and Risk Management)

1.2. Statement of the problem

A high attention and effort are paid to improve and excel the supply chain performance because it is one of the key indicators of organizational success, at the same time the deployment of ICT into the firm are not avoidable due to the fact that ICT helps firms to survive in a huge competition time(Bryan Jean, 2007)

In the dynamical competitive environment, many firms have adopted ICT in emerging supply chain trends in improving business performance. Considering the need for competitive advantage and

global competition, firms are adopting the latest ICT solutions in their operations (Brynjolfsson &Hitt, 2000)

According to the researcher observation a few years back there were only a few breweries operating in Ethiopia, like Meta Abo Brewery,BGI Plc, Bedela Brewery and Harer Brewery which was state owned by the government of Ethiopia and had major market share in Ethiopian beer market.

It was almost 6 years since the government of Ethiopian transferring the breweries to foreign multi-international companies, such as to Diageo Ethiopia which owned Meta Abo brewery with a total worth of USD 225ML, Heineken Brewery which owned Bedele and Harer Breweries with a Total worth of USD 78 and USD 68 ML respectively. Following this, in 2016 Habesha Breweries joined the beer market with attractive promotion aggressively and still has strong position in the market and the sector within a short period of time.

Above all, currently united beverage promoting Anbesa premium beer attractively to introducing in to the market to combat with existed breweries and to beat the competition and hold the bigger market share above another

Moreover, each and every brewery brewing non-Alcoholic beer independently, this had significance market share to soft drink and mineral water companies as the breweries producing substitute products. As an example, Harar Sofi & Malta gunnies brewed by Harar and Mata Brewery sh.co respectively and Bekeler &Neguse brewed by Heineken and Habersha Breweries sh.co respectively and have significant market share in non-alcohol drinks, such as soft& mineral water Drinks.

However, all these Breweries didn't meet customer requirement and are not responsive enough to customer request as the demand for beer are growing in Ethiopia. There are several concerns about for the success of these beverage firms in terms of fulfills customer demand, in particular late delivery and delivery of substandard products to customer.

Monczka,(2009)points that the main role of supply chain is to meet the consumer requirements through providing the customer with the right product, of right quality and quantity, from a right source, at a right price and finally utilizing the right technology. So that, from this perspective the beverage firms did not fill full customer requirements successfully.

Consequently, most of the beverage firms or breweries are investing a huge amount of money to implement ICT in their operating firms in order to stay competitive and provide effective service to their end customer.

Therefore, the reason why a researcher invested time and resource in carrying out this research in this field is to dig out the effect of ICT in enhancing supply chain performance in beverage firms

1.3. The Research Questions

The study seeking for to answer the following research questions: -

1. To what extent is ICT applied in supply chain Management of the beverage firms in and around Addis Ababa?
2. What is the effect of information communication technology (ICT) on the supply chain performance of the beverage firms' activities?
   - 2.1. What is the effect of information communication technology (ICT) on the supply chain performance of the beverage firms' Inventory management?
   - 2.2. What is the effect of information communication technology (ICT) on the supply chain performance of the beverage firms' operation performance?
   - 2.3. What is the effect of information communication technology (ICT) on the supply chain of the beverage firms' procurement?
   - 2.4. What is the effect of information communication technology (ICT) on the supply chain performance of the beverage firms' business to business collaboration?
   - 2.5. What is the effect of information communication technology (ICT) on the supply chain performance of the beverage firm's risk management?
3. To determine the challenges facing ICT deployment in the supply chain by the beverage firms

1.4. Research Objective

1.4.1 General Objective

To assess the level of ICT application in supply chain performance and analyze its effect on the main dimensions of the supply chain performance of Beverage firms in and around Addis Ababa.

1.4.2 Specific Objectives

The specific objectives of the research were as follows: -

i. To determine the extent to which ICT is applied in supply chain performance in beverage firms in and around Addis Ababa.
ii. To analyze the effect of ICT on the main dimensions of supply chain performance (firms' activities, procurement, operation performance, inventory management, Business to business collaboration and risk management.

iii. To determine the challenges facing ICT deployment in the supply chain by the beverage firms.

1.5 Significant of the study

This study will enable stakeholders to gain knowledge on importance of using information communication technology in driving businesses. The findings in this study will provide to supply chain managers with critical information on the need for ICT in enhancing the efficiency of their functional processes.

Beverage firms might use the study findings as an input to adjust its' policy and procedure on its ICT Practices and supply chain performance management. The study would enable to evaluate the benefits of implementing ICT solutions and the challenges arising thereof. The beverage firms would benefit from the improved efficiency in operations due to the deployment of ICT and also might contribute to the exiting literature through identifying the significance relationship between ICT and supply chain performance. Other researcher might use it as an input for further study and to investigate more in the area.

1.6 Scope of the study

The scope of this study is limited to the case of three brewery and two soft drink companies currently operating in and around Addis Ababa. The study is limited to only examining the effect of information communication technology (ICT) on supply chain performance that are consisting five dimensions (procurement, production scheduling, Inventory control, business to business collaboration and Risk management). The other dimension of the supply chain performance indicators such as firm size and location, transportation scheduling is out of the scope of this study

1.7. Limitation of the study

The study is not including all the beverage firms operating in Ethiopia but rather concentrated only in Beverage firms which are currently active and using ICT for their functional processes and located in and Around Addis Ababa (3 Breweries and 2 Soft drinks companies). The financial capacity and time constraint limit the researcher not to include other similar firms operating out of Addis Ababa. Time and firms' location can also be the researcher limitation as they are not perfectly much with the researcher appropriate and scheduled time against the researched firm working time.Therefore the

study investigated only the effect of ICT on supply chain performance on five beverage firms operating Addis Ababa and the findings generalized all the beverage firms operating all over in Ethiopia.

1.8 Organization of the study

The study was categorized into five chapters: Chapter one deals with the introduction part consisting of background of the study, statement of the problem, research questions, research objectives, scope of the study, limitation of the study and definition of terms. The second chapter discussed the review of related literature about the subject matter. In chapter three focused on research methodologies chapter four was contained data analysis interpretation and discussion of the result. Finally, chapter five was covered conclusions and recommendation.

1.9 Definition of terms

1.9.1 Information communication technology (ICT): -*The term" information communication technology (ICT)" means" the use of inter organizational systems for information sharing and /or processing across organizational boundaries "*(Fasanghari, 2008). *Also, Attaran (2003) defined (ICT) as the capabilities offered to organizations by computers, software applications, and telecommunications to deliver data, information, and knowledge to individuals and processes". ICT includes the application of hardware, software and networks to enhance information flow and facilitate the decision- making.*

1.9.2 Supply chain performance:-*Supply chain performance refers to the extended activities in meeting end-customer requirements, including product availability, on time delivery and all the necessary innovations, an capacity to deliver that performance in the supply chain in responsive manner (Hausman, 2004).Customer play an important role in the performance of supply chain, Lummus an Vokurka, (2001), is every action an activity in the supply chain is geared towards satisfying the customer effectively an and efficiently.*

CHAPTER TWO: REVIEW OF RELATED LITERATURE

Introduction

This chapter presents a review of studies that have been done in the past. The specific areas covered include the theoretical literature review, Empirical Literature Review and conceptual framework.

2.1 Theoretical Review

A theoretical framework can be defined as a collection of interrelated ideas based on theories. It is a reasoned set of prepositions which are derived and supported by data or evidence. This section provided the theoretical framework.

2.1.1 Information and communication technology

These days, Changes in the business environment forces organizations to invest in IS/IT, develop technological advantages in SCM and push the development of IS/IT applications and technological advancement. Changes in the business environment demand growing capacity for data and information management in SCM, thus continuously pulling organizational IS/IT investment(Awara, Udoh, &Anyadighibe, 2018)

Data, information and knowledge are critical assets to the performance of logistics and supply chain management (SCM), because they provide the basis upon which management can plan logistics operations, organize logistics and supply chain (SC) processes, coordinate and communicate with business partners, conduct functional logistics activities, and perform managerial control of the physical flow of goods, information exchange and sharing among SC partners. Information systems (IS) are the effective and efficient means to manage those critical assets, and to provide sustainable competitive advantages. As far as SCM is concerned, information technology (IT) consists of telecommunications, networking and data processing technologies – and is narrowly regarded here as the technological tools used to develop IS, capture or collect data, perform data analysis for generating meaningful information, and exchange and share this information with SC partners.(Fawcett, Osterhaus, &Magnan, 2007)

However, as (Fawcett et al., 2007, 2011). Explained despite considerable IT investments targeted at improving operational performance, many companies have been unable to replicate the performance results obtained by SC exemplars. Because they have focused on the technology itself rather than

how it can be exploited to transform SC operations and relationships and these companies have been disappointed with the returns from the return of investments. They have failed to understand two critical points

First, IT is a valuable-but-no-longer-rare resource. IT and supportive implementation services are now available to any company with the money to acquire them. By themselves, technology investments can be replicated by competitors and thus provide only a temporary competitive advantage (Brynjolfsson & Hitt, 2000).

Second Although IT is almost universal; the way IT is used can enable competitive differentiation. Inimitability emerges as IT enables unique value-creation opportunities— such as those found in coordinated and collaborative SC strategies (Agami, Saleh, & Rasmy, 2012)

To collaborate and communicate with SC partners, in order to reduce information time-lag and misunderstandings, and to make the data resources available and visible to all SC partners standardize logistics operations and data retrieval procedures, and develop generalized and rigorous information management policies, regulations and control measures; and to apply transaction cost theory to SCM to gain economies of scale and implement low-cost strategies(Wisner, Tan, & Leong, 2011).

According to (Sullivan, Barthorpe, & Robbins, 2010)the development and application of IS/IT in SCM can be:-

1. IS/IT in logistics functional areas – transaction support system. Here, IS/IT is typically used for applications such as bar-coding technology in point-of-sale (POS) systems, order process and inventory management, Warehouse management systems (WMS), transportation management systems (TMS) etc.
2. IS/IT for controlling information flows in integrated logistics operations across functional areas in an organization – intranet system, such as enterprise resources planning (ERP), groupware system and distribution requirement planning (DRP).
3. IS/IT used for information exchange and sharing between organizations– extranet system. The system is a structured and standard communication system, used to exchange logistics information among SC partners in certain transactions, such as ordering and trading information. Two of the most widely adopted extranet systems are electronic data interchange (EDI) and CPFR.

4. SCM system, or inter-organizational information system (IOS) – internet or network system for SC partners to exchange information, coordinate SC and logistics activities. Compared with an extranet system, an internet system is much more flexible and powerful in information distribution and conducting logistics transactions. Typical applications are electronic banking, electronic portal, electronic procurement and customer relationship management (CRM).

An intranet is intended only for internal members of an organization; an extranet is used by those who perform predefined logistics activities and transactions between two or more organizations. Internet systems allow anyone to access and use the system functions available and facilitate SCM information sharing(Fawcett et al., 2011).

2.1.2 Supply chain Performance

Supply chain performance can be described by its ability to be responsive to market requirements. Failure to link performance to information exchange may result in the inability to meet customer expectations. Information exchange between manufacturers and retailers had resulted in improved inventory management and enhanced products and services. Availability of information allows firms to be more responsive to customer needs and to improve performance. Responsiveness can be measured in terms of time taken to respond to customers' enquiry pertaining to order status, product information and stock availability. Supply chain uncertainty can be reduced through improvement in information flow which eventually leads to enhancement in supply chain delivery performance(Ramayah& Omar, 2010)

The area of the supply chain management has become one of the man perquisites of the competitive advantage in companies, and the emphasis now is how a group of firms in the same supply chain can perform to satisfy needs and create value to the final customer(Sullivan et al., 2010)

Manufacturing firms face the problem of how to provide efficient and cost-effective response to gain advantages in the changing environment. Uncertainties including complicated production processes, random yields, and high quality requirements and so on all affect their supply chain performance(Samadi& Kassou, 2016)

Numerous ways have been defined in the literature to describe the performance in the supply chain, and to help design a role model or strategy to effectively operate complex supply chain for firms .One of the most common definitions of the supply chain performance is that proposed by(Sullivan et al., 2010) defined as the extent to which the firm receiving the following benefits as a result of its

relationship with partners: cost efficiencies from higher sales volumes, improvements to current processes or creation of new processes and increased profitability

As Stewart (1995), The four key supply chain management focus areas originally identified with regard to supply chain excellence.(1) Delivery performance including: delivery-to request date; delivery-to-commit date; order fill lead time.(2) Flexibility and responsiveness including: production flexibility; re-plan cycle; cumulative source/make cycle time.(3) Logistics cost including: total logistics cost; order management costs.(4) Asset management including: inventory days of supply; days of sale outstanding.

Christopher (1998) sees the following aspects as important in future supply chains, which may be also virtual ones: the use of shared information that enables cross-functional, horizontal management should become a reality. Information shared between partners in the supply chain is even more important, making possible a responsive flow of products from one end of the pipeline to the other. Virtual enterprises or supply chains will be more common, and in fact they can be seen as a series of relationships between partners based on value-added exchange of information (Christopher, 1998). We express Christopher's themes for managing supply chains successfully: responsiveness, reliability and relationships. Assumptions about the 'the paradigm shift' to partnering and strategies of cooperation are also very familiar in marketing, especially among the Industrial Marketing and Purchasing (IMP) Group.

Coordination of different social networks and relationships has become more vital. Relational factors associated with the critical links between suppliers, manufacturers and customers are emphasized as firms strive for more efficient ways to work in supply chains or networks (Soliman & Janz, 2004).

Performance management in the supply chain is about setting goals within and between functions that will lead to the desired results with balance and without conflict. Ideally, these goals are then embedded in the fabric of the management measurement and reporting of the functions of the firm and its customers, suppliers and service providers. Each function is responsible for delivering its part of the chain to the performance objectives; and when things do not work as planned, the requirement is for failures to be identified and recovery actions mounted. Learning organizations will take the lessons of actual performance and the experience of failure and recovery to adjust the goals across the chain, acting as 'stewards' of the supply chain. This stewardship role is a key responsibility for

supply chain managers, since they often do not have functional responsibility for all the chain, though they are judged and rewarded on its overall performance(Auramo, Kauremaa, & Tanskanen, 2005)

2.1.3 The Effect of ICT on manufacturing firms

According to (David Frderic Ross, 2011) Beyond the changes driven by the growing power of the customer, increasing collaboration with supply partners, and globalization, the explosion in integrative information technologies during the first decade of the twenty-first century has had an enormous effect on today's manufacturer. Because of the scale, scope, and complexity of manufacturing, companies have for decades sought to utilize the processing power of information management systems, such as MRP II and ERP, to calculate material planning, plan and control manufacturing activity, and integrate the various functions of the business.

The purpose of these enterprise business systems (EBS) is to provide for the organization and standardization of all of the data of a manufacturing company and to enable the integration and optimization of an enterprise's internal value chain from purchasing and inventory management through sales, production, and financial accounting. Today, companies and software developers have all but completed the process of integrating into their EBS manufacturing support applications advanced planning toolsets that enhance tried and true MRP functionality. These advanced applications not only enable manufacturers to gain access to faster and more accurate planning and shop floor execution but also, by utilizing the integrative and collaborative capabilities of the Internet permit them to transmit and receive vital data on a real-time basis. These advanced Web applications provide today's manufacturer with the means to plan, control, and optimize operations by synchronizing production processes not only with other company processes, but also, through SCM systems, with supporting partners out in the supply chain(Bharadwaj, Bharadwaj, &Bendoly, 2007).

In commercial practice ICT has become integrated into manufacturing, some of the advantages of using computer to aid manufacture are:

- Machines can take over complex operations previously done by hand
- Reduce wastage through efficient manufacturing
- Improve quality control procedures by making production easier to monitor and control
- Reduction in overheads e.g. labor costs
- Increased production as there is no fatigue from repetitive manufacturing
- Improved safety and hygiene standards.

2.1.4 Drivers of supply chain performance

It was explained by *Sunil Chopra, Peter Meindl (2007*)understanding how a company can improve supply chain performance in terms of responsiveness and efficiency, we must examine the logistical and cross functional drivers of supply chain performance: facilities, inventory, transportation, information, sourcing, and pricing. These drivers interact with each other to determine the supply chain's performance in terms of responsiveness and efficiency. As a result, the structure of these drivers determines if and how strategic fit is achieved across the supply chain.

2.1.5 Managing supply chain Risk

The study completed in 2006 by global management consulting company Accenture, 73 % of the responding companies had experienced supply chain disruptions within the past five years and over half had said the impact of customer was moderate to significant. These and other studies point to the fact that as more and more firms penetrate new and emerging markets, then supply chain risk is increasing. As global economy emerges from recent recession, Risk management appears to be as even greater concern than ever before to the managers. ‘’ clearly risk mitigation is a high priority for every corporate we speak with even though the economy is picking up this still remain the hot button with virtually all of our clients,’’ says creigweks , Managing Director of global transaction services at Citibank (Wisner et al., 2011).

2.1.6 Operation scheduling

Today, companies and software developers have all but completed the process of integrating into their EBS manufacturing support applications advanced planning toolsets that enhance tried and true MRP functionality. These advanced applications not only enable manufacturers to gain access to f aster and more accurate planning and shop floor execution but also, by utilizing the integrative and collaborative capabilities of the Internet permit them to transmit and receive vital data on a real-time basis. These advanced Web applications provide today’s manufacturer with the means to plan, control, and optimize operations by synchronizing production processes not only with other company processes, but also, through SCM systems, with supporting partners out in the supply chain (Wisner et al., 2011)

To fully coordinate the information requirements for purchasing, planning, scheduling and distribution of an organization operating in a complex global environment, an enterprise-wide information system was needed. Thus, ERP systems that operated from a single, centralized database were engineered to replace the older legacy MRP systems (Ravichandran et al., 2005)

The term legacy MRP system is a broad label used to describe an older information system that usually works at an operational level to schedule production within an organization. Many legacy systems were implemented in the 1960s, 1970s and 1980s and subjected to extensive modifications as requirements changed over the years. Today, these systems have lasted beyond their originally intended life span. The continuous modifications of these systems made them complex and cumbersome to work with, especially when considering they were not designed to be user-friendly in the first place(Wisner et al., 2011)

Legacy systems were designed to perform a very specific operational function and were programmed as independent entities with little regard for meeting requirements or coordinating with other functional areas. Communication between legacy systems is often limited, and visibility across functional areas is severely restricted. Legacy systems were implemented to gather data for transactional purposes and, thus, lacked any of the analytical capabilities required for today's complex global environment(Wisner et al., 2011)

2.1.7 Procurement in supply chain

A world-class purchasing staff must continuously work to improve the efficiency and effectiveness of what we call the purchasing process. This is the process used to identify user requirements, evaluate the need effectively and efficiently, identify suppliers, ensure payment occurs promptly, ascertain that the need was effectively met, and drive continuous improvement. The challenges in ensuring that this process occurs effectively and efficiently are the theme of this chapter. Until an organization can streamline the day-to-day purchasing process, it will continually delay implementing other important strategic activities that help their organization become more competitive(Monczka, 2009)

There for the ideas associated with purchasing in multiple industries were: -

- Purchasing objectives
- Purchasing responsibilities
- E-procurement and the procure to pay process
- Types of purchases
- Purchasing process improvements
- Good practice example at Federal Express.

The development of information technology (IT) software and platforms that support an end-to-end supply chain have grown rapidly in the 21st century, as have identification technologies such as radio

frequency identification (RFID). These technologies allow enhanced collaboration between the parties in the supply chain. One example of this is highlighted by the mission of e-supply chain company EPIC:"EPIC delivers a comprehensive product line that enhances enterprise profit margins through collaboration and real-time connectivity"(Pedro M. Reyes, 2005; Ravichandran et al., 2005)

Software packages that are gaining the attention of purchasers include e-purchasing suites which have become popular with firms. Two primary supply chain applications involved in supply chain collaboration that involve purchasing are supply chain planning and supply chain execution. Planning software seeks to improve forecast accuracy, optimize production scheduling, reduce working capital costs, shorten cycle times, cut transportation costs, and improve customer service. Execution software helps obtain materials and manage physical flows from suppliers through downstream distribution to ensure that customers receive the right products at the right location, time, and cost (Monczka, 2009; Wisner et al., 2011)

2.1.8 Business to business collaboration

Today, it's all about predicting what the customer wants before they even know they want it and then making them think it was their decision in the first place. Good CRM, especially the social kind, is like being able to speak your cat's—or your customer's—language. That May not sound like a goal worth striving for, but trust me, it's huge. Think about that the next time your cat deposits its "customer feedback" in your shoe(Wisner et al., 2011)

Customers today like the convenience of communicating or transacting over the Internet; however, individualized contact between a company and its customers is also needed to ultimately keep customers satisfied and coming back. Two of the most recent trends in CRM are use of social networks and cloud computing. Companies are using both as a means to build better customer relationships. Some applications allow a company, for instance, to extract information automatically about people from a social network like LinkedIn and load it directly intone of its CRM systems. Other applications include the use of a service provider's e-Marketing cloud to send e-mail "blasts" to thousands of customers(Jeffers, Muhanna, & Nault, 2008; Kim, 2006).

Businesses today are rediscovering the need to provide personalized services to their customers. Many have come full circle, starting with Internet Business to Business (B2B) and Business to Customer (B2C) transactions. Today, we see that a firm's Internet presence, though desirable for many types of information or product transactions, is not sufficient to satisfy most customers in a

wide range of industries. Touching products and talking face-to-face with company representatives remain integral parts of the supplier–customer interface. Thus, CRM must still include talking to customers, understanding their behavior and their requirements, and then building a system to satisfy those requirements(Monczka, 2009; Wisner et al., 2011)

As supplier–customer interactions become more automated and more e-services are created, organizations will still find they must continue to identify and develop new ways to add value to customer relationships in order to maintain a competitive advantage. Cultivating the human element in customer relationships will always remain a necessary factor in creating that value. Ultimately, if used effectively, allows both sides to win—customers get what they want from

businesses, while businesses continue to find new customers and satisfy old ones(Kassani, 2004; Pedro M. Reyes, 2005)

2.1.9 Inventory Management

According to Wisner et al., (2011) explanation the most expensive, sophisticated software package will not automatically result in an optimal level of inventory for an electrical wholesaler. 'Optimal' means a high level of customer service and inventory turns, but with low inventory investment. To achieve and maintain an optimal level, employees educated in the principles of effective inventory management must understand how to set certain parameters; then set them and keep them set right.

RFID is a valuable technology for tracking inventory in the supply chain. It can synchronize information and physical flow of goods across the supply chain from manufacturers to retail outlets and to the consumers at the right place at the right time. Likewise, FID can track returned goods through the supply chain and prevent counterfeit. It also helps to reduce out-of-stock items. There is no doubt that RFID is an invaluable tool for improving inventory management and supply chain efficiencies. The steps by which the RFID can automate the supply chain follow(Quayle, 2006; Wisner et al., 2011)

The economic order quantity (EOQ) model is a classic independent demand inventory system that provides many useful ordering decisions. The basic order decision is to determine the optimal order size that minimizes total annual inventory costs—that is, the sum of the annual order cost and the annual inventory holding cost. The issue revolves around the trade-off between annual inventory holding cost and annual order cost. When the order size for an item is small, orders have to be placed on a frequent basis, causing high annual order costs(Pedro M. Reyes, 2005; Ramayah & Omar, 2010; Wisner et al., 2011)

However, the firm then has a low average inventory level for this item, resulting in low annual inventory holding costs. When the order size for an item is large, orders are placed less frequently, causing lower annual order costs. Unfortunately, this also causes the average inventory level for this item to be high, resulting in higher annual expenses to hold the inventory. The EOQ model thus seeks to find an optimal order size that minimizes the sum of the two annual costs. In EOQ computations, the term carrying cost is often used in place of holding cost and setup cost is used in place of order cost("Bryan" Jean, 2007; Waters & Chartered Institute of Logistics and Transport in the UK, 2010; Wisner et al., 2011)

2.2 Empirical review and Research Gap

Asabere, Oppong & Sarpong (2012) conducted a review of the role of ICT in supply chain operation for companies. In the study, it was noted that e-SCM has become the common language in reference to the electronic processes that should characterize modern supply chain operations. Sweeney (2005) evaluated the usage of "Point", "Best of Breed", "Enterprise" and "Extended Enterprise" solutions as approaches towards achieving business competitiveness in SCM. From their results, the ensuing challenge is the fact that use of ICT applications in SCM do not necessarily translate into efficiency and greater performance of the process.

Ayugi (2007) examined the effectiveness and efficiency of the supply chain model in Wrigley's East Africa. He indicated that efficient supply chain activities would increase the organization's performance significantly. Cheruiyot (2013)

Conducted a study on the impact of integrated supply chain on performance at Kenya Tea Development Agency. The findings indicated that the supply chain integration was positively associated with supply chain performance. Apiyo& Mburu (2012) did a study on the role of ICT tools in supply chain performance and found that ICT tools can have revolutionary impact on supply chain performance and that viewing ICT tools as an incremental improvement of supply chain performance can turn out to be the best thing to all organizations that are involved in logistics and manufacturing.

Magutu (2013) carried out a study on supply chain strategies, technology and performance of large-scale manufacturing firms in Kenya which established that when ICT tools are well implemented, the company will benefit from them and as a result, the organization will be able to save on costs and

eventually make high profits. Efficiency and reliability in the logistics industry through various modalities such as adoption of ICT solutions has seen improvements in customs management systems, security (tracking and tracing shipments) and information sharing. However, many sectors of the logistics industry still run on traditional or manual systems and this could be attributed to their ineffective and inefficient performance

SintayehuAsemamaw (2016) did a study assessing the perceived performance of supply chain management in the case of two brewery firms in Addis Ababa and stated how the brewery firms are booming up due to the growing demand of beer in the country.

("Bryan" Jean, 2007) did a study on the ambiguous relationship of ICT and organizational performance and the findings of the paper clarifies the ambiguous nature of the power -dependence relationship between small suppliers & these multinational customers.

Research under taken by AtenoElivan (2012) on the impact of information communication technology among logistic firms in Kenya, showed the use of ICT in a supply chain enabled firms to achieve their maximum level of effectiveness and efficiency, material flows, money flows and information flow throughout the entire supply chain.

(Soliman & Janz, 2004) did a study on the role of ICT in supply chain performance and found that ICT can have revolutionary effect on supply chain performance and that viewing ICT as an incremental improvement of supply chain performance can turn out to be the best thing to all organizations that are involved in manufacturing firms.

All the above studies have covered deployment of ICT in several various manufacturing firms. However, research has been done on beverage sector in Ethiopia none has focused on ICT effect on supply chain performance in the beverage firms.

Therefore, the study search for to bridge this gap and sought to answer the research question; what are the effects of information communication technology on supply chain performance in the beverage sector in Ethiopia.

2.3 Conceptual framework

Based on the overall review of related literature particularly from the work of Fasanghari , R. And Kamal, (2008). the following conceptual framework in which this specific study governed is developed.

As shown figure below, the model of the study contains two variables, the independent variable is the information technology (IT), and the dependent variable is the supply chain that is consisting 5 main dimensions.

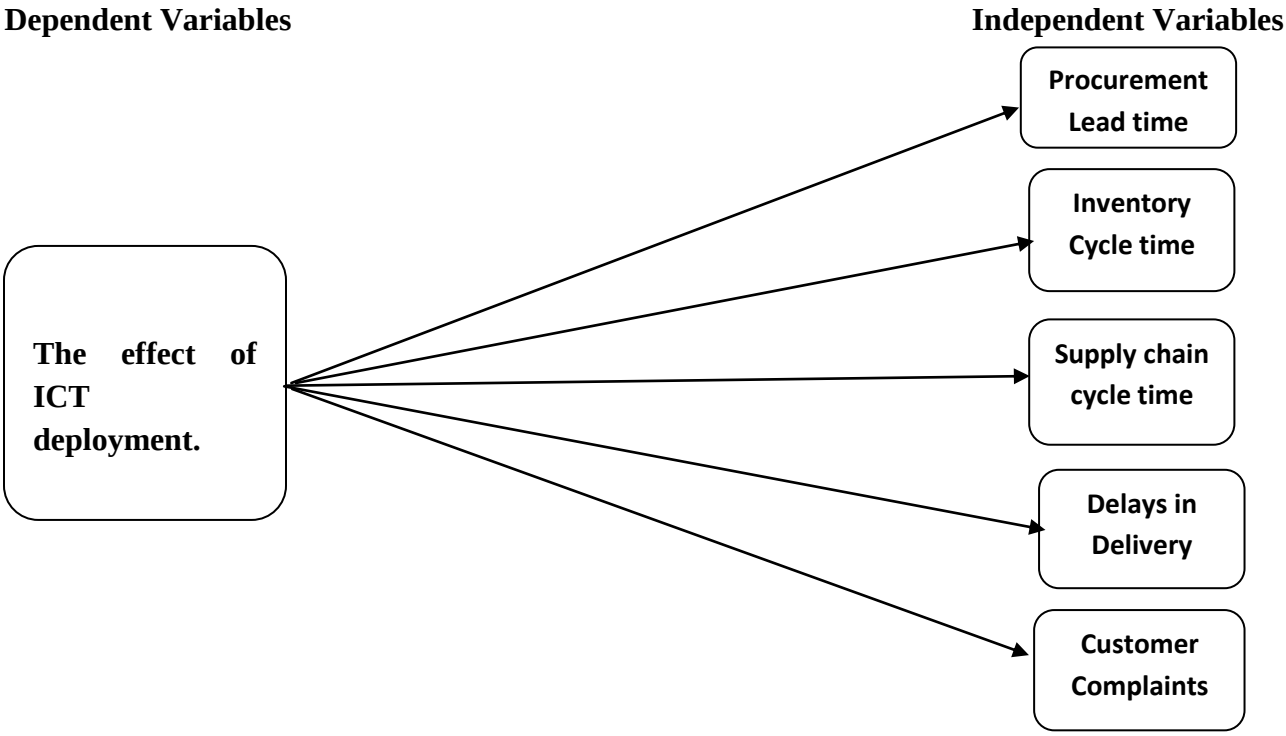


Figure (1): adopted from, Fasanghari, R. and Kamal, C. (2008), assessing the impact of information technology on supply chain management. World applied sciences journal 4(1):

CHAPTER THREE-RESEARCH METHODS OF THE STUDY

3.1 Introduction

The purpose of this study is to investigate the effect information communication technology (ICT on supply chain performance of the beverage firms and identify the performance of the supply chain performance indicators and come up with the findings and recommendation on the most applicable practices.

3.2 The Research Design

Research design is the blueprint for fulfilling research objectives and answering research questions (John et al., 2007:20-84). In other words, it is a master plan specifying the methods and procedures for collecting and analyzing the needed information. It ensures that the study will be relevant to the problem and it uses economical procedures. The research design employed under this study was Explanatory – quantitative research design as it aims to explain the relationship between the dependent and independent variables. The finding and conclusion of the study depends on the fully utilization of statistical data collection and analysis.

3.3The Research Approach

The total population of the study is 15 (Fifteen) beverage companies which are functional at the moment in and around Addis Ababa, Namely, soft drink manufacturing firms are East Africa bottling, Moha soft drinks ,Great Abyssinia water Aqua safe mineral and Aqua Addis mineral water and from brewery firms are Meta Abo Brewery sh.co, BGI Ethiopia Plc, Habesha Breweries sh.co, Dashen Brewery S.C, Heineken Brewery SC, Zebedare Brewery SC, United beverage sh.co, Awash winery sh.co, National alcohol& Liquor factory, and Balezafe Ethiopia liquor factory .

3.4 Sampling Design

In this study, purposive sampling technique was used to select Meta Abo Brewery sh.com/Diageo Ethiopia, BGI Ethiopia Plc and Habesha Breweries sh.co from brewery firms and East Africa Bottling and Moha soft Drinks from soft Drink companies as these firms have been operating in the business longer time in and around Addis Ababa as the case firms of this study are expected implementing modern ICT in their operation so that they are thought perfectly match for this particular study. In non-probability sampling technique, the researcher determines as to which subject

of the population to be included in the research study. Since this study is multiple case study, the researcher applied purposive sampling based on time and resource limitation.

Therefore, this study targeted only the five beverage firms operating in and Around Addis Ababa; Namely, Meta Abo Brewery Sh.Co, Habesha Brewery Sh.Co, East Africa Bottling, Moha soft Drinks and BGI Plc. The targeted respondents within each firm are ICT Manager, supply chain Manager, procurement Manager, Procurement officers, operation Manger, Inventory control Manager and Operation Manager who are engaged with supply chain function and IT function in the beverage firms. The respondents being selected based on their function in the supply chain and had been interviewed using self-administrative questionnaires.

3.4.1Sample size determination

The sample size i.e. the number of managers from the beverage firms to be included in the survey to 'represent' the population of interest and shall be calculated using the following assumption: The sample size is calculated using the current total number of employees engaged with supply chain and IT function in the Beverage firms were estimated to be 60, which mean 12 employees for each firm and an estimated prevalence of 50%[1], an error risk parameter of 1.96 (for an error risk of 5% i.e. 95% confidence limits), a desired precision of 5% which resulted the total sample size of 52. The targeted population is 52, which translated to 10 persons for each beverage firm in and around Addis Ababa.

$n = \frac{N}{1+(N)(e)2}$ Where, N = is the total population
n = is the sample from the population
e = is the error term which is 5% (i.e. 95% confident level)

Therefore,

$$\frac{60}{1 + (60)(0.05)2} = 52$$

Estimated prevalence (p) is set at 50% level that is conservative and elicits the largest sample size.

3.4.2 Sampling Technique

The study employed explanatory -quantitative research design and the purposive sampling procedure had been used and only employees engaged with supply chain and IT function in Beverage firms had

been selected. The researcher used this sampling method because employees included in the population from different departments. Therefore, such sampling allows the researcher to select samples to make it representative of all employees from the population.

3.5 Data Source and Types

The data for this study had been collected from primary source. For the purpose of data collection, self-administrated questionnaire had been used. The questionnaire was hand delivered to employees engaged with supply chain function and IT function due to the proximity and accessibility of the study population. A number of questions had been asked in order to gain data that can be analyzed.

Under this study, closed ended questions were prepared for the respondents and the researcher gathered this data in the form of cross-sectional type. The reason for the use of questioner for this study is due to the fact that the main purpose of the study is to investigate the effect of ICT on supply chain performance by using questionnaire and, in addition to this, time constraint is other factors which force the researcher to choose questionnaire types of data gathering techniques.

3.6. Data Collection Procedure

The following data collection procedure was applied:

- First, the randomly selected respondents were communicated to get their consent.
- Once their consent is accepted, the prepared questionnaires were distributed to each participant by appreciating their participation and devoting their precious time for the research.
- The questionnaires were collected by checking the completeness of the data.
- Finally, the activities had been accomplished by appreciating the respondents.

3.7. Method of Data analysis

The data analysis method used in this study is descriptive. Descriptive statistics analysis will be used in the interpretation and discussion. To analyze the raw data gathered from the target participants, the researcher will be used specialized statistics program of SPSS version 20.0 (Statistical program of Social Science). Accordingly, descriptive statistics listed as frequencies, mean and standard deviations will be analyzed and One Sample-Test and Multiple Regression will be used to test the hypotheses of the study.

3.8. Ethical consideration

The necessary ethical consideration will be made before the actual data collection takes place. Permission will be obtained from Beverage firms. Interview using self-administrative questionnaire will carry out only with full consent of the employees engaged with supply chain function being interviewed in Beveragefirms.Before each interview, clear and adequate explanation will be given using the participant's information sheet about all the relevant aspects of the study including its aim, interview procedures, and is neither to evaluate the performance of the employee nor to blame anyone for weakness but to gather information and opinions that may lead to eventual improvement in the supply chain performance the beverage firms. The data collectors will outline the scope of the interview and its approximate length prior to the start answering the questionnaire

3.9 Reliability Test

Reliability is the degree of consistency with which an instrument measures the constructs it is designed to measure. Reliability is known as to what extent the research findings can be replicated, if another study is undertaken using the same research methods(Ritchie and Lewis, 2003). This means the measure (data collection tools) should provide the same answer on another occasion or similar result should be obtained by another researcher using the same measuring instrument(Agami et al., 2012).

Therefore, the researcher applied Cronbach's alpha coefficient to measure of internal consistency. It is considered to be a measure of scale reliability. Technically speaking, Cronbach's alpha is not a statistical test - it is a coefficient of reliability (or consistency). According to George and Mallery (2003), Cronbach's alpha reliability coefficient normally ranges between 0 and 1. The closer Cronbach's alpha coefficient to 1.0 the greater the internal consistency of the items in the scale. George and (Melville, Kraemer, & Gurbaxani, 2004) suggested that Cronbach's alpha coefficient greater than 0.70 is acceptable. to produce a reliable scale and any scale with Chronbach Alpha less than this standard should be eliminated Sekaran (2005).

Table 3.1 Cronbach's alpha

	Variables	Cronbach's alpha	No ofitems
1	ICT deployment in supply chain	0.785	5
2	ICT deployment in Procurement	0.919	6
3	ICT In production schedule	0.637	5
4	ICT deployment in BTB	0.391	5
5	ICT deployment in Risk management	0.838	6

Source: Author (2019)

CHAPTER FOUR:DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

Having identified the problem of the study in chapter one, reviewing existing literature and showing gaps of knowledge in chapter two explained the methods that the study used to collect data. This chapter presents analysis and finding so for the study asset out in the research methodology. The results represented on the effect of information communication technology on supply chain performance of beverage firms existed in and around Addis Ababa. The data was mainly gathered mainly using an ended questionnaire and designed in line with the objective the study.

4.2. Distribution of Response Rate

The study targeted 50 respondents where each of the five beverage firms would provide 10 respondents, such as from operation manager & operation support staff, supply chain manger, procurement officer and ICT manager and ICT Support staff out of the 50 targeted respondents, only 43 were responded which means response rate of 86%.

Table 4.1: Response Rate

	Questionnaires Administered	**Questionnaires filled and Returned**	**Percentage**
Response	50	43	86%

Source: Author (2019)

This is regarded as a good and adequate response rate, in line with the literature by Mugenda and Mugenda, (2003) which recommends for generalization, a response rate of 50% is adequate for analysis and reporting 60% is good and any response rateof70% and over is excellent for explanatory studies.

4.3Demographic information of the respondents

Observing the demographic trend or characteristics of our sample population before starting the data analysis is useful to make the analysis more meaningful for the reader. This part of the questionnaire requested limited amount of information related to personal and demographic status of respondents.

Items	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	27	62.8	62.8	62.8
	Female	16	37.2	37.2	100
	Total	43	100	100	
Position of the respondents	ICT Manager	4	9.3	9.3	9.3
	ICT Support staff	10	23.3	23.3	32.6
	Supply chain Manager	7	16.3	16.3	48.8
	procurement Manager	3	7	7	55.8
	procurement officer	7	16.3	16.3	72.1
	operation manager	3	7	7	79.1
	operation support staff	9	20.9	20.9	100
	Total	43	100	100	
Education level	College Diploma	3	7	7	7
	Undergraduate	23	53.5	53.5	60.5
	Master	17	39.5	39.5	100
	Total	43	100	100	
Experience	Below 5 years	22	51.2	51.2	51.2
	5 to 10 years	12	27.9	27.9	79.1
	10 to 15 years	6	14	14	93
	Above 15 Years	3	7	7	100
	Total	43	100	100	
Age of Company	Below 5 Years	9	20.9	20.9	20.9
	5 to 15 years	2	4.7	4.7	25.6
	15 to 25 Years	1	2.3	2.3	27.9
	Above 25 years	31	72.1	72.1	100
	Total	43	100	100	

4.2: Demographic information of the respondents

Source: Author (2019)

The importance of demographic examination in this research is to describe the characteristics of the sample, like proportion of male and female, profession and educational background and experience of respondents in the beverage firms. Accordingly, these variables are summarized and described in tables shown above.

From the above table the first item of demographic characteristics was gender. From the findings, Majority of the respondents which are (62.8%) were male in gender and (37.2%) were female in gender. so that, this study showed male dominance than female in terms of respondent gender.

The second item of demographic characteristics was position of the respondents. From the findings most (23.3%) of the respondents were working as ICT support staff, (20.9%) were working as operational support staff, (16.3%) were working as supply chain manager and procurement officer for each, (7%) were working as operational Manager and Procurement manager for each, (9.3%) were ICT Managers. Therefore, the data percentage justifies that the questionnaires were distributed and collected fairly from each beverage's office.

The third demographic characteristic was education level of the respondents. From the findings, most (53.5%) of the respondents had earned undergraduate whereas (39.5 %) and (7%) had earned master degree and diploma respectively. So That this data shows the respondents are well educated and appropriate for this study. The respondents were asked to indicate their gender and their gender category showed below table.

The fourth demographic characteristic was experience of the respondents. From the study findings, most of the respondents 51.2% have been worked below 5 years, 27.9% has been worked between 5 to 10 years, 14% has been serviced between 10 to 15 years and 7% has been serviced above 25 years with respect in their beverage firms correspondingly. The majority of the respondents have served for considerable period of time with their respective beverage firms and this justifies that the respondents were in position to give reliable information in regard to this study.

The last demographic characteristics was age company in the business.From the above table, the findings showed most of (72.1%) the respondents indicated that their respective beverage firms existed for above 25 years, 20.9% of the respondents indicated below 5 years, 4.7 and 2.3 % of the respondents were indicated between 5 to 15 Years respectively. This justifies that most of the beverage firms have been in existence for considerable period of time and confirmed the information collected from these beverage firms are reliable.

4.4 Effects of ICT on supply chain performance

Since the main objective of this study is to determine the extent to which ICT is applied in supply chain performance of the beverage firms in and around Addis Ababa. So That, the respondents were asked to rate the statement in table 4.6 using a scale of 1-5, where 5= strongly agree; 4 Agree; 3= moderately agree; 2= Disagree; 1=strongly Disagree. The average mean and standard deviations are shown in table 4.6.

Table 4.3: Effects of ICT on supply chain performance

Effects of ICT on supply chain performance	Valid	Mean	Std. Deviation	Variance	Min	Max
Deployment of ICT efficient procurement of Items	43	3.9767	0.80144	0.642	2	5
ICT system decrease over stocking and shortage	43	4	0.69007	0.476	2	5
ICT in SC create transparent, Visible Demand Pattern	43	4.0698	0.63228	0.4	3	5
ICT enhances decision making b/n suppliers & Firm	43	3.9767	0.77116	0.595	2	5
ICT In transportation of goods ensure the most economical routs	43	3.8372	0.81446	0.663	2	5

Source: Author (2019)

From the findings, most of the respondents agreed: ICT deployment in supply chain create a transparent, visible demand pattern in the entire supply chain (M=4.04, SD=0.63);Deployment of ICT systems in inventory management decreases overstocking and shortages (M=4.00, SD=0.69);ICT deployment in supply chain enhances decision making between suppliers and my firm through sharing of information (M=3.97, SD=0.77);Deployment of ICT facilitates efficient procurement of items (M=3.97,SD=0.80);Deployment of ICT in transportation of goods ensures that the most economical routes are used to make deliveries respectively .

4.4.1 Deployment of ICT in procurement

Table 4.4: ICT in procurement

Deployment of ICT in procurement	Valid	Mean	Std. Deviation	Variance	Min	Max
E-Tendering Promotes info. Access to potential Bidders	43	3.7209	1.00772	1.016	1	5
E-payment ensure on time payment to suppliers	43	3.8605	0.86138	0.742	2	5
E-ordering ensures accuracy of info during order	43	4	0.9759	0.952	1	5
E-evaluation ensure all bids are given equal consideration	43	3.814	0.95757	0.917	2	5
E-Awarding ensures accuracy	43	4.093	0.99556	0.991	2	5
E-Business allows customers to access wide range of market info	43	4.0233	0.9383	0.88	2	5

Source: Author (2019)

From the above finding most of the respondents agreed: E-awarding application enhances transparency (M=4.09, SD=0.99); E-Business application allows customers to access wide range of market information (M=4.02,SD=0.93); E-ordering application ensures accuracy of information during ordering (M=4.00, SD=0.97; E-payment give insurance on time payment to suppliers (M=3.86, SD=0.86);E-Evaluation insure that all bidders are given equal consideration since evaluation is applied uniformly (M=3.81, SD=0.99);E-tendering application promote information access to potential bidders(M=3.2, SD=1.00) in procurement respectively.

4.4.2 Deployment of ICT in production schedule

Table 4.5: ICT in production scheduling

Deployment of ICT in production schedule	Valid	Mean	Std. Deviation	Variance	Min	Max
Accurate Material planning for production activity	43	3.907	0.8948	0.801	1	5
Insurance of quality of products monitored and controlled	43	3.9302	0.82794	0.685	1	5
Ensure production error minimized	43	3.9302	0.96103	0.924	1	5
Smooth flow of information from production to raw material	43	4.0465	0.81514	0.664	1	5
Mitigate over production and under production	43	3.9535	0.81514	0.664	1	5

Source: Author (2019)

From the findings, most of the respondents agreed: deployment of ICT promotes smooth flow of information from production floor to raw material storage and forward flow of material to the production (M=4.04, SD=0.81); ICT deployment Ensure that over- production and under – production is mitigated by mapping material requirement to production planning to product storage (M=3.95, SD=0.81); Deployment of ICT insures that quality of products is monitored and controlled (M=3.93, SD=0.82); deployment of ICT ensure that production error are minimized (M=3.93, SD=0.82);Deployment of ICT enables a more accurate material planning for production activity in production scheduling respectively.

4.4.3 Deployment of ICT in to business to business collaboration

Table 4.6: ICT in to business to business collaboration

Deployment of ICT in to business to business collaboration	Valid	Mean	Std. Deviation	Variance	Min	Max
Helps tracking inventory mov. from supplier to store	43	3.9767	0.80144	0.642		5
Helps to create a transparent SC	43	4	0.75593	0.571	2	5
Creates observable demand pattern	43	3.8837	0.76249	0.581	2	5
promotes information sharing	43	4.1395	0.77402	0.599	2	5
promotes BTB r/ship through resource pooling	43	3.9767	0.80144	0.642	2	5

Source: Author (2019)

From the above table findings most of the respondents agreed: ICT deployment promotes information sharing (M=4.13, SD=0.77);ICT deployment helps to create a transparent supply chain (M=4.00, SD=0.75);ICT deployment helps in tracking inventory movement from suppliers to the store (M=3.97, SD=0.64);ICT deployment promotes business to business relationship through resource pooling (M=3.97, SD=0.80) and ICT deployment helps to create an observable demand pattern (M=3.88, SD=0.76) in business to business collaboration respectively .

4.4.4 ICT Deployment in Risk Management

Table 4.7: ICT in Risk Management

Deployment of ICT in Risk Management	Valid	Mean	Std. Deviation	Variance	Min	Max
Helps monitoring operation and strategic process	43	4.0233	0.73964	0.547	2	5
ICT Helps to track goods to avoid loss in transit	43	4.0233	0.9383	0.88	1	5
ICT assist to identify skill gap for training to min. cost	43	3.7674	0.86842	0.754	2	5
ICT ensures expiry of products and required action is taken	43	3.9767	1.03483	1.071	1	5
ICT assist to identify which required extra knowledge	43	3.5581	1.05339	1.11	1	5
ICT Minimize the risk of stock out and overstocking	43	4.2326	0.75078	0.564	2	5

Source: Author (2019

From the findings, most of the respondents agreed: ICT deployment minimizes the risk of stock out and overstocking of items (M=4.23, SD=0.75); deployment ICT in movement of goods ensures that items are tracked to avoid loss (M=4.02, SD=0.93) ICT deployment helps monitoring operations and strategic process (M=4.02, SD=0.73)ICT Deployment ensures that expiry date of products is identified and necessary action is taken to avoid loss (M=3.97, SD=1.03)ICT deployment assist in identifying areas in which require extra knowledge thus promotes research and development (M=3.55,SD=1.03) and ICT deployment assist in identifying skill gap for training of staff to minimize cost (M=3076,SD=0.86) in ICT deployment in risk management respectively .

4.5 ICT Deployment challenges

Challenges of ICT Implementation	Valid	Mean	Std. Deviation	Variance	Min	Max
ICT Faces resistance by staff that is not ready to adopt.	43	3.7209	1.03108	1.063	1	5
ICT Encounters lacks support from top Management	43	3.3023	0.86009	0.74	2	5
Low quality training to staff contribute to low appetite	43	3.7674	0.99612	0.992	1	5
High cost of initial inv. ICT Infrastructure. negatively Dep. of ICT	43	3.6512	0.97306	0.947	2	5
Poor Management of transfer of operation from Manual to ICT contributes to low success of ICT Deployment.	43	3.7907	0.80351	0.646	2	5
Poor ICT infrastructure access hinders effective ICT System	43	3.814	0.87982	0.774	2	5
ICT is negatively affected by lack of affordable connectivity &hand width	43	3.7442	0.90219	0.814	2	5

Table 4.8: ICT deployment Challenges

Source: Author (2019

From the findings, most of the respondents agreed: poor ICT infrastructure access e.g. internet connectivity hinders effective deployment of ICT System (M=3.81, SD=0.87);Poor management of transfer of operation from manual to ICT platform contributes to low success rate of ICT deployment(M=3.79, SD=0.80); Low quality of training to staff contribute to low appetite to deployment of ICT (M=3.76,SD=0.99);High cost of ICT infrastructure initial investment negatively affect deployment of ICT (M=3.65,SD=0.97); ICT deployments negatively affected by lack of affordable connectivity and hand width (M=3.74,SD=0.90);ICT deployment faces resistant to change by staff that is not ready to adapt to a new way of doing things (M=3.72, SD=1.03);ICT deployment encounter lacks support from the top management who consider the associated changes

with unnecessary cost (M=3.30,SD=0.86) associated with deployment of ICT challenges respectively .

4.6 Multicollinearity

In research investigation we are expected to understand concepts beyond the means and standard deviations of the dependent and independent variables so as to know how one variable is related to one another which mean the concept of correlation. Multicollinearity exists whenever two or more of the predictors in a regression model are moderately or highly correlated. So, we would like see the nature, direction, and significance of the bivariate relationship and multicollinearity of the variables.

Table 4 .9: Correlations

Correlations		ICT Adoption in procurement	ICT Adoption in production schedule	ICT in to Business to Business collaboration	ICT in Risk Management
ICT Adoption in procurement	Pearson Correlation	1	.382*	.485**	.455**
	Sig. (2-tailed)		.011	.001	.002
	N	43	43	43	43
ICT Adoption in production schedule	Pearson Correlation	.382*	1	.675**	.696**
	Sig. (2-tailed)	.011		.000	.000
	N	43	43	43	43
ICT in to Business to Business collaboration	Pearson Correlation	.485**	.675**	1	.793**
	Sig. (2-tailed)	.001	.000		.000
	N	43	43	43	43
ICT in Risk Management	Pearson Correlation	.455**	.696**	.793**	1
	Sig. (2-tailed)	.002	.000	.000	
	N	43	43	43	43

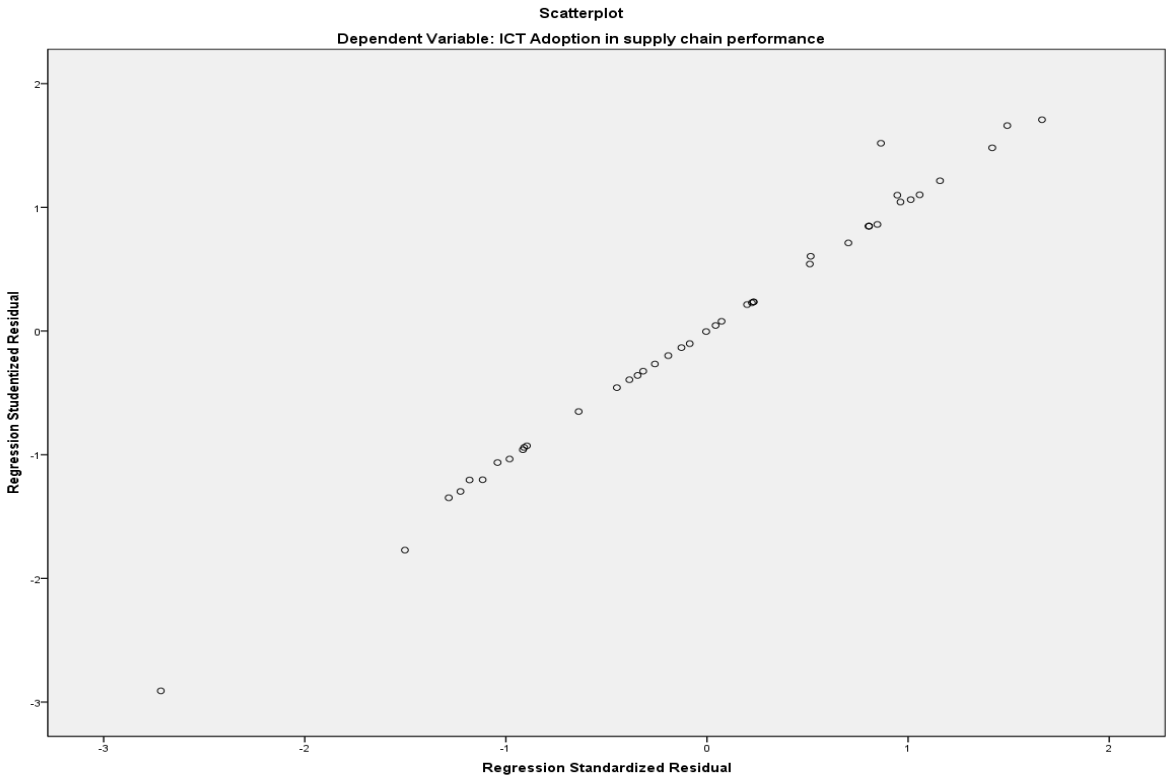
*. Correlation is significant at the 0.05 level (2-tailed).

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

Source: Author (2019

As shown in the figure, the highest correlation detected b/n ICT deployment in Procurement and ICT in business to business collaboration (0.485), Procurement and risk management (0.455), production scheduling and risk management (0.696), Risk Management and business to business collaboration (0.793), production scheduling and business to business collaboration (0.675) and lowest detected ICT in procurement and ICT in production scheduling.

Below scatter plot describes the linear relationship between the independent variables (deployment of ICT) and dependent variable (supply chain performance).



Source: Author (2019

4.6 Regression Analysis

The researcher used descriptive statistical tools such as Statistical Package for social science (SPSS) and MS excel as the data collected was purely qualitative. Data analysis used frequencies, percentages, means, standard deviation and other central tendencies and this generated quantitative reports through tabulations. To analyse the first objective, descriptive analysis technique was used to derive descriptive statistics and to determine the effect of ICT on supply chain performance of the beverage firms in and Around Addis Ababa, the researcher carried out multiple Regression Analysis.

Multiple Regression Analysis Equation ($Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$)

Where Y= supply chain performance of beverage firms.

X1=Procurement, X2= Production scheduling, X3 Business to business collaboration X4= Risk management while β0= the constant Regression, β1, β2, β3 and β4 are Regression coefficients and ε = Error term.

Table 4.10: -Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.701[a]	.492	.438	.45596

a. Predictors: (Constant), ICT in Risk Management, ICT Deployment in procurement, ICT Deployment in production schedule, ICT in to Business to Business collaboration.

The R (0.701) indicates the relationship between the overall supply chain performance and the predictors which are ICT in risk management, ICT in procurement, ICT in production scheduling, ICT in to business to business collaboration.

The R Squared indicates the four independent variables that were studied which explain 49.2% of the information communication deployment effect on supply chain performance as represented by $\mathbf{R^2}$ (coefficient of determinant). Therefore, the other factors not studied in this research contribute 50.8% influencing Supply chain performance. The result of this study agrees with Davis (1989) who found that ICT in Risk management play a key role in SCP

Table 4.11: -ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.637	4	1.909	9.183	.000[b]
	Residual	7.900	38	.208		
	Total	15.537	42			

a. Dependent Variable: ICT Deployment in supply chain performance

b. Predictors: (Constant), ICT in Risk Management, ICT Deployment in procurement, ICT Deployment in production schedule, ICT in to Business to Business collaboration

Table 4.12 shows the output of the ANOVA Analysis and it used to test the significance difference to the overall supply chain performance. It is evident the significance Value F(4,38) =9.183, P=.000 is less than 0.05. Therefore, there is statistically substantial difference in the supply chain performance. According to (Melville et al., 2004) this model can be used for estimating purpose .

Table 4.12: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	1.653	.473		3.495	.001	.696	2.611
ICT Deployment in procurement	.285	.101	.379	2.838	.007	.082	.489
ICT Deployment in production schedule	-.147	.138	-.178	-1.059	.296	-.427	.134
ICT in to Business to Business collaboration	-.203	.183	-.224	-1.106	.276	-.574	.168
ICT in Risk Management	.660	.184	.731	3.577	.001	.286	1.033
a. Dependent Variable: ICT Deployment in supply chain performance							

The established regression Equation was: -

$$Y=0.285x1-0.147x2-0.203x3+0.66x4 + 1.653$$

Therefore, holding all the independent variable (Procurement, Production Scheduling, Collaborations and Risk Management) constant, other factors influencing supply chain performance will be 0.473. The findings also show that taking all other independent variables at zero, a unit raise in information communication technology deployment in procurement will result to a 0.285 raise in the scores of the SCP.

A unit raise in information communication in risk management will result to 0.66 in scores of the SCP. However, this did not work for the other independent variables which are production scheduling and business to business collaboration as significance value of this variable didn't exactly predict the dependent variable (SCP). More over the researcher applied only 49.2% of the independent variables for prediction of the SCP so that the chance of outcome could positive if the researcher applied more variables which above 50 to 60 % of the independent variables.

Therefore, the study also recognized a significant relationship between the Supply Chain Performance and Procurement, Risk Management however the coefficient for production scheduling and business to business collaboration did not predict a significant relation with SCP. The regression coefficients were tested for significance at $\alpha=0.05$. Significance occurs at p-values less than 0.05. From the above results, only the two predictors are good for the supply chain performance.

4.7 Discussion of the findings

The study recognized that the information communication technology deployment in Risk management has a great effect on supply chain performance in the beverage firms in and around Addis Ababa. The study result showed also that ICT help monitoring operations and strategic process and ICT deployment in transit goods ensures that goods are well tracked to avoid loss.

Moreover, deployment of ICT assists in identifying skills gap for training of staff to minimize costs and ensures that expiry date of products is identified and necessary action is taken to avoid loss It was recognized that ICT deployment assist in identifying areas which require extra knowledge thus promotes research and development and also recognized ICT deployment minimizes the risk of stock outs and over stalking of items.

Further the prediction by regression model indicated that taking all other independent variables at zero, a unit raise in information communication technology deployment in Risk management lead to a raise in the scores of the Supply Chain Performance. The study also recognized a strong positive correlation coefficient between information communication technology deployment in Risk management and Supply Chain Performance, as shown by correlation factor of 0.66.

Further the study revealed that ICT deployment in product scheduling promotes; accurate material planning for production activities (M=3.95, SD=0.73), reduction in time wastage and smooth flow of information from production floor to raw material storage and forward flow of material to the production floor (M=3.97, SD=1.03).This finding agrees with that of (Giffler, 2012) that production schedule identifies where resources may conflict, ensures timely order of necessary, ensures that deliveries are made on time and identify the time necessary for maintenance to prevent delays.

The study also revealed that ICT deployment in product scheduling ensures that; quality management is effective in production process and over-production and under-production is mitigated (M=3.55, SD=1.05)). According to (Graves, 2011) computer-based scheduling using computers assists manufacturers to reduce the time spent on deliveries, act quickly on clients' orders, and come up with manageable schedules hence it has a positive relationship with supply chain performance.

This finding agrees with this study that there exists a strong positive correlation between information communication technology deployment and Production Scheduling. However, the regression model did not predict a unit increase in information communication technology deployment in Production Scheduling lead increase in the scores of the Supply Chain Performance.

The study recognized that ICT Deployment in business to business Collaborations helps in; tracking inventory movement and creating a transparent supply chain. It also promotes resource sharing and creates a visible demand pattern.

This study is in line with (Bryson, 2011) that any supply chain management effort must include working with others. The study further recognized a strong positive correlation between information communication technology deployment and business to business Collaborations. However, Prediction from regression indicated that a unit increase in ICT deployment in business to business Collaborations lead to decrease in Supply Chain Performance.

On deployment of ICT in Risk Management, the study recognized that ICT helps in monitoring operations and strategic processes as well as accessing new markets. It also ensures that goods on transit are safe (M=4.00, SD=0.73) and expiry date are managed. ICT also Promotes research and development. These findings conform to that of (Williams, 2013) that developing an effective supply chain risk management calls for expertise in a number of areas. Further the study revealed that a unit increase in ICT deployment in Risk Management lead to a 0-66 increase in the Supply Chain Performance in beverage firms in and around Addis Ababa. The study also revealed a strong correlation between ICT deployment in Risk Management and Supply Chain Performance in the beverage sectors,

Finally, the study recognized that ICT deployment challenges are caused by; inability of staff to adapt to change (M=3.68, SD=0.57), lacks support from the top management (M=4.00, SD=0.96) and the limited quality of training to staff (M=3.72, SD=1.03). Further the study noted that high cost of initial investment of ICT infrastructure is also a challenge. Finally, the study noted that ICT deployment challenges are contributed by poor management of transfer of operations from manual to ICT platform and also poor ICT infrastructure. This conforms to findings by (Mathews, 2007) view that lack of competent and globally renowned IT professionals is extremely obstructing IT deployment and expansion in most businesses.

CHAPTER FIVE: SUMMARY OF FINDINGS CONCULUSION AND RECOMMENDATION

5.1 Introduction

In this final chapter the study gives the summary of the findings, the discussion, conclusions, recommendations of the study based on the objective of the study and suggestions for further findings. The chapter finally presents the suggestions for further studies.

5.2 Summary of findings and Discussion

The study found that the beverage firms implementing ICT in supply chain that affects supply chain performance significantly. The study investigated the effect of ICT deployment on supply chain performance of the beverage firms; the study revealed that information communication technology deployment in Risk management has a significant effect on supply chain performance in the beverage firms in and around Addis Ababa.

Moreover, deployment of ICT recognised that E-Tendering application increase competitiveness in bidding, E-payment application improves supply relationship and E-Ordering application increases efficiency of product delivery. E- Awarding application is found to increase efficiency and transparency in awarding of tenders and E-business application promotes flow of information which enhances sourcing. The study also recognized that an increase in ICT deployment level in procurement lead to a corresponding increase in the scores of the Supply Chain Performance. It also recognised a strong positive relationship between information communication technology deployment in procurement and Supply Chain Performance.

Further, ICT deployment in product scheduling promotes; accurate material planning for production activities, reduction in time wastage and smooth flow of information from production floor to raw material storage and forward flow of material to the production floor. Further, ICT deployment in product scheduling ensures that; quality management is effective in production process and over-production and under-production is mitigated. Further it is noted that there is strong and positive relationship between deployment of ICT

and production scheduling. However, the regression output indicates that, the independentvariable in production scheduling is not statistically significant to predict the dependent variable (SCP)

ICT Deployment in business to business Collaborations has helped in; tracking inventory movement and creating a transparent supply chain, also it promotes resource sharing and creates a visible demand pattern. The study further has recognised a strong relationship between ICT deployments in business to business Collaborations. However, coefficient of the independent variable is not statistically significant to predict the dependent (SCP)

Moreover, the study has recognized that ICT deployment challenges are caused by; inability of staff to adapt to change lacks support from the top management and the limited quality of training to staff. Further ICT deployment challenges are contributed by poor management of transfer of operations from manual to ICT platform, poor ICT infrastructure and high cost of initial investment of ICT infrastructure

Finally, the study revealed that ICT helps in monitoring operations and strategic processes as well as accessing new markets. It also ensures goods on transit are safe and expiry date is well managed. A unit increase in ICT deployment in Risk Management is found to result to an increase in the Supply Chain Performance in the beverage firms in and Around Addis Ababa. There is Strong relationship between ICT deployment in Risk Management and Supply Chain Performance.

5.3 Conclusion

The study concludes that ICT is valuable, offering an extensive menu of potential benefits ranging from flexibility and quality improvement to cost reduction and productivity improvement.

ICT deployment in risk management has a great effect on supply chain performance of in among the beverage firms.ICT deployment minimizes the risk of stock out and overstocking of items; deployment ICT in movement of goods ensures that items are tracked to avoid loss ,helps monitoring operations and strategic process ,ICT application

ensures that expiry date of products is identified and necessary action is taken to avoid loss ICT deployment assist in identifying areas in which require extra knowledge thus promotes research and development and lastly ICT deployment assist in identifying skill gap for training of staff to minimize cost and improved the supply chain performance

Moreover, E-Tendering, application E-payment application, E-Ordering application, E-awarding application and E-business application has improved the supply chain performance as well in the in the beverage firms. There is a strong positive relationship among information communication technology deployment in risk management, procurement and Supply Chain Performance. So that the study concludes that a unit increase in ICT deployment in risk management and procurement results to a significant in the scores of the SCP respectively.

Further the study concludes that product scheduling promotes; accurate material planning for production activities, reduction in time wastage and smooth flow of information from production floor to raw material storage and forward flow of material to the production floor. It also ensures that; quality management is effective in production process and over-production and under-production is mitigated. Further the study concludes that a unit increase in ICT deployment in Production Scheduling did not result an increase in score of the SCP. However, there is strong and positive relationship between production scheduling and ICT.

5.4 Recommendation

From the study outcomes, it was concluded that deployment of ICT within the supply chain enables organizations to be more flexible in coping with uncertainties in the supply chain and meeting expectations customer demand. Both Risk management and procurement are significant in enhancing supply chain performance in the beverage firms in and around Addis Ababa. However, it is more difficult to obtain and measure the significance of business to business collaboration and production scheduling at this specific study which were only considering below 50 % independent variable to predict the supply chain performance.

Therefore, the beverage firms seem to treat production scheduling and business to business information strategic information and confidential to share for others due to competitive reason.

Subsequently the study found that ICT adoption challenges are caused by; inability of staff to adapt to change, lacks support from the top management and the limited quality of training to staff. This study recommends more training to the staffs and top management should give priority and support ICT deployment.

Moreover, as the study recognized the strong and positive relationship between ICT deployment and supply chain performance in the beverage firms the attention of the management should be ICT and much more fund allocated to ICT deployment.

The study is based on the analysis of small sample which focused on manufacturing beverage firms operating in and around Addis Ababa. Further study should include larger samples and cover other areas in Ethiopia. Further study should investigate the effect of specific information such as marketing, production; sales and promotion that could lead the improvement of supply chain performance as the number of variables are limited in this study.

.

REFERENCES

Agami, N., Saleh, M., & Rasmy, M. (2012). Supply Chain Performance Measurement Approaches: Review and Classification. *The Journal of Organizational Management Studies*, 1–20. https://doi.org/10.5171/2012.872753

Auramo, J., Kauremaa, J., & Tanskanen, K. (2005). Benefits of IT in supply chain management: an explorative study of progressive companies. *International Journal of Physical Distribution & Logistics Management*, *35*(2), 82–100. https://doi.org/10.1108/09600030510590282

Awara, N. F., Udoh, E. G., & Anyadighibe, J. A. (2018). Information technology tools and supply chain performance of online retailers in Calabar Metropolis, Cross River State, Nigeria. *Global Journal of Social Sciences*, *17*(1), 55. https://doi.org/10.4314/gjss.v17i1.6

Bharadwaj, S., Bharadwaj, A., & Bendoly, E. (2007). The Performance Effects of Complementarities Between Information Systems, Marketing, Manufacturing, and Supply Chain Processes. *Information Systems Research*, *18*(4), 437–453.

"Bryan" Jean, R. (2007). The ambiguous relationship of ICT and organizational performance: a literature review. *Critical Perspectives on International Business*, *3*(4), 306–321. https://doi.org/10.1108/17422040710832568

Brynjolfsson, E., & Hitt, L. M. (2000). Beyond Computation: Information Technology, Organizational Transformation and Business Performance. *Journal of Economic Perspectives*, *14*(4), 23–48. https://doi.org/10.1257/jep.14.4.23

David Frderic Ross. (n.d.). *Supply chain technology.pdf*.

Fasanghari, M. (2008). Assessing the Impact of Information Technology on Supply Chain Management. *2008 International Symposium on Electronic Commerce and Security*, 726–730. https://doi.org/10.1109/ISECS.2008.208

Fawcett, S. E., Osterhaus, P., & Magnan, G. M. (2007). Information sharing and supply chain performance: the role of connectivity and willingness. *Supply Chain Management: An International Journal*, *12*(5), 358–368. https://doi.org/10.1108/13598540710776935

Fawcett, S. E., Wallin, C., Allred, C., Fawcett, A. M., & Magnan, G. M. (2011). INFORMATION TECHNOLOGY AS AN ENABLER OF SUPPLY CHAIN COLLABORATION: A DYNAMIC-CAPABILITIES PERSPECTIVE: Information Technology as an Enabler of Supply Chain Collaboration: A Dynamic-Capabilities Perspective. *Journal of Supply Chain Management*, *47*(1), 38–59. https://doi.org/10.1111/j.1745-493X.2010.03213.x

Gunasekaran, A., Patel, C., & McGaughey, R. E. (2004). A framework for supply chain performance measurement. *International Journal of Production Economics*, *87*(3), 333–347. https://doi.org/10.1016/j.ijpe.2003.08.003

Jayaram, J., & Vickery, S. K. (2000). The effects of information system infrastructure and process improvements on supply- chain time performance. *International Journal of Physical Distribution & Logistics Management*, *30*(3/4), 314–330. https://doi.org/10.1108/09600030010326082

Jeffers, P. I., Muhanna, W. A., & Nault, B. R. (2008). Information Technology and Process Performance: An Empirical Investigation of the Interaction Between IT and Non-IT Resources*. *Decision Sciences*, *39*(4), 703–735. https://doi.org/10.1111/j.1540-5915.2008.00209.x

Kassani, B. (n.d.). *Effect of supply chain information system on firm performance: An empirical case study.*

Kim, D. (2006). Information System Innovations and Supply Chain Management: Channel Relationships and Firm Performance. *Journal of the Academy of Marketing Science*, *34*(1), 40–54. https://doi.org/10.1177/0092070305281619

Melville, Kraemer, & Gurbaxani. (2004). Review: Information Technology and Organizational Performance: An Integrative Model of IT Business Value. *MIS Quarterly*, *28*(2), 283. https://doi.org/10.2307/25148636

Monczka, R. M. (Ed.). (2009). *Purchasing and supply chain management* (4th ed). Mason, OH: South-Western.

Pedro M. Reyes. (2005). Future impacts of RFID on e- supply chains in grocery retailing | Supply Chain Management: An International Journal | Vol 10, No 2. Retrieved April 14, 2019, from https://www.emeraldinsight.com/doi/abs/10.1108/13598540510589205

Quayle - 2006 - Purchasing and supply chain management strategies.pdf. (n.d.).

Quayle, M. (Ed.). (2006). *Purchasing and supply chain management: strategies and realities* (1st ed). Hershey, PA: Idea Group Publ.

Ramayah, T., & Omar, R. (2010). INFORMATION EXCHANGE AND SUPPLY CHAIN PERFORMANCE. *International Journal of Information Technology & Decision Making*, *09*(01), 35–52. https://doi.org/10.1142/S0219622010003658

Ravichandran, T., Lertwongsatien, C., & Lertwongsatien, C. (2005). Effect of Information Systems Resources and Capabilities on Firm Performance: A Resource-Based

Perspective. *Journal of Management Information Systems*, *21*(4), 237–276. https://doi.org/10.1080/07421222.2005.11045820

Samadi, E., & Kassou, I. (2016). The Relationship between IT and Supply Chain Performance: A Systematic Review and Future Research. *American Journal of Industrial and Business Management*, *06*(04), 480–495. https://doi.org/10.4236/ajibm.2016.64044

Soliman, K. S., & Janz, B. D. (2004). An exploratory study to identify the critical factors affecting the decision to establish Internet-based interorganizational information systems. *Information & Management*, *41*(6), 697–706. https://doi.org/10.1016/j.im.2003.06.001

Sriram, V., & Stump, R. (2004). Information technology investments in purchasing: an empirical investigation of communications, relationship and performance outcomes. *Omega*, *32*(1), 41–55. https://doi.org/10.1016/j.omega.2003.09.008

Sullivan, G., Barthorpe, S., & Robbins, S. (2010). *Managing construction logistics*. Chichester, West Sussex ; Ames, Iowa: Wiley-Blackwell.

Waters, C. D. J., & Chartered Institute of Logistics and Transport in the UK (Eds.). (2010). *Global logistics: new directions in supply chain management* (6th ed). London ; Philadelphia: Kogan Page.

Wisner, J. D., Tan, K.-C., & Leong, G. K. (2011). *Principles of supply chain management: a balanced approach* (3rd ed). Mason, OH: South-Western.

Sullivan, G., Barthorpe, S., & Robbins, S. (2010). Managing construction logistics. Chichester, West Sussex ; Ames, Iowa: Wiley-Blackwell.

The Effects of Process Development and Information Technology on Time-based Supply Chain Performance - ScienceDirect. (n.d.). Retrieved April 14, 2019,

Fawcett, S. E., Osterhaus, P., &Magnan, G. M. (2007). Information sharing and supply chain performance: the role of connectivity and willingness. Supply Chain Management: An International Journal, 12(5), 358–368.

Jeffers, P. I., Muhanna, W. A., &Nault, B. R. (2008). Information Technology and Process Performance: An Empirical Investigation of the Interaction Between IT and Non-IT Resources*. Decision Sciences, 39(4), 703–735.

Kim, D. (2006). Information System Innovations and Supply Chain Management: Channel Relationships and Firm Performance. *Journal of the Academy of Marketing Science*, *34*(1), 40–54.

Ravichandran, T., Lertwongsatien, C., &Lertwongsatien, C. (2005). Effect of Information Systems Resources and Capabilities on Firm Performance: A Resource-Based Perspective. *Journal of Management Information Systems*, *21*(4), 237–276.

Soliman, K. S., &Janz, B. D. (2004). An exploratory study to identify the critical factors affecting the decision to establish Internet-based interorganizational information systems. *Information & Management*, *41*(6), 697–706.

Sriram, V., & Stump, R. (2004). Information technology investments in purchasing: an empirical investigation of communications, relationship and performance outcomes. *Omega*, *32*(1), 41–55.

Sullivan, G., Barthorpe, S., & Robbins, S. (2010). *Managing construction logistics*. Chichester, West Sussex ; Ames, Iowa: Wiley-Blackwell.

Waters, C. D. J., & Chartered Institute of Logistics and Transport in the UK (Eds.). (2010). *Global logistics: new directions in supply chain management* (6th ed). London; Philadelphia: Kogan

Wisner, J. D., Tan, K.-C., & Leong, G. K. (2011). *Principles of supply chain management: a balanced approach* (3rd ed). Mason, OH: South-Western.

Bharadwaj, S., Bharadwaj, A., &Bendoly, E. (2007). The Performance Effects of Complementarities Between Information Systems, Marketing, Manufacturing, and Supply Chain Processes. *Information Systems Research*, *18*(4), 437–453. Retrieved from

"Bryan" Jean, R. (2007). The ambiguous relationship of ICT and organizational performance: a literature review. *Critical Perspectives on International Business*, *3*(4), 306–321. David Frderic Ross. (n.d.). *Supply chain technology.pdf*.

Jayaram, J., & Vickery, S. K. (2000). The effects of information system infrastructure and process improvements on supply- chain time performance. *International Journal of Physical Distribution & Logistics Management*, *30*(3/4), 314–330.

Kent, J. L., & Mentzer, J. T. (2003). THE EFFECT OF INVESTMENT IN INTERORGANIZATIONAL INFORMATION TECHNOLOGY IN A RETAIL SUPPLY CHAIN. *Journal of Business Logistics*, *24*(2), 155–175.

Lee, H. K., & Fernando, Y. (2015). *The antecedents and outcomes of the medical tourism supply chain*.

Samadi, E., &Kassou, I. (2016). The Relationship between IT and Supply Chain Performance: A Systematic Review and Future Research. *American Journal of Industrial and Business Management*, *06*(04), 480–495.

ANNEX I: QUESTIONNAIRE

Greetings!

I am conducting a study on measuring the effect of information communication Technology (ICT) on supply chain performance in Ethiopian beverage sector for the partial fulfillment of master's degree in LSCM in AAUSOC. The information given here will only be used for purpose of this study and will be treated with utmost confidentiality. Taking part in this study will contribute towards alleviating the problem of adoption of ICT in supply chain performance for this project and similar sector. You will be asked kindly to give your response to the data collector at the earliest possible time.

If you need any more clarification Please use the following address: -0911-385606 -YaredTatek or yaredtatek.2011@gmail .com

Section A: Demographic Information

1. Gender

   Male [ ] Female [ ]

2. Position/Designation of the respondent

   ICT Manager [ ] Supply Chain Manager [ ]

   ICT support staff [ ] Procurement Officer [ ]

   Operation Manager [ ]

   Operation support staff [ ]

   Others (Specify)…….

3. Please indicate the highest level of education attained? (Tick as applicable)

   Certificate [ ]

   College Diploma [ ]

   Undergraduate [ ]

   Master [ ]

   Others (specify) ……

4. Indicate your period of service in this Company

   Below 5 years [ ] 5 to 10 years [ ]

   10 to 15 years [ ] above 15 years [ ]

5. How long has this Company been in existence? (Tick where appropriate)

   Below 5 years [ ]

   5 – 15 years [ ]

   15– 25 years [ ]

   Above 25 Years [ ]

Section B: Effects of ICT adoption in supply chain

6. To what extent do you agree with the following statements on ICT adoption in supply chain? Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

ICT adoption in supply chain in my beverage firms	1	2	3	4	5
Deployment of ICT facilitates efficient procurement of items					
Implementation of ICT systems in inventory management Decreases overstocking and shortages.					
ICT adoption in supply chain creates a transparent, visible demand pattern in the entire supply chain					
ICT adoption in supply chain enhances decision making between suppliers and my firm through sharing of information.					
Deployment of ICT in transportation of goods ensures that The most economical routes are used to make deliveries.					

Section C: Effects of adoption of ICT

7. Indicate your level of agreement with the following statements relating to deployment of ICT in supply chain. Key Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

Deployment of ICT in Procurement in my beverage firm.	1	2	3	4	5
E-Tendering application promotes information access to potential Bidders.					
E-payment application enables suppliers to receive payments in real Time.					
E-Ordering application ensures accuracy of information during Ordering.					
E-evaluation ensures that all bids are given same consideration Since evaluation criteria is applied uniformly.					
E-awarding application enhances transparency.					
E-business application allows customers to access wide range of market information					

8. To what Extent do you agree with the following statements on production scheduling? Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

Adoption of ICT in Production Scheduling in my beverage firm.	1	2	3	4	5
Enables a more accurate material planning for production Activities.					
Ensured that quality of products is monitored and controlled.					
Ensured that production errors are minimized					
Promotes smooth flow of information from production floor to raw material storage and forward flow of material to the production					
Ensures that over-production and under-production is mitigated by mapping material requirement to production planning to product storage.					

9. To what extent do you agree with the following statements on collaborations? Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

Deployment of ICT in to business to business collaboration in my beverage firm.	1	2	3	4	5
Helps in tracking inventory movement from the supplier to the store.					
Helps to create a transparent supply chain					
Creates a observable demand pattern					
Promotes information sharing					
Promotes Business to business relationships through resource pooling.					

10. To what Extent do you agree with the following statements on Risk management? Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5=strongly Agree)

ICT Deployment in Risk Management in my beverage firm.	1	2	3	4	5
ICT helps monitoring operations and strategic processes					
Deployment of ICT in movement of items ensures that items are tracked to avoid loss in transit.					
Deployment of ICT assists in identifying skills gap for training of staff to minimize cost.					
ICT deployment ensures that expiry date of products is identified and necessary action is taken to avoid loss.					
ICT deployment assist in identifying areas which require extra knowledge thus promotes research and development					
ICT Deployment minimizes the risk of stock outs and overstocking of items.					

Section D : ICT Adoption challenges

11. To what extent do you agree with the following statements on ICT adoption challenges? Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

The following challenges are associated with adoption of ICT in my beverage firm.	1	2	3	4	5
Implementation of ICT faces resistance to change by staff that is not ready to adapt to a new way of doing things.					
Implementation of ICT encounter lacks support from the top management who consider the associated changes with unnecessary cost					
Low quality of training to staff contribute to low appetite to adoption of ICT					
The high cost of initial investment of ICT infrastructure negatively affect deployment of ICT in my beverage firms					
Poor management of transfer of operation from manual to ICT Platform contributes to low success rate of ICT adoption.					
Poor ICT infrastructure access e.g. internet connectivity hinders effective implementation of ICT systems					
Adoption of ICT is negatively affected by lack of affordable connectivity and bandwidth					

THANK YOU FOR YOUR TIME