UNIVERSITY FOR DEVELOPMENT STUDIES

CONTRIBUTION OF INFORMATION TECHNOLOGY TO COMMODITY SUPPLY CHAIN MANAGEMENT IN THE ABOABO MARKET OF TAMALE METROPOLIS

BY

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THESIS SUBMITTED TO THE DEPARTMENT OF MARKETING AND PROCUREMENT, SCHOOL OF BUSINESS AND LAW, UNIVERISTY FOR DEVELOPMENT STUDIES, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF A MASRTER OF COMMERCE DEGREE IN PROCUREMENT AND SUPPLY CHAIN MANAGEMENT.

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DECLARATION

I certify that this submission is my own work towards the Master of Commerce Degree and that, to the best of my knowledge, it contain no materials previously published by another person nor materials which has been accepted for the award of any other degree of the University, except where acknowledgement has been made in the text.

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Supervisors Declaration

This thesis was supervised according to the Thesis Writing Guidelines of the University for Development Studies.

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Dr. Stephen D. Kpinpuo

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ABSTRACT

Although most institutions heavily invest in Information Technology (IT), there is little empirical evidence to show how IT creates value in Supply Chain Management (SCM), especially in developing contexts. This study sought to assess the impacts of IT on SCM in Tamale Aboabo Market. Cross sectional data were obtained from a sample of 90 enterprise workers in the Tamale Aboabo market, using a multistage sampling technique. The data were analysed using qualitative instruments as well as a quantitative instrument (linear regression). Results of the mixed methods study indicated that distribution, resource planning, and warehouse management systems were statistically significant, with positive influence on inventory management performance such as vendor managed inventory and materials resource planning. More importantly, it was observed that, these achievements were possible largely as a result of the use of smart phones and computers with installed software in transacting business in the Tamale Aboabo market. Nonetheless, the adoption of IT by firms in inventory and supply chain management was found to have been constrained by factors such as lack of IT specialists in the firms, high cost of acquiring and installing IT facilities, and poor awareness about the benefits of IT usage in supply chain management. It was, therefore, recommended that enterprises in the country should collaborate with government and other stakeholders in the IT industry to help educate current and prospective entrepreneurs on IT usage and benefits.

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God bless you all.

DEDICATION

I dedicate this work to my parents, My Wife and Kids for their unreserved love, support and encouragement. The courage and determination they taught me has made my life so wonderful.

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LIST OF ACRONYMS

CRM	Customer Relationship Management
DRP	Distribution Resource Planning
EDI	Electronic Data Interchange
EOQ	Economic Order Quantity
ERP	Enterprise Resource Planning
ERP	Enterprise Resource Planning
FIFO	First In, First Out
ICT	Information Communication Technology
IT	Information Technology
JIT	Just-In-Time
LIFO	Last In, First Out
MIS	Management Information System
MRP	Material Requirement Planning
SCM	Supply Chain Management
VMIS	Vendor Managed Inventory System

CHAPTER ONE

INTRODUCTION

This chapter is an introductory part of the research study, and explains why this study has been conducted and what limitations the researcher is likely to face. This chapter covers the introduction and background to the study, statement of the problem, research objectives, research questions, significance of the study, scope of the study, limitation of the study and organization of the study.

1.1 Background to the study

Procurement is the process of identifying and agreeing on terms and the acquisition of goods, services, and works from an external source, often through a tendering or competitive bidding process. Procurement is also understood as the processes of acquiring, attaining or purchasing of goods and services performed by people in charge of procurement in an organization or procurement entity (Frempong et al, 2013). From the definitions above, procurement is basically the set of processes put in place to acquire goods and services, consultancy and other works by an organization. Frempong et al (2013) defines Public procurement as the buying of goods and services for government agencies or institutions using the right procurement methods or procedures as established by a legal regime. In the early days, procurement of good, works and services were done manually from initiation of intention to buy product specification and actual buying and disposal. This took longer lead time, paper processing (documentation), and store transactions which depended on the bin cards, store ledger cards and stock record cards. Local purchase order was also used for purchases of materials and keeping the record of such items. With the

introduction of Information Technology within the organization, the impact has been enormous in terms of cost reduction, reduced transaction cycle time, enhanced budgetary control, elimination of administrative errors and improvement in the payment process. Also, the continuing advancement in technology such as mobile communication, internet, improved transport systems etc. has inspired the continuous development of the supply chain and of the ways and techniques to manage it efficiently and effectively. In a typical supply chain management (S.C.M) system, raw materials are procured at one end, produced in one or more factories, transported to warehouses for intermediate storage, and then transported to wholesalers or retailers and / or customers. Subsequently, enhanced service levels, efficient supply chain techniques or strategies must be taken into account through interactions at the different levels within the supply chain. Supply chain, is also known as the logistics network is made up of suppliers, manufacturers, warehouses / Stores, distribution channels, and retail outlets. Raw materials, work-in-process and finished goods that move between the facilities as well.

According to Fasanghari (2008), the use of I.T in S.C.M, refers to the use of interorganizational systems that are used for sharing information and processing it across organizational boundaries. The implementation of I.T in the S.C.M can enable organizations and businesses to develop and gain knowledge of stores, ordering process, payment, suppliers and market demands, which in turn influence the organization performance. It is also agreed that the significance of IT on S.C.M is largely on procurement and logistics, customers' relations or vendor management. IT has become one of the very key indicators or drivers in contemporary time. It has played critical roles in developments and cuts across every business segment as well as every home. Generally

according to Hoek, 2001, IT has become to the economy what steam and machine power were to the industrial revolution. Currently, expectations about the contribution of IT on businesses are great and positive. IT is positively correlated with improved overall organizational and business performance (Pokha,rel, 2005). It consists of a number of technologies that come together to access, process and transmit information. It includes computer hardware and software as well as other media for the gathering of data, processing of the data, storing of data, transmission and production of information. This information comes in different forms such as sound, text (alphanumeric) and pictures. With regards to delivery of service in business entities or organizations, IT has been used to facilitate the provision of service, even though it requires significant amount of investment. The essence of this investments is to create business value by offering timely and reliable goods and services.

In order for any investment to have a positive impact on business value, additional incomes or revenues needs to be generated or reduction in general cost. That is, when evaluating the impacts of technology investment to the enhancement of business performance, the interactions of costs among the various business processes and activities needs to be considered (Roztocki and Weistroffer, 2008). Investment in information technology can have significant impact on both the internal and external operations of a business entity. Internally, improvement in IT systems can enhance and strengthen the infrastructure of the business as well as capacity of employees by increasing their efficiency, service coordination, and sharing of information among departments. It also can enhance financial record keeping and keeping track of the business's production. Externally, IT solutions can basically change business organization service delivery (Allison, 2010). Organizations and

businesses around the world are increasing their investment in Information Technology (IT). The development of electronic-business practices has made it easier for organizations to share information and to encourage co-operation among stakeholders. Globally, IT has become the basis for success in every sector of the economy. In the economic transformation of nations, IT has played a crucial role in transaction cost reduction thereby improving the productivity of the business, offering immediate connectivity and also improving the efficiency and transparency as well as accuracy. IT has also replaced more expensive and time consuming means of communicating and performing business activities. For example, reduction in physical travels time, increasing consumer choice in the marketplace and also provide access to otherwise unavailable goods and services. It has also contributed to widening the geographic space and scope of potential markets and channeling knowledge and information of all kind.

According to Bryson (2006), I.T systems have provided sound knowledge management in corporate institutions. With knowledge and information planning, information services have the dual responsibility of adding value to business policy and strategy, planning and managing all the corporate resources. I.T systems provide an efficient and flexible service infrastructure, that enable organizations achieve competitive opportunities through innovations, sound management of resources and improved service delivery. Today, IT has brought a significant change on service delivery to customers in business entities. This development has enabled businesses to work and to re-structure their business operations to align them to the new technologies for better service delivery (Jagdev and Browne, 1998). A typical example is the use of IT to integrate the various business functions, operational flow of activities, enhanced business collaborations through systems such as

Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) and Supply Chain Management (SCM). Information technologies (IT) has brought about new and improved business models and structures. There are several business opportunities for developing a business through new models and methods and, with current IT solutions. Chan et. al. (1997) indicates that, in implementing new ideas of technologies, some challenges could arise, when the business development lives its own life without taking note of real business needs and cooperation aspects. Some of these problems are real in business enterprises where business developers and owners follow all the new technologies and trends of business methods such as the Customer Relationship Management (CRM) systems, Enterprise Resource Planning (ERP) systems etc.

There are other problems that may arise when designing and developing new methods at the expense of ICT. Certainly, a problem may arise if a company adopts and implements a new system such as a Customer Relationship Management System, without creating the necessary support systems and processes. It is therefore recommended that the development and implementation of business and IT should take place concurrently (Hanseth and Braa, 1998). There are new emerging business models which make businesses more efficient and competitive. It is therefore not advisable however, to adopt all new waves very seriously and as such implement them all in strategy and business. Consultants and system analyst develop new ideas and provide their assistance and support in implementing these new business models. These models and techniques are not good and hence not recommended for every kind of business. It is challenging to find the perfect solutions for one's business. Today IT has played a significant role in business, and businesses should pay due attention to IT at an early stage of every development activity

(Henderson and Venkatraman, 2000). In recent years, organizations have been craving for homogeneous and standardized ERP systems that form the information backbone of the corporation and seamlessly integrate business processes and information flows throughout the whole supply chain. As a result, information infrastructures of today's organizations consist of a growing pile of systems that specifically target various aspects of the business, including customer Relationship Management, Enterprise Resource Planning, Supply Chain Management, Business Intelligence, Content Management, Portals, Computer-aided Design, Embedded Systems, and Network and Collaborative systems (Hanseth & Braa, 1998).

1.2 Statement of the problem

The contribution of IT investments to service delivery and business value is an important issue for researchers, resource managers and other stakeholders. IT business value and service delivery include productivity enhancement, profitability improvement, improved work relations, competitive advantage and efficient use of resources at both intermediate and organizational levels (Prasad, 2008; Melville, 2004; Kohli, 2003). While institutions invest heavily in IT, much attention has not been given to the understanding of how IT creates value in business, especially in developing countries (Devaraj 2003). Considering the enormous benefits that are experienced by multinational organizations on use of IT systems, the local business organizations have moved to adopt the same kind of technologies. However, they still experience some obstacles or hindrances in the effective and efficient use of the IT resources in their operations. Many business organizations in Ghana are facing problems such as queries from vendor, cost of order processing, and

management of inventory (communication of stock outs by customers) to vendors, or notification of stock outs by companies to customers. These lead to customer order shipping delays and inventory emergencies.

In most organizations in Ghana today, there is growing IT system acquisition, adoption and implementation, to facilitate a shift towards e-service provision. The levels of computerization have drastically improved especially in the public organization in the last few years. In this regard, the issue of the pay-offs of I.T investments in developing countries like Ghana is an important issue for policy makers, economists, and business managers and academic researchers. It has been observed that very little research is reported about the impact of I.T investments on business value and service delivery in organizations (Roztocki, 2004).

Studies that have been done in this area reveal that IT service delivery qualities influence consumer evaluation and drive purchase intention. Also, extant studies have provided inconclusive findings have not just provided inconclusive findings but have focused on formal organizations ignoring the informal sector especially in Ghana which contribute significantly to economic development (Presutti, 2003;Yuksel, 2002; Mmanthou et al, 2004). Factors that influence this trend were found to include customization, interactivity, care, cultivation, community, choice, convenience, and character (Srinivasan, 2002). Production scheduling has traditionally been the most difficult aspects of Supply Chain Management (SCM), and plays a key role in an organization's relationship to facilities. The use of IT is considered as a perquisite for the effective control of today's complex supply chain. However, IT investment in the supply chain process does not guarantee a stronger organizational performance. In fact, the adoption of a particular technology is

easily duplicated by other firms and it often does not provide a sustained competitive advantage for the adopting firm. This study intended to illustrate the impact of Information Technology on Supply Chain Management in different areas, particularly at the Tamale Aboabo Market. The neglect of informal sector by extant studies makes the study of Aboabo market relevance as it is the largest market in the Northern Ghana which houses all sorts of trade activities.

1.3 Objectives of the study

1.3.1 General objective

To assess the impact of Information Technology (I.T) on Supply Chain Management (SCM) at the Tamale Market.

1.3.2 Specific objectives

1. To determine the level of IT adoption in commodity supply chain management processes at the Tamale Market.
2. To examine how the use of computer applications can improve inventory management in warehouses and market stalls in Tamale
3. To investigate the challenges faced by businesses exploring the ICT space in commodity supply chain management at the Tamale Market
4. To determine how IT can make commodity SCM more effective in Tamale Market

1.4 Research Questions

1. What is the level of IT adoption in the management of commodity supply chain at the Tamale Market?

2 How may computer applications improve inventory management in Tamale warehouses and market stalls?

3 What are the challenges faced by businesses using Information and Communication Technology in the management of inventory in the Tamale Market?

4 How may the use of IT create a more effective commodity Supply Chain Management in the Tamale market?

1.5 Significance of the study

The study findings guide the business environment to implement policies, standards and procedures for better service delivery. In effort to provide efficient, effective and reliable services to clients, the study findings will benefit IT industry players with clients in similar setup by equipping them with prior knowledge on the kind of system functionalities that their customers may require. The study helps in adopting faster and timely service delivery, thereby saving on costs and time that would be spent on evaluating the systems and at the same time offer solutions to challenges and to improve the systems. Many public institutions in Ghana will find this study very valuable to harness the benefits of IT and obtain a benchmark to decisions related to IT implementation in public organization. The policy makers in the Ministry of Trade and Industries, Ministry of Communication, Ministry of Business Development and other state agencies find the study useful as a basis of formulating policies, which can be effectively implemented for better and easier business operations. The government will use the study so as to come up with policies and ways of promoting better services to the public. An understanding of the contribution of I.T investments to business value and service delivery in developing countries like Ghana provides investors more confidence and direction in their IT investments.

Also, the study revealed the challenges to organization to see how to overcome operations problems by the use of IT in conducting their activities in SCM and suggest possible solutions. It will help to design and propose methods that would be effective for use in information and communication technology towards supply chain management. Finally, the study will be used as additional reference to researchers on procurement and suppliers and other related subjects on the impact of IT in SCM.

1.6 Scope of the study

The study was conducted at Tamale Market. The choice of the area is purposive because it is the central business district of Tamale and the northern Region at large, therefore easily accessible. The main concentration areas are business organizations or enterprises within Tamale Market. This area is in a good position to provide reliable data.

1.7 Limitations of the Study

Indeed, there is the anticipation of various challenges which may be encountered as the researcher undertakes this study. However, measures have been established in to curtail such challenges. Some of those challenges could be: difficulty in retrieving data, limited time for the study, and the financial commitments and reluctance on the respondents to provide accurate information. This will call for limited and careful selection of population and samples of the study into a manageable one and the requirement of immense work in data sourcing and information managing from the respective bodies. Limitations of the study will be discussed totally after the research has been conducted.

1.8 Organization of the Study

The project work is organized into five chapters. Chapter One of the study consists of the introduction which contains the background of the study, the statement of the problem, objectives of the study, research question, significance of the study, the scope of the study and limitation of the study. Chapter two consists of review of related literature of the study and logical framework. Chapter three will consist of the research methodology which contains the research design, sampling technique and sample size, data collection methods and analysis. Chapter four consists of the data analysis, presentation and discussion of the findings, while chapter five consists of the summary, conclusion and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Literature review is critical in any research undertaking and synopsis of a particular area of research, allowing anybody reading the report to establish why somebody pursued a

particular research. This chapter covers key terms used in the research, theoretical literature review, empirical literature review and conceptual frameworks for the research study.

2.2 Procurement

According to the Public Procurement Authority (PPA), Ghana (2004), Procurement is the buying, purchasing, renting, leasing or acquiring of any goods, works or services by a procuring entity spending public funds on behalf of a ministry, department or regional administration of the government or public body and includes all functions that pertain to the obtaining of any goods, works, or services, including description or requirements, selection and invitation of tenders, preparation and award of the contract. According to Baily and Farmer 2005, the procurement process involves the successive stages in the procurement cycle which includes planning, choice of procedures, measures to solicit offers from tenderers, examination and evaluation of those offers, award of contract and contract management.

2.3 Inventory

The word “inventory” has been defined in several ways, as indicated in the literature. Basically, three definitions have been identified and seems more appropriate to the topic developed in this dissertation. “Inventories are stockpiles of raw materials, suppliers, components, work in process, and finished goods that appear at numerous points throughout a firm’s production and logistics channel”(Ballou, 2004).

According to Chase, Jacobs and Aquilano (2004), inventory is the stock of any item or resource used in an organisation. An inventory system consist of a set of guidelines and controls that are used to study the levels of inventory or stock and decide at what levels should it be maintained, when should stock be replenished, and how large orders should be.

Pycraft et al. (2000) defined inventory or stock as "the stored accumulation of material resources in transformation system. So a manufacturing company will hold stocks of materials, a tax office will hold stocks of information and a theme park will hold stocks of customer (when it is customers which are being processed we normally refers to the stocks of them as a queue). According to Lysons and Gillingham (2003), inventory is the volume or amount of raw materials, components, assemblies, consumables, and work - in – progress and finished goods that must be kept or stored for use as and when the need arises. Also, according to Coyle et al (2003), Inventory is defined as the raw materials, work-in-progress, finished goods and supplies required for creation of a company's goods and services. The amount of units and value of the stock of goods a company should hold.

In an article written by Michael Pollick and edited by Lindsey D. (Wise Geek, 22 May, 2011), Inventory is the total amount of goods or materials contained in a storehouse or warehouse at a given point in time. Inventory can also be referred to as the total amount of goods and the act of counting them. The significance of these publications to the study is that, Inventory is seen to be the largest investment in assets of a business and represents one of the primary sources of income generation and subsequent earnings for a business entity, hence it should be efficiently and effectively managed so as to reduce the cost as well as increase profit for the business entity.

2.3.1 Types of Inventory

There are different categories of inventory depending on the nature and type of business. It varies in different organisations but the most common of inventory is stock of raw materials and work in progress. Finished goods and stocks in supplies such as stationery and fuel can also be referred to as inventory. Inventory or Stock can be categorised into six (6) main groups according to Stock and Lambert (2001). These include; Cycle Stock, In-transit inventory, Safety stock, Speculative stock, Seasonal stock and Dead / Obsolete stock.

Cycle Stock is the **inventory** that you plan to sell based on demand forecasts. It results from the replacement process and is necessary in order to meet the demand under certain conditions. This is as and when the business entity can make perfect predictions on demand and replenishment times.

In-Transit Inventory. These are goods that have dispatched from the dispatch, loading, or shipping point but have not yet arrived at the destination or receipt, offloading, or delivery point. It can also be referred to as **transit inventory** or **stock** in **transit.**

Safety or Buffer Stock; this is a term used to describe the level of extra stock or inventory that is maintained to lessen or mitigate the risk of stock outs caused by uncertainties in supply and demand. Adequate buffer stock levels allows business activities to proceed according to plan.

Speculative Stock; this is stock or inventory that a business entity or trader uses for speculative purposes. Many businesses resort to speculative stocks due to their higher

volatility, which creates an opportunity to generate greater returns but can also create as greater loss as well.

Seasonal Stock; these are stock materials or goods that is kept at hand to meet seasonal changes or fluctuations in demand or to meet the shortfall caused by fluctuations in production also called anticipation inventory.

Dead (obsolete) stock it is a term used to describe stock or merchandise that was never sold or used by consumers before being removed from sale, usually because it was outdated. Dead stock is often warehoused, but it can also subsequently be offered for sale and typically retains its original package and tags.

2.3.2 Inventory Management

This involves the control of your inventory or stock such that you're able to hold a reasonable amount or the least amount of stock in your warehouses for easier organization, lower holding costs, better cash flow, and more space within your warehouses. When it comes to stock control procedures or techniques, less is definitely more. This requires inventory or stock levels that will sustain the business's daily operations at lower costs. It involves issues such as determining the level of stock to order, what time to order, putting in place receipt and inspection procedures as well as providing proper storage facilities. Without proper stock management procedures, businesses are likely to face two undesirable stock levels. That is, excessive or very high levels of inventory and low levels of inventory. Inventory management involves the trading off the level of inventory held to achieve high customer service levels, with the cost of holding inventory, including capital tied up in inventory, warehousing costs, and obsolescence Nuertey (2012). In most

instances, the costs can be as high as 50% or more of the value of inventory annually. Effective and efficient inventory control involves knowing the level of inventory necessary to achieve the desired level of customer service while looking at the cost of performing other activities.

2.3.2.1 Perspectives of Inventory Management

Inventory control and management is all about the business's ability of predicting the right amount of stock to keep at any point in time as well as knowing when and where to make placement of stocked goods. The objective of inventory management is basically to achieve better sales through improved service to customers, reduction in inventories to reduce size of investment and reducing cost of production by smoother production operations. According to Stock and Lambert (2001), the objectives of inventory management are to increase corporate profitability, to predict the impact of corporate policies on inventory levels, and to minimize the total cost of logistics activities.

2.3.3 Inventory Management Techniques

There are several techniques involved in the management of inventory or stock. Some of these techniques involves strategies for storing, tracking, delivering, and ordering stock. A significant amount of capital, if not the majority of a company's capital is usually tied up in their inventory. Inventory management relates to the tracking and management of stock which includes monitoring of materials both raw and finished moved into and out of warehouse and the reconciling of the inventory balances. Some of the techniques used in managing inventories include:

2.3.3.1 ABC/Pareto Analysis

The **ABC Analysis** is based on the **Pareto** principle (also called the 80/20 rule), which states that about 80% of the effects come from about 20% of the causes. In terms of inventory or stock management, the **Pareto** principle can be declared as 20% of inventory items by type account for 80% of annual consumption value.

It seeks to classify all inventories based on relative impact and value, such that the more value that is placed on an item or material, the more of that material or item held in stock. This technique assigns items to three groups according to the relative impact or value of the items that makes up the group. The categorization criteria of ABC analysis are as follows:

Category A contains the most valuable items of inventory in terms of annual consumption value. This category represents about 20% of inventory items accounting for about 80% of annual consumption value. Items from this category are subject to strict control and priority replenishment.

Category B represents inventory items of medium annual consumption value and about 15% of total annual consumption.

Category C relates to inventory items of minor significance and accounting for about 5% of annual consumption value. Such a method helps inventory managers focus their efforts on the most important inventory items by type, avoiding wasting time to control items of low significance.

Those thought to have the greatest impact or value, for example constituted the ‘A’ group, while those thought to have a lesser impact or value were contained in the ‘B’ and ‘C ‘ groups respectively. (Coyle et al, 2003). In many ABC analyses, it will be wrong to think

of the 'B' and 'C' items as being for less important than the 'A' items and as a result focus most or all of management's attention to the 'A' items. A decision might be made to assume very high in-stock levels for the 'A' items and little or no availability for the 'B' and 'C' items. The irony here is to the effect that all items in the 'A', 'B' and C' categories are important to some extent and that strategy to assure availability at an appropriate level of cost. According to (Lysons and Gillingham, 2003), Selective control will be more effective than an approach that treats all items identically.

2.3.3.2 Economic Order Quantity (EOQ)

Economic Order Quantity *(*EOQ*)* is the number of units that a company should add to inventory or stock with each order to minimize the total costs of inventory—such as holding costs, order costs, and shortage costs. According to Plasecki (2001), Economic Order Quantity is an accounting formula that determines the point at which the combination of order cost and inventory costs are the least. Economic Order Quantity approaches have proven to be effective stock management tools when the demand and the lead time are relatively stable, as well as when significant variability and uncertainty exists. It focuses more on minimizing inventory cost rather than minimizing the inventory itself. Lysons and Gillingham (2003) defines Economic Order Quantity as the optimal ordering quantity for an item of stock that minimizes costs. According to them, in calculating the Economic Order Quantity of an entity, a mathematical model of reality must be constructed. All mathematical models make assumptions that simplify reality. The model is true only when the assumptions are true or nearly true. When an assumption is modified or deleted, a new model must be constructed.

2.3.3.3 Material Requirement Planning

This is a system used for calculating the materials and components needed to manufacture an item or a product. It consists of three primary steps;

- Taking stock of the materials and components on hand,
- Identifying which additional materials or components are needed and
- Planning or scheduling their production or purchase

Coyle et al (2003) explained material requirement planning as a set of logically related procedures, decision rules, and records designed to translate a master production schedule into time – phased net inventory requirements for each component item needed to implement this schedule. According to Ballou (1999), material requirement planning is a mechanical method of supply scheduling where the timing of purchase or of production output is synchronizing to meet period by period operations requirement. He further explained that material requirement planning methods try to avoid keeping more inventory than needed at a particular time. The emphasis is on carrying only the quantity of stock needed at any point in time and this is achieved through precise timing of material flows to meet requirements. Lysons and Gillingham (2003) also defines material requirement planning as a product – oriented computerized technique aimed at minimizing inventory and maintaining delivery schedules.

2.3.3.5 Manufacturing Resource Planning

According to Wikipedia, Manufacturing resource planning is defined as a method for the effective planning of all resources of a manufacturing company. Ideally, it addresses operational planning in units, financial planning, and has a simulation capability to answer "what-if" questions and extension of closed-loop MRP. It has been defined by the American production and inventory control association as a system built around materials requirements planning and also including the additional planning functions of production planning, master production scheduling and capacity requirement planning. According to Coyle et al (2003) manufacturing resource planning (MRP II) allows a firm to integrate financial planning and operations/logistics. They further explained that manufacturing resource planning (MRP II) serves as an excellent planning tool, that helps describe the likely results of implementing strategies in areas such as logistics, manufacturing, marketing and finance. Lysons and Gillingham (2003) also explained that, manufacturing resources planning (MRP II) has wider implications than material requirements planning (MRP I). Stock and Lambert (2001), also explained that, material requirements planning (MRP I) developed into manufacturing resource planning (MRP II) with the addition of financial, marketing and purchasing components.

2.3.3.6 Enterprise Resource Planning (ERP)

This is a process used by business entities to manage and integrate the important parts of their businesses. Many ERP systems exist to help businesses implement resource planning by integrating all of the processes it needs to run an entire business with a single system. ERP system can integrate planning, purchasing inventory, sales, marketing, finance etc.

Enterprise resource planning (ERP) is a system that includes the core accounting functions of accounts payable, accounts receivable, and general ledger, coupled with logistics functions, to manage the organisation Stock and Lambert (2001).

Also according to Lysons & Gillingham (2003), enterprise resource planning (ERP) is a business management system that is supported by multi – module application software integrates all the departments' functions of an enterprise. They further argue that Enterprise resource planning (ERP) is the latest and possibly the most significant development of materials requirement planning (MRP1) and manufacturing resource planning (MRP2). Whereas MRP1 and MRP2 allows manufacturers to track supplies, work in progress and the output of finished goods to meet sales orders, ERP is applicable to all business functions and also allows managers from all functions to have an integrated understanding of what is happening throughout the business entity.

2.3.3.7 Distribution Resource Planning (DRP)

Wikipedia defines DRP as a method used in business administration for planning orders within a supply chain. DRP allows the user to set certain stock control indicators or parameters and calculate the time-phased inventory requirements. This process is also commonly referred to as distribution requirements planning. It can also be described as a way of keeping replacement of inventory in a multi-level environment. DRP avoids redundant stock or inventory and also compare inventory levels with the total amount of materials or items required to meet the amounts of product to be produced.

Coyle et al (2003), describe Distribution resource planning (DRP) as a widely used and potentially powerful technique for outbound logistics systems to help determine the

appropriate level of inventory. They further explained that, distribution resource planning (DRP) helps businesses to improve and enhance customer service, reduce the overall level of finished goods, and improve distribution centre operations. Distribution Resource Planning is an inventory control scheduling technique that applies material requirements planning principles for the distribution of inventories, Lysons and Gillingham (2003). The facts behind DRP are to forecast more accurately the demand and to relay that information back for the use in planning and developing production programs.

2.3.3.8 Just-In-Time System (JIT)

Just-in-time manufacturing also known as just-in-time production or the Toyota Production System, is a procedure aimed basically at reducing times within production system as well as response times from suppliers to customers. The concept of JIT inventory management methodology is a common stock or inventory management or control technique and type of lean approach designed to increase the efficiency, reduce costs as well as waste by receiving goods only as and when they are needed.

According to Coyle et al. (2003), JIT systems is an inventory control or management system that attempts to reduce the level by coordinating demand and supply by the point where the desired item arrives just in time for use. Normally, materials should arrive exactly when an entity needs it, with no excuse for late or early delivery. Stock and Lambert 2001 defines JIT as a program which seeks to eliminate non–value–added activities from any operations with the objectives of producing high – quality goods, at high productivity

levels, lower levels of inventory, and developing long – term relationships along the channel. They further described Just in Time (JIT) systems as anything that is over the minimum amount necessary for a task is considered unnecessary and wasteful.

Lysons and Gillingham (2003) on their part described JIT Systems as an inventory control philosophy whose goal is to maintain first enough material in just the right place at just the right time to make just the right amount of product. It is a thin manufacture system used mainly in repetitive manufacturing. It recommends that inventories or stock should be available as and when an organisation needs them. JIT inventory technique tries to reduce inventories through the removal of safety stock. .

2.3.3 First In, First Out (FIFO)

FIFO is one of the systems or procedures in stock management commonly used to estimate the value of stock or inventory on hand at the end of an operational period and the cost of goods sold during that period. This technique assumes that inventory purchased or manufactured first, is sold first and the new stock or inventory remains in stock. Therefore cost of older inventory is assigned to cost of goods sold and that of newer inventory is assigned to finish inventory. The actual flow of inventory may not exactly equal the first-in, first-out pattern.

This technique assumes that the goods or materials that were acquired or produced first are the goods or materials to be sold or consumed otherwise disposed-off. The goods or materials in inventory at the end of the financial year are matched with the costs of goods

or materials of the same type that were recently acquired or purchased. First-In, First-Out technique can be used or applied in both the periodic inventory system and the perpetual inventory system.

2.3.3. Last In, First Out (LIFO)

The last in, first out (LIFO) technique is used to place an accounting value on stock or inventory. The LIFO technique works operates with the assumption that the last item of inventory bought should be the first item or goods to be sold. The issues with the LIFO technique is that it is hardly used in practice. It is basically the exact opposite of the FIFO technique.

The motive behind the use of LIFO by businesses is the theory that the cost of inventory increases over time, which is a realistic assumption in times of inflation. If businesses use LIFO in such a circumstances, the cost of the most recently procured stock or inventory will always be higher than the cost of earlier stock bought, and hence the ending stock balance will be valued at the earlier costs, while the most recent goods costs will appear in the cost of goods sold. This method of moving high-cost stock or inventory into the cost of goods sold allows a business entity to reduce its level of proft reported and hence defer its detection of taxes on profit.

2.3.3. Vendor Managed Inventory System-VMIS

Vendor Managed Inventory (VMIS) is a business idea in which the buyer of a product or item provides information to a vendor of that item or product and the vendor takes full responsibility for maintaining an agreed inventory of the material, usually at the buyer's

consumption location. It is a concept based inspired by a combination in supply chain management with respect to system dynamics. Currently, different corporations such as vendor managed inventory method have been used in inventory management as a means to manage with the bullwhip effect. Wisner et al, 2005, also explains vendor managed inventory services as one of the most prevalent roles of third party logistics firms today. Businesses are better able to manage their customers' inventories if they can have real-time visibility of inventory in the customers' storage locations.

2.3.3. Kanban Inventory System

This is a system of lean production or manufacturing where production happens with the minimum amount of stock or inventory. This method proposes that Instead of keeping huge amounts of inventory or stock, an indication is used to place order for the inventory as they are being used up in the production process.

With this technique, a business entity only restocks goods based on the volume or quantity it anticipate selling. This methodology uses terms such as the downstream and the upstream to show where the pull typically occurs. For example, in order to produce or manufacture an item, an inventory may be required. The team that is to produce or manufactures the item or product is called the upstream, and makes their orders from the downstream with only the amount of material or inventory that is required to produce or manufacture that item.

2.3.4 Reasons why Businesses hold Inventory

Inventory is regarded as one of the most important assets of any business organization. The techniques of managing inventory has to be practical, accurate and efficient. Though holding too much or too little stock or inventory puts so much burden on the productivity and profitability, it is still very essential for businesses to hold a sufficient amounts of inventory at all times.

The principal objective of holding inventory is to ensure that businesses are able to meet customer service targets without compromising the cash flow or running out of stock. When customers are deprived of what they need as and when they need it, they often cease to be customers. This most results in Losses and customers jumping ship to a competitor, or paying the holding costs on surplus stock that may be obsolete.

Businesses constantly refine their supply chain activities in a constant and never-ending bid so as to attain ideal stock levels. This is largely because any decrease on the costs relative to inventory, ordering costs, storage costs and shortage costs, points to improved profitability, access to more working capital and the ability to take advantage of opportunities as they come.

Because of the uncertainty in future demand, and the unavailability continuous supplies of goods and services, inventory is held to ensure a continuous availability of goods to reduce the overall costs associated with the management of inventory. Drury 2000, indicates that the purpose of holding stock by a business organization is for three motives that is the transaction, precautionary and speculative reasons.

1. **Transaction Motive:** This motive of holding inventory propels a business organization to maintain inventories levels such that there are no blockages in their production schedule and sales. It is a usual phenomenon for a business to plan inventory investment proportionate with the level of transactions in the business. The business seeks to ensure that on the shop floor, production does not get stalled for want of raw materials. Hence sales do not suffer on the basis of non-availability of finished goods. According to Balloon, inventories should be held to improve customer service and therefore goods should be spotted at a place where customers can get them in the quantities they wish. Pandey 2002**,** also argues that the transaction motive emphasizes the need to maintain inventories to facilitate smooth production and sales operation.
2. **Precautionary;** the precautionary motive is also at work. Stocks are held such that there is a mitigation against unpredictable happenings. For example, there may be a sudden and unforeseen levels in demand for finished goods or there may occur a sudden and unforeseen collapse or interruption in supply of raw materials or other constituents needed for production. A business entity would certainly like to have some leverage to rush over such situations. Gittinger (1995), argues that precautionary motive means stock are held to guard against risk of unpredictable changes in demand and supply in the market. It is therefore advisable to ensure product availability at all times of the business operations, businesses maintains additional amount of safety stock to meet regular production and market needs. Precautionary motive necessitates holding of inventories to guard against the risk of unpredictable changes in demand and supply forces as well as other factors.

3. **Speculative Motive:** Stocks or inventories may also be held to take advantage of price fluctuations. For example, if the price of a particular raw material is expected to go up somewhat steeply, the business organization may or can decide to hold a larger amount of stock than necessary stock of this raw material. Firms are expected to maintain back up of inventory either in excess or at low levels to take advantage of current and future demands of price instabilities. According to Kakuru, 2000 businesses should purchase goods and stock them in advance when they anticipate price increase in future and also prepare for contingencies that may befall them. Pandey (2002) also indicates that speculative reasons influence the decision to increase or decrease inventory levels to take advantage of price instabilities.

According to Kenneth and Brian (2006), most of the reasons for keeping stock or inventory include reducing the risk of supplier failure or uncertainty. Safety and buffer stocks are also held to provide some protection against civil disturbances such as strikes, transport breakdowns due to disasters such as floods or snow, crop failures, wars and other factors. Protection against lead time reservations, especially where supplies replacement and lead time are not known with certainty. On such occasions, investments in safety stocks are necessary if customer services is to be maintained at acceptable levels. Meeting unexpected demands or demands for customisation of products as with agile production and smooth seasonal or cyclical demand. Taking advantage of lots or purchase quantities in excess of what is required for immediate consumption to take advantage of price and discounts on volumes. Hedging against predictable shortage and price increases, especially in times of high inflation or as a deliberate policy of speculation.

Bloomberg, Lemay and Hanna 2002, also identified five (5) mains explanations for keeping inventory. This include;

Economies of scale. Businesses can recognise economies of scale in production, manufacturing, purchasing and transportation by keeping stock. Whenever a business purchases large amounts of goods or items, it is given discount on quantity purchased. Consequently, larger amounts or volumes can be transported and achieve economies of scale through better utilisation of equipment's or machinerey. Manufacturing can have unique production runs if more material is inventoried, allowing reduction in per units fixed cost of items.

Balance of supply and demand. Most businesses also accumulate stock or inventory taking advantage of seasonal demand. A toy manufacturer see some demand year – round, but 60 percent or more of sales will come in the Christmas season. By manufacturing to stock, production can be kept throughout the year. This reduces idle plant capacity and maintains a relatively stable workforce, keeping costs down. If demand is relatively constant but input materials are seasonal, such as in the production of demand fruits, then finished inventory helps meet demand when the materials are no longer available.

Specialization. Stocks or inventory permits businesses with affiliates to specialize. Instead of producing a diversity of items and transporting the finished products directly to consumers or customers or for storage.

Protection against indecisions. One of the basic motives to hold inventory is to guard against or make provision for uncertainties in demand. When demand increases and raw material stocks run outs, the production line shuts down until more material is delivered.

Similarly, a shortage of work in process means the product cannot be finished. Finally, if customer order outstrips finished goods supply, the resulting stock outs could lead to the lost customers leading the poor services delivery to the organisation.

Buffer boundary. Holding of stocks can server as a buffer key boundaries, generating time and places utility. Key interfaces include; supplier and purchasing, purchasing and production, production and marketing, marketing and distribution, distribution and intermediary, and intermediary and customer. Having inventory at these interfaces helps ensure that demand is met and stock outs are minimized.

2.3.5 Some Challenges Relating to Stock Management

Inventory management in Business is a major challenge for many business operations. Though tight inventory control and sales forecast are two key strategies that help with inventory management. Businesses are still facing major inventory challenges and taking the time to look at and understand these challenges can be a turning point in solving them. Some of these include;

1. Breaking down the inventory into safety stock, replenishment stock, and normal stock in order to maintain adequate levels for each of them.
2. Using numerical methods that integrate sales forecast data to precisely compute safety stock levels.
3. Recalculating safety stock levels at least every quarter to improve the effectiveness and efficiency of your inventory control.
4. Determining who takes key inventory control decisions in order to maintain cost-effective inventory levels as well as to ensure a fast and reliable customer service.

5. Gathering a team that decides when new products have to be ordered or manufactured to keep up with the effects of major marketing campaigns.
6. Determining how often to order new inventory items when this isn't set by the supplier or the factory from which the products are obtained, while taking into consideration switch and inventory costs.
7. Deciding whether inventory ordering should be done regularly using data from investigative tools, in order to constantly improve the inventory control
8. Instituting a process for determining why excess stock arises and figuring out how to deal with it in a cost-effective manner.
9. Allocating the tasks of ascertaining the root causes of obsolete stock to different teams within your organization, which work simultaneously, linking their efforts.
10. Performing effective inventory control on all parts of your inventory, not only the finished goods.

2.4 Supply chain

Supply chain is a system of establishments, people, events, information, and assets involved in moving an item or product or service from a supplier to a consumer or customer. Business Supply chain is that system of establishments that are used through the upstream and downstream relationships, in different processes and activities that produce value in the form of products and services in the hands of the ultimate customer or consumer. According to Lyson and Farrington (2006) supply chain is that network of organizations that are involved, through upstream and downstream linkages, in different processes and activities that produce value in the form of products and services in the hands of the ultimate customer or consumer.

A supply chain is the linkage of all the individuals, organizations, resources, activities and expertise involved in the formation and trade of a merchandise, from the carriage of source materials from the supplier to the producer, through to its final conveyance to the end user.

Supply chain refers to the complete chain of units, directly or indirect connected and inter-reliant in serving the same customer or consumer. It involves sellers that provide or supply the raw materials procedures who transform the material into end products, warehouse for the storage as well as delivery center that distribute to the dealers or wholesalers, and retailers who convey the product to the end user. Supply chain highlights the entire network because without them no business unit or producer can serve their customers effectively. Techniques complement with each other only through the supply chains and no amount of improvement in one procedures can make up for deficiencies in a supply chain which reduce the procedure's ability to compete.

The SC consist of a set of organization, people, events, data, and assets or resources involved in moving an artefact or product and service from the supplier or producer to customer or final consumer. Supply chain activities convert ordinary resources or raw materials as well as other components into a complete products that is delivered to the final consumer.

The objective of SC is to exploit the general value created. The value that is generated or created by the SC is the variance between what the final product is worth to the consumer and for the work the supply chain disburses in filling the consumer or customer's demand.

Droodchi and Nikmehr (2007) define supply chain based on the information and use of that information which encompasses the following features:

- **Widespread coverage**: Supply chain information covers the communications from suppliers or manufactures, to distributors and retailers. Data or information flow involves two different current supply and demand.
- **Access channels:** Businesses in the supply chain comprises cooperation and integration complex and such there should be as many channels as possible for the flow of information on supply chain.
- **Quality of Data:** Due to the technical nature of the supply chain, the quality of data and information is much higher than the information in a single entity.

2.4.1.0 Supply chain management (SCM)

Supply chain management involves the oversight of resources such as material, funds and information as they move along a process from the supplier, manufacturer and to wholesaler or retailer as well as the final consumer. There are three main flows within the supply chain of the product flow, the information flow and the financial flow. Supply Chain Management involves the synchronizing and mixing of these flows both inside and between companies.

According to Chaffey (2004) SCM comprises the coordination of all supply activities of an organization from its supplier and delivery of products to its customers. Supply Chain Management activities incorporates the planning and management of all activities involved in finding and procurement, conversion and all logistics related management activities.

Consequently, it also involves organization and cooperation with network partners, which could be suppliers, mediators and third party service providers as well as consumers or

customers. According to the Council of Supply Chain Management Professionals, supply chain management follows encompasses planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities.

Altekar (2006) defines SCM as the method of enhancing the delivery of goods, services and information from a supplier to a customer. It consist of a set of business activities that involve a trading entity in the collective goal of fulfilling the needs of the end consumer. Basically it includes enterprises resources planning as we discussed earlier, manufacturing or processing, warehouse management and transportation management system.

With improvement in technology, there are automated substitutes to the conventional paper chain, providing business organizations with a clever, faster and more efficient ways to getting the right product and price to the right consumer at the right time. SCM integrates the influence of the Internet with the modern technology that allows contributing suppliers to access up to date business information and also facilitating businesses to better manage and keep track of supply and demand trends.

2.5 Business Communication

Business communication involves information sharing between individuals and groups within and outside a business that is performed for the profitable benefit of the organization. It is also defined as transmitting of information within a business by its people. Communication can also be defined as a transmission of information from one person to another person. According to Prasad (2004) it is a way of reaching others by transmitting ideas, fact, thought, feelings and value.

Communication is the action of carrying information through the interchange of thoughts, meaning from one end to another.

2.5 Buyer-Supplier Relationships

Relationship exist between buyers and suppliers and this is can be very intricate and complicated sometimes due to the fact that each party wants to maximize profit. There may be conflicting interest that can compromise this relationship. Buyers are the ones or businesses that purchases goods or services from the suppliers.

The research work uses relationships based on assurance and conviction without any prescribed arrangements but purely on mutually beneficial terms for long-term collaboration, discounting the aggressive type of relationship that may be real and hence does not inure to the benefits of each other and established on dependence arrangement. The significance is to analyze the attributes that sustain such relations in improving performance.

According to Bruggen et al. (2005) supply relationship management most especially between suppliers and customers is observed as one of the crucial management dependency where maintaining strong but long-term relationships become driving force for remaining in business. However, it is significant to observe that any time there is trust and understanding between the two parties, each performing their part of the contract agreement, the organization is able to safeguard confidential information, and as such the relationship become long lasting and advantageous to both parties. Developing business confidence to long term relationship is not an easy task. According to Thomas et al. (2002);

Kingshott and Pecotich (2007), it has different sizes and contents that must be balanced and maintained.

A number of research work indicated in the literature have the assurance of the two specific indicators of good will and credibility as defined by Baker et al (1999). The conviction is that both the supplier and vendor or buyers motives are made very clear in developing ad establishing long-term buyer - supplier interactions. The quests for self-centered desires in order for profit motive are abandoned. Hence the integrity is a serious factor, and as such each partner in the supply relationships keeps their words and assurances in achieving their contractual arrangement or obligations. The dependence demonstrates the extent to which a party must institute the relationship with your business partner so as to realize the desired objectives.

According to Tellefsen et al. (2005) the dependency may exist because the company needs to maintain that relationship to survive especially in competitive procurement environment. To be able to sustain the relationship one regularly must be open to business requests and also willing to subject to adjustment by the other business partners while the dependent businesses have weaknesses and are ready to continue operating within the guidelines for future relationships. Therefore building of trust in procurement and supply chain requires some level of commitment, communication, long-term direction, continuous stakeholder engagements and the capacity for development and education to ensure the quality of relationships.

According to Athanasopoulou (2009), Customer loyalty has two meanings. Long-term and short-term loyalty. Customers with long-term loyalty do not easily switch to other service

providers, while customers with short-term loyalty defect more easily when offered a perceived better alternative. With regard to the impact of IT on SCM, this study examines how relationship quality and commitment as well as mental image influence long-term loyalty. Also he indicates that relationship quality consists of two aspects. He argues that the primary measurement to build a comprehensive supply relationship is by the commitment and intended gratification to be gained from the creations of relationship.

In as much as obligation is assumed to mean that business partners believe in unending business relationships and hence trust one other to perform their best to embrace the given objectives until such a time they no longer interested in the business agreement. Geyskens et al., (2000) also mentioned that long-term relationships in business are an coordination and the observation of the interdependence of results that are attainable if parties are committed for the intended results in the long run. The fulfilment of business relationship is estimated on the bases of the suppliers' commitment to belief what brings about the economic and social fulfillment.

2.6. Concept of buyer-supplier partnership

Business collaboration is defined as "two or more chain members working together to create a competitive advantage through sharing information, making joint decisions, and sharing benefits which result from greater profitability of satisfying end customer needs than acting alone" (Togar and Sridharan, 2002). Business relationship is a withdrawal from the presenter point of discreteness that motivates business transactions to a relational exchange as the roles of suppliers and buyers are no longer barely defined in terms of the simple transfer of ownership of products. Concentrating on relational exchange,

collaboration relates to the set of activities that are commenced mutually rather than unilaterally. According to Simatupang and Sridharan (2003), the requirements for effective collaboration are mutual objectives with integrated policies, joint decision making, information sharing, as well as sharing of benefits and losses.

2.6.1.0 Trust in SCM

According to Doney and Cannon 1997, trust is the extent to which supply chain partners perceive each other as credible and benevolent. Ganesan, 1994 describe credibility sayint that it reflects the extent to which a firm believes their relationship partner and has the expertise to perform effectively while benevolence occurs when a firm believes their relationship partner has intentions and motives that will benefit the relationship. As supported by Moorman (1993) who also defines trust as "a willingness to rely on an exchange partner in whom one has confidence". Trawick (1987), operationalizes trust in five dimensions as reliable, honest and competent, partner orientation and friendly.

Additionally, Muhwezi (2009) postulates that trust gives the self-confidence that the other party can be relied upon and that it is also both a precondition and an outcome of collaboration. He believes that trust is conveyed through faith, reliance, or confidence in the collaborating partner and is viewed as a willingness to forego opportunistic behavior.

2.6.2.0 Commitment in SCM

Commitment is an engagement or obligation that restricts freedom of action. According to Dion et al., 1992, commitment is the belief that trading partners are willing to devote energy to sustaining the relationship. However, Moorman, Zaltman and Deshpande (1992)

describe commitment as "an enduring desire to maintain a valued relationship". Commitment enjoins partners to commit resources to sustain and advance the goals of the relationship. Basically, there are two (2) main scopes of enhancing commitment. Instrumental commitment which according to Gilliland and Bello, 2002 is where a party is limited by the costs and inconveniences of leaving the current collaboration. Normative commitment also according to Brown et al., 1995 is based on the partners' value in the collaboration and effective commitment which relates to a partner's identification and involvement with the others.

2.6.3 Business Adaptation

This is the ability of a business entity adjust to changes within and around the business environment. Hallén, (1991); Mukherji and Francis (2008) explains that adaptation is the specific modification made by a firm to meet the requirement of exchange partner. In line with the argument of Henry Ford (1998) who describes adaptations as a way in which a company shows that it can be trusted to respond to a partner's requirements. Sousa and Bradley (2008) also conceptualize adaptation in terms of product, price, distribution and promotion and they further explained that adaptation decisions regarding product, price, promotion, and distribution differ from business to business since each cooperative group has exceptional needs.

Theodosiou, and Leonidou (2003) also hypothesized product, pricing, promotion and distribution adaptations as the degree to which the product meet requirements. The point at which the pricing strategies such as retail price, wholesale price, and profit margins meet

combined creativities. Also, the adjustment of the promotional program such as advertising etc to match the needs of the other party and the adjustment of distribution a relationship.

According to Brennan and Turnbull (1995) adaptation is significant, because most collaboration is based on some kind of match between the operations of the two firms. It occurs when suppliers adapt to the needs of specific important customers and that customers adapt to the capabilities of specific suppliers (Hallén et al., 1991). Most adaptations that each of the parties effect to their usual processes are generally arranged in any of the contracts between the buyers and suppliers, whereas others are informal adaptations that are established to cope with difficulties that arise. The adaptation conduct usually differs over the life within the firm's relationship. At the early phases adaptation is a means to advance trust, and at the matured phase it is about extension and cementing of the relationship. It is to establish a bond between the buyer and seller in a much tighter relationship and forms walls for entry to a competing supplier.

2.8 Customer-supplier relationship and trust

The spirit of a strong relationship between a buyer or customer and supplier or seller is trust, which in turn affects the supplier performance and subsequently the business performance. Berry and Parasuraman (1991) explained that a buyer and supplier relationship requires trust if the relationship is to be persistent. Effective and positive buyer-supplier relationship is mostly characterized by a high level of trust along with a readiness to share the risk thereof (Maini and Sahay, 2002). Assuming a high level of trust, parties in the partnership or relationship want to continue, and this increasingly reduces

unscrupulousness. It is also noted as far as there is trust the parties' values the relationship this is according to Brown et al., 1995 and hence wants to be recognized with the relationship. According to Mettessich and Monsey (1992) partnership and trust are reciprocal processes; they rely on each other and also substitute each other.

Better cooperation embraces the probability of greater trust as the business partners have knowledge of one another overtime and also have the chances to witness the goodwill, trustworthiness, competence, honesty and openness of their partner as explained by (Putnam, 1993). Goodwill and trust are usually underscored as the most significant issue for managing long-term relationships and collaboration but it is also as a result of long-term affiliations between partners as underscored by Spekman et al. (1998). According to Moorman 1993, trust is "a willingness to rely on an exchange partner in whom one has confidence". Whereas Anderson and Narus (1990) focuses on the apparent outcomes of trust where one party believes that the other entity will accomplish actions that will result in progressive results for the entity as well as not taking unanticipated activities that will result in undesirable results.

Generally it is established that trust obviously exists when one party has assurance in a cooperative exchange partner's trustworthiness and integrity. This is in agreement with Luo and Park (2004) who suggest that Collaborative arrangements among partners induce further collaboration over time and the emergence of trust and loyalty which generate increasing benefit.

Moreover, for supply-chain partnerships to become truly collaborative in nature, trust, is not only a desired characteristic, but a necessary characteristic (Spekman et al., 1998, p.

635). According to Mentzer et al (2000) strong relationships increase the likelihood that firms will exchange critical information as requirement to collaborate. In order for this sharing of critical information to occur, a high degree of trust must exist among the collaborating partners (Frankel et al., 2002). Morgan and Hunt (1994), propose that when exchange partners communicate and share similar values, trust is enhanced. In this respect, shared values reflect the degree to which partners share goals that can be accomplished via joint action and align incentives towards parity in buyer-supplier collaboration (Morgan and Hunt, 1994; Wilson, 1995; Chen and Barnes, 2007).

2.9 Buyer-supplier collaboration and commitment

Buyers collaborate with suppliers whom they perceive as having made idiosyncratic investments on their behalf. More generally, it is the willingness to collaborate that demonstrates the supplier's obligation to withstand the relationship. It is worth noting that the resource spent in the performance of some cooperation to support a given relationship cannot be readily transferred elsewhere according to Williamson (1985). In such situations it sends a signal of commitment to the relationship and result in an entity being considered more dependable by the other partner. According to Morgan and Hunt (1994), commitment is a central aspect for the supply relationship success. It implies that, when commitment exist, efficiency, productivity and effectiveness are encouraged. In addition, according to Anderson and Weitz (1991) the commitment of each supply chain linkage is based on its commitment perception regarding the other members. Consequently buyer's commitment influences positively that of the supplier's commitment.

2.9.1 Electronic data interchange

Electronic Data Interchange is a method of sharing data and information between two or more computer systems or network. Usually used by businesses for e-commerce purposes such as sending customer orders to warehouse or tracking customer order. There is more to EDI than just an email. Electronic Data Interchange is a process that allows one business entity to send information to another business entity electronically instead of with paper. It is basically paperless. It refers to the arrangement of data transmission between businesses by electronic means. It also refers to the transfer of documents electronically from one computer system to another. That is from one business entity to another business entity.

2.9.2 Concept of information

Information is define as processed data that makes meaning. It is knowledge or data presented to a person in a form that makes meaning and can be understood. Data or information that has attributes such as accuracy and presented timely for business decision making. Data or information for business decision making must be accurate, relevant, reliable, timely and above all cost effective.

2.9.3.0 The Concept of Information technology

It involves the development, maintenance, and use of computer systems, software, and computer networks for the processing and dissemination of information or data. The concept of the technological innovation itself are also an important determinant in the decision to adopt IT. Rogers (1983) outlined the desirable characteristics of an innovation in terms of its relative advantage, compatibility, complexity, observability and trialability. These terms are defined as:

1. Relative advantage: how much better an innovation is perceived to be compared to its Predecessor.
2. Compatibility: how consistent an innovation is perceived to be with regard to existing values, past experiences and the needs of the targeted adopters
3. Complexity: how difficult and innovation is perceived to be to learn and use,
4. Observability: how visible the results of innovation are to others, and
5. Trial ability: how much an innovation may be experimented with prior to adoption

Applying Roger's (1983) theory to the adoption of IT in SCM as the innovation, the software must be perceived better than the predecessor system (most likely a manual SCM system); must be consistent with the needs of the adopter, such as capable of handling GST; must be easy to learn and use; the results must be apparent; and such application should be available on a trial basis. Over the past decade, the advent of powerful, low cost micro-computers coupled with user-friendly inventory management software, have improved and lifted the barriers to IT innovation adoption. This has led to an increase in the adoption of IT by small business (Thong 1999).

According to Anderson (1990), information technology is the study, design, development, implementation, support or management of computer-based information system, particularly software applications and computer hardware. IT comprises all materials relating to the maintenance of computer science and technology as well as the design & development, installation and implementation of information system and other computer

applications. Information and Communication Technology refers to the use of computers and computer systems and applications that is linked by a network or internet. ICT consist of a numerous nodes of microcomputers and many other devices such as telephone and mobile phones, radio, television, video, voice information systems as well as computer-mediated networks that are inked to a personal computer to the internet. It is an integrated system that integrates the technology and infrastructure essential to process, store, manipulate, and transfer the information that is required by the legal and economic organizations to regulate its access and practice as well as the social and inter-personal structures which allow information to be shared.

Information technology design is a cohesive framework for obtaining and evolving IT to attain strategic objectives. Information Technology can be said to have both logical and technical constituents. The logical constituent includes the mission, practical and information requirements system configurations and information flows. According to Rahul (2006) the technical components of IT comprise the IT standards as well as the rules that will be used to implement the logical architecture. IT can also be discussed as the study design, development, implementation, support or management of computer based information system particularly software application and computer hardware. It is the mixture of telecommunications and computing to achieve processing, storage, communicate and producing output as information in the form of sound, image and text (alphanumeric). It integrates a diversity of restraint including telecommunication, information system, software design & development as well as database management system. Information and communication technology particularly has brought a complete standard shift on businesses functions and on their customer service delivery. As a result,

there are more flexible and user friendly service delivery modes that business organizations have.

2.9.4 Information and Communication Technology

According to Bajaj and Nag (2005) Information and communication technology (ICT) could be described as an umbrella word that comprises any communication device or application that includes radio (wireless media), television, mobile phones, computer hardware and software as well as computer networks, satellite systems etc. It also includes the various services and applications related to them such as video conferencing etc.

2.9.4.1 Software

Computer software refers to the set of instructions or programs that tells the computer what to do. It refers all the installed programs which allow the computer hardware to operate effectively. Computer software instructs the computer on what to do and how to do it. It therefore means that without a computer software, the computer becomes more or less redundant. The term software simply applies to those programs that are built within the computer and also what is additionally installed. It can be categorized as system software (operating systems) and application software (specialized and office suit). The hardware and software taken together forms a computer system (Seleemi, 2009).

2.9.4.2 Hardware

These are the physical components of the computer system. They are physically connected to your computer or something that can be physically touched. Most computer hardware will contain a circuit board ICs, and other electronics. A perfect example of hardware is a computer monitor, which is an output device that lets you see what you're doing on the

computer. Without any hardware your computer would not exist, and software would not be able to run.

2.9.4.3 A computer

It is an electronic device that accepts data, process the data into information as an output. It has the ability to store the information and also transmit the information between different computers on a network.

Oxford dictionary, (2000) defines a computer to be an electronic device that can store, organize and find definitions, do calculations and control other machines**.**

A computer can accomplish arithmetic calculations, hence it is more than just a calculator. It is a device that can copy, move, relate and perform other non-arithmetical calculations on the many alphanumeric and other codes that can be used to represent objects. The computer can controls these objects or symbols in a preferred pattern by following a set of instructions called a program or software. A program is a complete set of instructions that guides the computer system how to perform a function in a specified manner to produce a desired outcome.

2.9.5 Management information system

Management Information System (MIS) can be referred to the complete set of components working together to collect data, process it, produce information, store and disseminate the information for the purpose of decision making. It helps us to do our planning, controlling, coordinating and analyzing. Management information system can also be defined as computer system typically built on mainframe computers designed to provide information

to management to enhance organizational performance or business activity such as inventory management and sales etc. Information requirements differ according to the level of management.

Management information system is the most significant and ancient of all present systems in businesses organizations today. As stated by Daştan and Sürmen (2007) management and information are the two inseparable concepts showing the impossibility of the normal performance of management functions without information. Management information system (MIS) comprises of a number of subsystems. Accounting Information System is another aspect of computerized systems used by organizations for transaction purposes. There are various definitions of AIS and it is seen as a subsystem of a management information systems, and its major function is to process financial transaction, as well as non-financial transactions that directly affect the processing of financial transactions.

2.10 Procurement Principles Affecting Compliance

Act 2003 of the Public Procurement authority identifies certain principles that ensure that the procurement of goods and services and works are done in the best interest of the beneficiaries while achieving value for money in accordance with the act.

These principles as guaranteed by the procurement act include;

2.10.1 Professionalism

Profession basically is a career established upon specialized educational training, the purpose of which is to provide disinterested objective counsel and service to others, for a direct and definite compensation, wholly apart from expectation of other business gain.

Consequently, a professional is someone who exhibit the competence or skill expected of a professional, hence the key to quality and efficiency is professionalism.

It is a discipline where educated, experienced and responsible persons tasked with a responsibility to make informed decisions regarding procurement activities. It is based on this assumption that the Public Procurement Authority commits resources on the training and development of individuals as well as promotion and support for those involved in public procurement to ensure compliance to professional and ethical standards.

2.10.2 Transparency, Competitiveness and Fairness

The word transparency as used in business and other social settings operates in such a manner that is easy for others to see what actions are performed. Transparency implies openness, communication, and accountability as well as fairness in whatever business transactions engaged in. Achieving transparency in procurement results when the same set of procurement rules or guiding principle for the procurement of goods and services are clearly specified and made known to the parties involved before the start of the procurement processes. Transparency leads to the reduction in cost as well as delivery of quality goods and services or works which eventually increase the lives of the beneficiaries. Transparency in the procurement processes can be accomplished when tenders are advertised, publish, and are open in a fair and open way and the winner announced with the terms and conditions of the contracts publicly declared as well as final delivery of goods or services in accordance with the stated contract specifications.

2.10.3 Accountability

The obligation of an individual or organization to account for its activities, accept responsibility for them, and to disclose the results. Accountability is also referred to as answerability or liability. Officers in charge of different business units are required to be accountable to the owners of these business. Employees of these businesses should be held accountable for their actions and in actions and also their decisions taken on behalf the business organization. Basically, there is a relationship between accountability and transparency as transparency requires the advertisement of procurement processes, opening of public tender and other disclosures.

2.10.4 Value for Money in the Procurement Process

Every business organization must ensure due diligence in its procurement activities to ensure that value for money is achieved. This can be best done when there is a rational combination of Cost and Quality of the Goods and Services obtained. According to the PPA Manual (2006) value for money requires procurement practitioners to think strategically and blend different approach. The efficiency and effectiveness of every procurement activity is measured by the extent to which Value for Money is achieved in the entire process. Therefor Value for Money is such an important model in the area of procurement. According to the World Bank, 2003, efficiency, effectiveness equity and economy are the four (4) E's that measure Value for Money attained in a procurement process.

Undermining Value for Money in the execution of a business or procurement function suggest the non-compliance to the Procurement Act as provided by the public procurement

authority. It is very essential in the procurement sector based on which procurement managers are measured to establish their level of transparency, fairness and accountability in the procurement process. The concept is not only about minimizing cost or obtaining goods and services at a lower cost but also to ensure the achievement of the four E' (Efficiency, Effectiveness Equity and Economy) within a procurement processes. Therefore procurement professionals are required to continuously develop the procurement processes to be able to achieve Value for Money.

2.10.5 Efficiency

According to Wikipedia, efficiency is the ability to avoid wasting of materials, energy, efforts, money, and time in the performance of an activity or in producing a desired result. Generally, it is the capability to do things well, successfully, and without waste. Procurement process is thought to be efficient when it accomplishes results in a more cost effective and more advantageous manner. This simply means that goods and services are delivered in a timelier manner good enough to meet the needs of the people for which the goods and services are procured. Efficiency and value for money audits are directly related as a more procurement system transforms better attaining value for money since value for money relatively is the amount of efficiency, effectiveness, equity and economy.

The paramount manner in which to realize efficiency for the various procurement procedures are through Competitive tendering since this allows for competition and fairness. Competition guarantees and ensure effectiveness also ensure that bidders charge reasonable amounts in their bid to enable them win the contract allowing the realization of

efficiency and effectiveness within the procurement processes. According to McDonald (2008) efficiency when accomplished reduces the cost of procurement processes hence available resources can be used for the needs of more citizens and hence reducing corruption and poverty. He indicates that procurement systems capacity to address the most urgent needs of the people or community to their gratification using less resources is what can be referred to as efficiency. The PPA (2008) indicates that the ultimate way to ensure efficiency and effectiveness of the procurement system is to be transparent and fair in dealing with the procurement associated activities so as to satisfy the customers essentially the people or owners as well as the bidders.

This can only be realized through the engagement of very good procurement players as well as observing the provisions of the act, (act 663) and the procurement rules that are issued occasionally by the public procurement authority.

A mutual but confusing approach of differentiating between efficiency and effectiveness is to say that, Efficiency is doing things right, whereas effectiveness is doing the right things. This saying incidentally highlights that the selection of objectives of a production process is just as important as the quality of that process. This saying popular in business however confuses the more common sense of effectiveness, which should produce the following reminder. Efficiency is doing things right, effectiveness is getting things done. This makes it very clear that effectiveness, for instance large production numbers, can also be achieved through inefficient processes if for example workers are prepared or used to working longer hours or with greater physical effort than in other companies or organizations or if they can be compelled to do so. Equally, a company or business

organization can achieve effectiveness, for example large production numbers, through inefficient processes if it can manage to use more energy per product, for example if energy prices or labor costs or both are lower than that of its competitors.

2.10.6 Ethical Approach

Ethics or moral philosophy is a branch of philosophy that involves structuring, defending, and recommending concepts of right and wrong conduct. It is the code of right or wrong that oversees our decisions, behaviors and action. Morally it defines what we stand for and is suitable for ensuring that decisions of business practitioners are ethically correct in the best interest of the business owners or people. Essential ethical issues in businesses include promoting conduct based on integrity and that bring about trust, but more complex issues include accommodating diversity, compassionate decision-making, and compliance and governance reliable with a company's core values.

In the multifaceted global business environment of the 21st century businesses and companies of every size face a myriad of ethical issues. Businesses organizations have the obligation to develop codes of conduct and ethics that every member of the organization must abide by and put into action. Essential ethical issues in business include promoting conduct based on integrity and that stimulates trust, but more germane complex issues include accommodating diversity, empathetic decision-making, and compliance and governance consistent with the company's core values.

2.10.7 Technology

Technology can be described as the collection of techniques, skills, methods and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation. The use of technology in the procurement sub sector can have the propensity to minimize corruption, speed up the procurement processes and encourage transparency. Technology will ensure the possible to automation of the procurement processes so as to reduce the so many human interventions and the manual hands who sometimes ask for something from bidders before working on their contract documents.

Technology has many effects in affairs of today's business organizations. It has helped to develop more advanced economies and has also allowed the rise of a leisure class. Most of these technological processes produce unsolicited end products known as pollution and also drain natural resources to the detriment of the environment. Technology and innovations have always influenced the values of a society and raised new questions in the ethics of technology. The application of Technology is very vital in having a robust and efficient procurement system.

2.11 Appearance of Public Procurement

Government procurement or public procurement is the procurement of goods, services and construction on behalf of a public authority, such as a government agency etc. The philosophy that purchasing is a service function in business establishments was outward and usually subservient to manufacturing or production in the engineering sector, or to economics in the service sector or perhaps to the user section in a business organization.

Public procurement also refers to the purchase by governments and state-owned enterprises of goods, services and works. As public procurement accounts for a substantial portion of

the taxpayers' money, governments are expected to carry it out efficiently and with high standards of conduct in order to ensure high quality of service delivery and to safeguard the public interest. The views are that a practitioner could do the bidding of more strategic essentials of the business and also make use of their expertise at the secondary level.

In 1983, Jones developed a procuring framework. In his purchases model, he tries to establish whether or not business organizations with well-developed procuring functions were more efficient and effective negotiators than those where purchasing were not developed. A diversity of benchmarks were measured and profiles produced. He observed that where purchasing activity was well developed, the business organization negotiated not essentially better prices but better deals, based on strategic acquisition cost than where purchasing activity were not well developed.

Reck and Long (1988) also developed what is known as the four phase strategic procurement model. He began investigation about the contribution procurement could make to organizational strategies of businesses.

The Reck & Long (1998) four phase strategic procurement model include;

Passive – where purchasing reacts to requests from other departments. At this stage the purchasing function has no strategic direction and primarily responds to the requests of other functions or departments within the business organization.

Independent - During this phase, the importance of negotiation with suppliers to securing the best prices for individual products or services purchased is recognized.

A more professional approach to purchasing is taken or used. At this level, the purchasing function adopts the latest purchasing techniques and practices, but its strategic course is independent of the firm's competitive strategy.

Supportive - The potential for purchasing to support wider organizational goals is acknowledged. This phase is often characterized by a centralized purchasing department with organization-wide buying policies and systems. The significance of careful supplier selection is recognized. The purchasing function support the entities competitive strategy by accepting purchasing methods and procedures which build up the firm's competitive location in the industry.

Integrative – At this phase, purchasing is now fully integrated in the major business activities of the organization. Pro-active purchasing strategies are developed and persued. Purchasing is part of the organizational strategic planning process and purchasing strategy is aligned with corporate goals and strategy. At this, the purchasing strategy is fully incorporated into the company's competitive strategy and forms part of a combined effort to formulate and implement a strategic plan for the business organization.

2.14. Identification of Need

A need is something that is essential for an organism to live a healthy life. Needs are distinguished from wants such that, in the case of a need, the absence causes a clear adverse result or consequence. In the case of businesses, needs are the gaps between the current state of a business and its goals. Needs are the basic drivers of change in an organization or business entity that are identified as requirements and implemented by hiring people,

implementing projects, transforming operations and purchasing goods. There should always be the appreciation of a certain need by the procuring organization before any procurement activity arises. The business entity must be aware of what the individual unit requirements are, that is; what is needed, how much of it is needed, and when it is needed. This is to ensure that there is adequate planning and preparation of a material requisition from inventory. Within time intervals such requisitions may be realized by a simple transfer of excess stock from another function or department. Some purchases requisition emanates from within the production or user department (Reck and Long, 1988).

The purchasing department is accountable and responsible for selection to identify the needs and requirement of the user departments. The procurement manager should ensure not only that the requests be up to standard in nature but as much as possible be at a minimum of special or normal orders be placed, but also that requests be as precise and clear as possible (World Bank,2003).

Usually what the business entity need should actually be what is supposed to be purchased, that is, the person or entity responsible must know precisely what he / she wants. Hence, it is important to have a clear-cut description of the need, the product, the object, or the service requested. Procurement as well as the end user share a responsibility for precisely describing the product or service needed. It is at this level in the procurement cycle or process that costs are assigned in the final cost determined. Each time a buyer or user sends an imprecise or unclear or ambiguous request or even over specify materials or quality, it leads to unnecessary spending. The procurement officer should query or request for a detail specification of what appears unclear, so that the organization might be better served through any changes. A classic example is a case of the one where market shortages occur

in the goods or service requested and a substitute is the only realistic option. Mostly it is important to have some level of discussion or interaction between the procurement team and the user departments at the early stages of the need identification since future market environments or dynamics play a critical role in the procurement process. Failure to make accurate specification of goods and services can result in loss of operational time as well as have serious financial implications and can also result in disruption of supply chain, lost opportunity for a product or service improvement and most importantly loss of supplier trust and confidence. There should be consistency and accuracy in the terms used for product or service specification or description. The importance of accurate organization is to help avoid misunderstanding. The most effective and efficient way to ensure this consistency is to maintain a file catalogue that is usually purchased or procured in the supply office. Some establishments have found it expedient to maintain a common catalogue, which contains a list of all of the goods or materials kept in stock (Chaffe,2004).

2.14.3 Identification of Sources of Supply

This is an important part of the purchasing process. Supplier selection involves the location of qualified sources of supply and assessing the probability agreement that would result in prompt delivery of acceptable product and needed services before and after the sale. Some of the essential records that should be found in a well-organized supply office either computerized or hard copy should be;

- A record of suppliers
- A commodity classification of items purchased
- Outstanding contracts against which orders are placed as required.

There is no problem with many commodities which are in constant use by an organization. Largely, commodities for which there is an open and free market on which quotations can be obtained at particularly any hour of the day. Bids are often called for on merchandise of common use, such as stationery.

2.14.4 Request for Quotation

When the purchasing department has identified some number of suppliers, a document called quotation note is sent to the suppliers requesting them to quote their prices and delivery terms for the items to be supplied.

2.14.5 Analysis of Quotation

At this stage of the purchasing process, suppliers are selected based on those who will meet the organizational requirements. Price is one most important issue to be considered for items that are frequently bought. In this case price list, catalogues and discount schedules may be useful. There are no obligations to buy from the supplier quoting the lowest price. The modus operandi employed is one or more of the following circumstances, thus

1. Product needed is complex and costly and the purchasing department has little or no experience in procuring it.

2. There are items competitions among suppliers of the product or materials.

3. Not enough price information is required on the item needed.

4. Intended purchase would involve relatively high expenditure.

5. A major contract is up for renewal and purchasing want to research the market for competitive prices and services.

Generally, it is mandatory in public organizations or government institutions, to invite for bids when a major purchase is planned. Except in an unusual case that requires an elaborate justification for soul sourcing. The contract must be awarded to the lowest bidder following public opening of the bid. When suppliers submit their quotation, the various processes of negotiations and decision making takes place between the time a purchase is authorized and the time an order is issued.

2.14.6 Acknowledge Order

This is a document which the supply sends to purchasing department, informing them that the purchases order has been received and is been acted upon. It is usually of little legal importance but should be checked to make sure that error does not find its way into the supplier reference.

2.14.7 Placement of Order

Placement of an order is the next stage of the process after the analysis of the quotes and the selection of the supplier. In view of the fact that analysis of bides, quotations, and proposals and the selection of the supplier are matters of judgment, it is necessary only to indicate here that they are biological steps in purchasing. A simple bid analysis form is use by some organizations to assist them in analyzing the bids.

After the purchases order has been issued to a supplier, the buyer may wish to follow up and/or expedite the order. At the time the order is issued, an appropriate follow-up date is

indicated. In some firms, purchasing has full-time follow-up and expediting personnel. Follow-up is the routine quotations, but there is no uniform practice. And many purchases are placed through methods other than bidding, for example, from price lists or through negotiations.

2.14.8 Expediting and Follow-Up

After the tracking of an order to ensure that the supplier will be able to meet delivery promises. The buyer needs to know as soon as possible if problems in terms of delivery or quality are developing, so that appropriate action can be taken to ensure efficiency and effectiveness. The application of pressure on a supplier to get it to meet the original delivery promise, to deliver ahead of schedule, or to speed up delivery of a delayed order is what is meant by expediting. It may also involve the treat of order cancellation or withdrawal of future business if the supplier cannot meet the agreement. Expediting should be necessary on only a small percentage of purchase orders issued. If the buyer has done a good job of analyzing supplier capabilities, only reliable suppliers will be selected. That is those who will perform according to the purchase agreement.

2.14.10 Advice Note

This is a document indicating the confirmation from the supplier detail information about the consignment to be shipped or transported in terms of mode of transport, date of dispatch and other relevant information to the organization or company.

2.14.11 Receipt and inspection of goods

It is of vital importance to properly receive materials and other items. With the exception of large organizations with multiple aides, many organizations have as a result of experiences centralized all receiving in one department. Receiving is so closely related to purchasing such that, in many organizations, the receiving department is directly or indirectly responsible to the purchasing department. In companies where just-in-time inventory management systems have been implemented, materials from certified suppliers or supplier partners bypass receiving and inspection entirely and delivered directly to the point of use.

The major purposes of receiving are;

- To ensure the quantity ordered has been received.
- To check that the shipment arrived in good condition.
- To forward the shipment to its proper next destination, be it storage, inspection, or use.
- To ensure that proper documentation of the receipt is registered and forwarded to the appropriate parties'.
- To confirm that the order placed some time ago has actually arrived.

2.14.12 Maintenance of Records

After having gone through the steps described, all that remain for the completion of the order is to update the records of the supply department. These processes involve little more

than assembling and filling the purchasing department's copies of the document relating to the order and transferring the appropriate records or information the department may wish to keep (Lenders, Fearon, 1993).

2.15 Empirical literature review

Many authors have written or cited the problem which exists in many organizations being governmental or private concerning the impact of information technology in supply chain management as discussed hereunder. IT in general, and IT in SCM, is argued to enable great opportunities: ranging from direct operational benefits to the creation of strategic advantage. This section presents some empirical study findings on inventory management and organizational performances; SCM and business performance; and most importantly, IT and SCM.

2.15.1 Inventory management techniques and the performance of organisations

According to Likert (2003) manual perusal of the inventory levels on a daily basis is one of the ways to facilitate re-ordering under computerised system. Under this plan a printout is generated of all items in inventory and is examined by the inventory manager, who decided when and how much to order based on usage rates and expected future needs. ABC Pareto analysis and minimum and maximum meters of establishing inventory review plans are vital and they are useful for both manual and computerised systems.

Vilfredo (1848-1923) an Italian Swiss engineer and economist believes that a 20 percent of a country's population does 80 percent of the work. Today's inventory control manager refines Pareto's arguments into three priority categories A, B and C. The A items may number only 10 or 20 percent of the inventory's total number of items. The B items number perhaps only 10 to 15% of the total inventory. The C items number perhaps 65 percent of all items in inventory. Typical advantages that have resulted are concentrated on class A and B and on using larger order quantities on C. reduced purchasing department costs through processing of fewer orders. This therefore tends to reduce receiving and inspection cost through the elimination of the handling and processing of materials as well as paper work for many small vale items.

The broad for determining inventory policy rests with general management because inventories feature prominently in a company's financial operations. However, the actual management of inventory is usually entrusted to subordinate departments. There is considerable variation in which a department manages inventory control procedures. The customers' service level that the firm wants to maintain and the stock out reveal that the leverage require defining as part of management's responsibility for inventory control.

In a few companies an inventory control committee has been established to initiate broad control policies with the administration of the policies left to the purchasing department. Representatives of all the company departments affected by inventory control policies fit on such committees (Lei, Slocum and Pitts 1999).

Like purchases Leenders/Fearon, (1997) assess that inventories may be classified in a variety of ways including ABC analysis. Nature of items carried is frequency of use. Modern computer and word processing systems allow extensive automation of purchasing and inventory control. Control of all items is improved and a managerial time freed for the negotiations value engineering, research and other managerial tasks necessary to deal effectively with A and B items.

Leenders and Fearon (1997) has a different description on inventory control. Many purchases cover repetitive items held in inventory. Thus inventory has a great influence on purchase-quantity decisions. The question of when and how much to order, how to continue improvements examinations along the flows on quality and customer, employee and supplies satisfaction. It is important in making delivery inventory or purchase order size decisions to understand why inventories exist and what the relevant trade off- are. The rapidly changing environment within which an inventory complicates inventory management and purchasing planning is carried out. Inventories always seem to be too big, too small of the wrong type or in the wrong place.

With changing economic conditions, what is too little is one period may easily become too much in the next. Because of the high cost of carrying inventory many systems have been developed to reduce stocks (Hellen, 1993). Japanese manufactures have spearheaded such efforts in mass production industries. Suppliers often located very near the plant deliver directly to the point of use in the plant and at very frequent interval. The use of Kanbans and a variety of just in time inventory management schemes have revolutionized

manufacturing thinking about all form of inventories. Never the less it is useful to understand the nature and costs of inventories so that appropriate policies and procedures can be developed for specific organisational needs (Porter, 1994).

Inventory exists for this reason alone, the relevance of the decision to be made. Carrying, holding or possession costs. These include handling charges, labour and operating costs, insurance premium, breakage, pilferage, obsolescence, taxes and investment or opportunity costs. In short any cost associated with having as opposed to not having inventory is included. Other costs may include ordering costs, or purchase costs, set-up costs, stock out and price variation costs (Ronald, 1999).

According Halachmi and Bouckart (2005) inventories have the following purposes including: to provide and maintain good customer service; to smooth the floor of goods through the productive process, to provide protection against the uncertainties of supply and demand and to obtain a reasonable utilization of people and equipment.

Transit or Pipelines Inventories are used to stock the supply and distribution pipelines linking an organisation to its suppliers and customers as well as internal transportation points. They exist because of the need to move materials from one point to another. Obviously transit inventories are dependent on location and mode of transportation. A decision to use a distant supplier will probably create a far larger raw materials transit inventory than one to use a local supplier with truck delivery. In just in time (JIT) production a variety of means are used to reduce transit inventories including the use of

local supplies, small batches in special containers and trucks specifically designed for side loading in small quantities (Ronald, 1999).

However Alvesson (2001) argued that cycle inventories arise because of management decision to purchase, produce or sell in lots rather individuals units or continuously. Cycle inventories accumulate at various points in operating systems. The size of the lot is a tradeoff between the cost of handling inventory and the cost of making more frequent orders and set ups. A mathematical description of this relationship, the economic order quantity is very vital. In JIT the need for cycle inventory is reduced by set up cost and time reduction.

Malcom, (2005) Buffer or uncertainty or safety stocks exist as a result of uncertainties in demand or supply. Raw materials, purchased parts or MRO buffer stocks give some protections against the uncertainty of supplier performance due to shut down, strikes, led time variations, late deliveries to and from suppliers, poor quality units that cannot be accepted and so on. Work in process buffer inventories protect against machine break down, employee illness and so on. Finished goods buffer protect against unforeseen demand or production failures. Management efforts to reduce supply uncertainty may have substantial pay off in reduced inventories.

Ronald (1999), Purchasing or production solutions may also permit order quantities to be reduced, the other factor that has an immediate and direct effort on average stock level. Both purchasing and production can concentrate efforts on acquiring or making batches of a smaller size, without increasing the unit price or cost (Note that this is reversal of the

Western belief in the efficacy of large batch sizes in order to reap the apparent advantages of economies of scales).

Large batch sizes mean making goods in large quantities, ahead of immediate demand and hence lead to a build-up of inventories. The EOQ/EBQ equation was of rational attempt to tackle the root causes of the problem. The Japanese, on the other hand saw that it is the times and cost of setting up (or preparing) machines and processes for production could be reduced, then batch sizes could be made smaller and in line with immediate short term demands. Large batch sizes also have implications with regard to the management of time. It takes a longer time to produce the whole batch thus tying up capacity to produce goods in quantities that are not needed immediately. Longer lead-times and longer periods of time laid in stock are the outcome of many products. The point to emphasize is that lead-time may not be independent of the quantity decision, an assumption of most stock control techniques (Colvin and Slevin, 2007).

Increasingly, large online advertising buyers can't cost-effectively buy enough audience reach. Publishers have an "inventory performance problem" in that 20 percent of their audiences generate 80 percent of page views. Buyers find the problem is just being passed on them. It seems that for large online buyers in particular, 80 percent of their campaign frequency goes to only 20 percent of their target audience. That 20 percent audience share is becoming saturated with messages from the top online advertisers. There's almost no way to effectively segregate, buy, and deliver audience-coordinated campaigns across multiple publishers, portals, and networks. As a result, every time the buyers try to extend

their reach, they end up receiving more frequency against that saturated 20 percent. This means lots of wasted impressions and lots of wasted money (Halachmi and Bouckart, 2005).

According to Ronald, (1999), inventories are stockpiles of raw materials, supplies, components, work in process and finished goods that appear at numerous points throughout a firm's production and logistic channel. Inventories are frequently found in such places as warehouses, yards, shop floors, transportation equipment and on retail store shelves. Having these inventories on hand can cause between 20 and 40 percent of their value per year. Therefore, carefully managing inventory levels makes good economic sense in relation to the performance of the business organisation. Even though, many strides have been taken to reduce inventories cost through just in time, time compression and quick response purchases applied throughout the supply channel, the annual investment in inventories by manufacturers, retailers and merchants wholesalers.

Inventory management process is the science-based art of controlling the amount of stock held in various forms, within a business to meet economically the demands placed up one that business. The aim of inventory control system is to maintain the quantities of stock held by a business at a level which optimizes some management criteria such as minimizing the costs incurred by the whole business enterprise for improved performance (Halachmi and Bouckart, 2005).

Malcom (2005) contends that buffer or uncertainty or safety stocks exist as a result of uncertainties in demand or supply. Raw materials, purchased parts or MRO buffer stocks

give some protections against the uncertainty of supplier performance due to shut down, strikes, led time variations, late deliveries to and from suppliers, poor quality units that cannot be accepted and so on. Work in process buffer inventories protect against machine break down, employee illness and so on. Finished goods buffer protect against unforeseen demand or production failures. Management efforts to reduce supply uncertainty may have substantial pay off in reduced inventories.

2.15.2 Relationship between Inventory Management and Organisation's Performance

Inventory plays an important role in the growth and survival of an organisation in the sense that, failure to an effective and efficient management of inventory, will mean that the organisation will lose customers leading to poor services delivery and sale will decline. Emphasizing on the importance of inventory on the balance sheet of companies, Coyle, Bardi and Langley (2003:188) state that "inventory as an asset on the balance sheet of companies has taken an increased significance because of the strategy of many firms to reduce their investment in fixed assets, that is plants, warehouses, office buildings, equipment and machinery , and so on.

Virtually every enterprise finds it necessary to hold stocks (or inventory) of various items and materials. That is because it would be practically impossible to operate with only one of each item to be sold or used in manufacture or used in office work. A reserve or a fund or inventory of each item or material used or sold frequently is therefore maintained, so that as items or materials are sold or used they can be replaced or replenished from the

stocks held in reserve. Due to uncertainty in future demand, and because of the unguaranteed availability of supplies, stock is therefore held to ensure an availability of goods to minimize the overall costs associated with the management of stock (Drury, 2000).

Gittinger (1995) argues that precautionary motive is one of the central roles of inventory management. Accordingly, precautionary motive means that stock held to guard against risk of unpredictable changes in demand and supply. In most cases, the level of demand of goods and the time required for supply cannot be known with certainty. Therefore, to ensure product availability, the organisation maintains additional amount of safety stock to meet regular production and market needs. Firms should invest in stock control for precautionary motive to act as a buffer or link between demand and supply so that production can be geared to a more constant output. Precautionary motive necessitates holding of inventories to guard against the risk of unpredictable changes in demand and supply forces and other factors (Pandey, 2002).

According to Kenneth and Brian (2006) includes keeping inventory includes the following reason:- Reduce the risk of supplier failure or uncertainty- safety and butter stocks are held to provide some protection against such as strikes, transport breakdowns due to floods or snow, crop failures, wars and similar factors. Protect against lead time uncertainties, such as where supplier's replenishment and lead time are not known with certainty – in such case an investment in safety stocks is necessary if customer services is to maintain at

acceptable levels. Meet unexpected demands or demands for customization of products as with agile production and smooth seasonal or cyclical demand.

Balloon (1987) illuminates that inventories should be held to improve customer service and therefore goods should be spotted at a place where customers can get them in the quantities they wish. The transaction motive is aimed at facilitating smooth operations on daily basis. According to Pandey (2002) transaction motive emphasizes the need to maintain inventories to facilitate smooth production and sales operation. Firms should maintain back up inventory either in excess or low levels to take advantage of current and future demands or price fluctuations. They should therefore purchase goods and stock them in advance when they anticipate price increase in future and also prepare for contingencies that may befall a company, for instance, strikes, prices, goods among others (Kakuru, 2000).

A research conducted by Holdren and Hollingshead (1999) in the US notes that, much of the $700 million work of inventory held by American businesses is financed by the bank loans with the goods pledged as security. An important industrial marketing relationship exists between inventory managers and commercial lending officers who write this inventory loan. Inventory manager need to provide their lenders with sufficient information to obtain financing at the lower rate. Loan officers need to assess the degree of inventory loans are matters of concern for both inventory manager and creditors.

According to Richard et al. (2009), organisational performance encompasses three specific areas of firm outcomes: (a) financial performance (profits, return on assets, return on investment, etc.); (b) product market performance (sales, market share, etc.); and (c) shareholder return (total shareholder return, economic value added, etc.). The term Organisational effectiveness is broader.

Specialists in many fields are concerned with organisational performance including strategic planners, operations, finance, legal, and development. In recent years, many organisations have attempted to manage organisational performance using the balanced scorecard methodology where performance is tracked and measured in multiple dimensions such as: financial performance (e.g. shareholder return) ,customer service ,social responsibility (e.g. corporate citizenship, community outreach) ,employee stewardship.

According to West et.al (1990), organisational performance refers to a function of an organisation's ability to meet its goals and objectives. How successful an organisation achieves its objectives, satisfies social responsibilities or both depends upon how well an organisation carries out its activities. Organisational function is an important factor in the performance of a society or nation. How well the organisations of the society do their job-organisational performance, gives rise to debate (Stoner et. al, 1989). Organisational performance is evaluated regardless of the system being used, either formal or informal. Systematic ways of appraising organisational performance throughout the company are however desirable so that each manager can help to improve current performance and

identify individuals who show the greatest potential for higher management positions (Pigers et. al, 1989).

Lucay (2003) observes that excessive levels of stock are undesirable because they increase the risks of inventory becoming obsolete, stock loss through damage and theft, increased storage costs like rent, insurance and unnecessary tie up of the firm's funds. He further state that a firm would be foregoing profits when it continues maintaining excessive levels of inventory, which implies that the probability position of the firm is being threatened in the long run since funds are not being invested in other profitable ventures. Lower levels of inventory are also undesirable because it interrupts production, loss of good will and high ordering costs especially when ordering is frequent. Inadequate inventory levels leads to business closure due to shifting of customers to other efficient suppliers as a result of production/ operation interruptions (Gittinger 1995).

2.15.3 Effect of Supply Chain Management on Business Performance

By improving only the process and model of the supply chain it is possible to reduce many cost elements like warehousing, transportation cost, inventory carrying cost etc. (Aytekin et al., 2004). Also the companies that integrate processes like product innovation and quality with the supply chain, get benefit by reducing product development times, cost of the good sold and cost of poor quality (Chen and Kai-ling, 2004, Erdil et al., 2003). It has also positive impacts on order to delivery lead times by optimizing the whole process and attacking the problems in the process therefore helps to improve companies' cash to cash cycle.

2.15.4 Benefits of IT in Supply Chain Management

Technological development and innovation which are taking place today will have significant effects on tomorrow's management. Understanding these changes and forces causing them will guide managers and administrators, supply chain activities included to new and better ways of utilizing these changes to their advantages**.**

The most knowledge area where a great number of technological advancement has already taken place and are still taken place is the field of IT.

The following are a few benefits that organization can derive after implementing IT in

Supply Chain Management:

- Minimizing errors in the process minimizing chances of errors normally caused by human intervention, or incorrect interpretations.
- Reduction of transaction cost: reducing paper based processes and the spent on reconciling various documents.
- Better management control: all data is processed through one central database and allowing relevant analysis and management reports to be easily produced.
- Improved planning capabilities because of comprehensive information about supply chain participants' performance.
- Improving information management (better access to prices from alternative suppliers and summaries of spending).
- Enhanced budget control.

- Reducing purchasing cycle time and cost.
- Improve coordination with third-party service providers because of information.
- Sharing and process integration.
- Reduce bullwhip Effect in inventory because of information sharing.

2.15.5 Effects of Information Technologies on Business Performance

One of the most significant characteristics of the period in today's business world is continuous change in inner and outer environment of organizations. In such an environment, the success of the business depends more on obtaining information and using it in line with the aims of business than on factors like capital and labor force. In this context, the basic dynamics which entail the use of IT, which makes significant contributions to businesses to deal with increasing global competition, by businesses are technological, economic, political, cultural and environmental factors and change in business management (Çağlar et al., 2006:135).

IT is an implementation which importance is increasingly becoming important in the collection, procession, preservation and transmission of data. Thus, IT is also an effective means for businesses as it offers businesses new ways to perform better than their rivals and gain competitive edge. According to Porter and Millar (1985), IT has a strong influence on the business cost structure and provides opportunities for differentiation. In this context, IT affects competition primarily in three ways, namely; by changing the structure of the industry (1) creating competitive edge (2) and creating new jobs (3) (Porter and Millar, 1985).

Furthermore, Whiteley (1996) stated that IT can be used as a strategic means of obtaining competitive edge, improving efficiency and performance, and in the improvement of management and organization of the business and in the creation of new business opportunities by providing businesses significant new business and management opportunities (Whiteley, 1996:11). IT applications, therefore, have positive impacts on the business performance by itself. Most of the companies are not able to sustain their business without the support of IT. Gathering, storing and processing data helps companies to increase their efficiency and effectiveness by improving decision making process (Güleş et al., 2003).

Besides operational efficiency, companies also utilize IT for supplier, sales channel and customer collaboration in order to meet customer requirements in the most effective and fastest way (Gunasekaran and McGaughey, 2002). IT also enables companies to monitor operational and organizational performances and manage the complex processes like product development (Whiteley, 1996). Information plays a critical role in the success of the companies in the recent dynamically changing business environment. Accessing and processing information enables companies to sustain their competitiveness in this challenging environment (Caglar et al., 2006).

Under the light the explanations made so far, it can be argued that IT influences the competitive structure in a sector with the development of innovative products and services, by supporting decision making, strengthening ties between businesses, decreasing costs and with its integration to products and services. IT is also very significant in terms of the improvement of the effectiveness of supply chain management applications. IT support companies to achieve better performance in the supply chain by restructuring customer and

supplier relations, improving business processes, monitoring performance and increasing data visibility over the whole supply chain (Mclyor et al., 2000).

2.15.6 Effect of Information Technologies on Supply Chain Performance

Information technologies which matured in business life in time and based on more realistic bases and needs can today bring in significant incomes and enabled them to reach to promise efficiency levels. The Internet with its structure open to general use, low cost compared to value-added networks, its use without special rules and world wide access feature plays a strategic role in the spread of electronic processes among enterprises. At this point, it can be said that there are two main reasons for businesses to use the Internet. One of them is the low establishment and application cost of the internet thanks to its characters by its nature. The other is that thanks to its high influential power on the environment, the Internet improves opportunities resulting from new cooperative relations more effectively (Manthou et al., 2004).

In recent years, with the development of computer systems and communication technologies, information technology supported supply chain applications (e-scm) started to be used more commonly considering the huge value add potential of supply chain (Presutti, 2003). Considering these two powerful solutions together, supply chain management model and processes that are supported by IT applications have more significant impacts on the business performance.

One of the most important IT applications in this area is the supply chain planning and optimization tools that enable visibility, finding optimized solutions for complex planning problems and integrating whole value chain. The visibility and synchronization of the

information such as order and inventory, companies reach on time and effective purchasing, production, sales and delivery plans (Yüksel, 2002). Another supporting application is Electronic Data Interchange (EDI) that enables real time data interchangeability between all parties in the supply chain (Peppard, 1993).

A supplier portal with the information on price, order, quality, logistics and inventory indicator is an example how supply chain performance can be improved by leveraging internet applications (Manthou et al., 2004). With EVD, businesses make changes in one or more than one level can integrate information systems with the activities of their businesses. With IT based systems, businesses can continuously monitor their stock levels and stock needs can be automatically transferred to the supplier with EVD system. Such an application decreases safety stock for the products purchased and shortens circulation period. Besides, with coordination between supply chain members', on-time production applications can be realized. EVD makes it possible to monitor orders on the computer and to achieve on-time delivery (Yüksel, 2002:273). Besides the applications mentioned above some other I.T tools like Product Data Management (PDM), Customer Relationship Management (CRM), Supply Chain Planning System, Supplier Relationship and Warehouse Management System, Geographic Informatics, etc. support companies for a better supply chain performance.

2.15.7 I.T and supply chain management

Dave Chaffey (2004**)** comments that the traditional procurement cycle on supply chain management is very costly such that it contains a longer typical cycle time from the searching for goods to cheque payment, hence he recommends to use information technology in SCM in order to reduce cost in all operations.

According to Sun et al. (2008) ICT has a positive impact on firm's performance. There is relationship between five perspectives – utilization, work efficiency, operation management, effect on user and firm performance. The ICT improving work efficiency and operation management. Rahman and Afsar (2008), in their study on Iranian journal of information technology, the impact of application of information technology on supply chain performance in studies were reviewed in the steel supply chain. They suggested the following:

- Information Sharing and information technology of supply chain, affect accountability of steel supply chain.
- Information technology and Information Sharing of supply chain, affect the steel supply chain efficiency.
- Responding of supply chain, affect the steel supply chain performance.
- The efficiency of supply chain affects the performance of supply chain.

2.15.7.1 Functional roles of IT in SCM

Transaction execution Collaboration and coordination Decision support Benjamin *et al.*,

(1985), and Porter and Millar (1985) argued previously in the 1980s for the strategic possibilities of IT for business. Porter and Millar (*ibid*), in particular, advocate that IT changes industry structures and rules of competition, creates competitive advantage, and creates new business opportunities. In the logistics/supply chain context, Bowersox and Daugherty (1995) outlined that IT is key in supporting companies creating strategic advantage by enabling centralized strategic planning with day-to-day centralized operations. A common view held is that IT has a profound impact on managing supply

chains. Using case studies in six Finnish industrial supply chains as data, Kemppainen and Vepsäläinen (2003) argue that IT is, alongside specialization and outsourcing, a key precondition for networking of organizations. One group of scholars argues that because of information technologies, supply chains become less integrated and more market oriented (Malone *et al*., 1987; Golicic*et al*., 2002; Williams *et al*., 2002).

For example, Williams *et al*., (*ibid*) suggest that electronic SCM (in their discussion 'electronic' relates to the use of the Internet) combines the structural benefits of SCM with the efficiency benefits of an arm's length approach, enabling, for example, lower cost through possibilities of selecting from a larger supplier base. The landmark work of Malone *et al*., (1987) proposes that the value offerings through IT are electronic communication (speed of communication), electronic brokerage (by IT providing a 'lean', automated intermediary for resolving market transactions), and electronic integration (coupling of processes). IT seems to be particularly important in *fast clock speed* industries (Guimaraes *et al*., 2002) or when flexibility and agility are needed (Sanders &Premus, 2002; Heinrich & Betts 2003). Many theoretical papers have addressed the value of IT in SCM (van Hoek, 2001; Lee &Whang, 2001; Levary' 2000; Cross' 2000; Bowersox& Daugherty, 1995). For example Levary (*ibid*) suggest that IT in SCM provides reduction of cycle time, reduction of inventories, minimization of bullwhip effect, and improvement of effectiveness of distribution channels. There are also a number of articles presenting empirical findings on the benefits of IT in SCM. The results of these articles are, unfortunately, diminished

because of the typically narrow focus of discussion; for example, estimating the dollar value of EDI in automotive manufacturer–component supplier–relationships (Mukhopadhay*et al*., 1995) or the impact of enterprise resource planning (ERP) on order completion performance, under a period of one year after the implementation of the system (McAfee, 2002). Reporting on a general level, the benefits of IT in SCM is fraught with problems, because, as noted insightfully by Walton and Gupta (1999) in their discussion of the benefits of EDI:

• Some benefits are dyadic (or multilateral), dependent on both (or a number of) supply chain parties, and some individualistic

• The magnitude of change differs from slight to significant process change to the creation of competitive advantage

• Benefits depend on where (EDI) is implemented.

Thus, the benefits of IT in SCM are manifold; and can vary from the implementation method. Moreover, the use of IT is closely related to process changes. As such, SCM can be viewed as a process change that is helped or enabled by IT. This makes it difficult, or even in many cases a profane academic exercise, to separate the origin of the benefit, whether derived from IT, process change, or both Finally, with regard to the impact and benefits of IT, the controversial phenomenon, productivity paradox of IT (for example Loveman, 1991) cannot be avoided.

Macroeconomic studies in the US identified that despite growing IT investment, overall productivity statistics showed poor performance. However, several firm-level studies have

argued for the non-existence of a productivity paradox. For example, in a longitudinal firm-level investigation, Brynjolfsson and Hitt (1996) showed that IT has a clear impact on firm output. More recently, Devaraj and Kohli (2003) argued that the conceptual problem relating to the productivity paradox of IT is that in many studies only IT investment, not the actual usage, is considered. They showed how the observed use of IT was positively and statistically significantly related to revenue and quality improvements with a specified time lag; while the investment in IT, as such, with the same data, was not.

In addition, David (1990) draws a parallel of IT productivity paradox with an example of the introduction of a revolutionary electrical dynamo during the turn of 1900, and concludes that this innovation did not first affect productivity, and argues that there are common problems with the introduction of new technology, which may realize productivity gains only after a considerable time lag.

2.15.7.2 Impact of ICT in Supply Chain Management

According to Martin (2005), there is a rapid development in the use of information and communication technology (ICT) in logistic and supply chain Management. ICT is today being applied in many organizations in a wide range and areas of operations. It has provided new ways to store, process, distribute and exchange information both within an organization and with customers and suppliers in the supply chain. Marco (2004) in his study concluded that, every organization must develop Information system to improving performance for each of the five rights of purchasing of the company in order to ensure

that materials are of the right quality, of the right quantity, from the right source, are delivered at the right time, and at the right price.

2.15.8 ICT use and Service Delivery in business Organizations

According to Bloemer (1998) most models in the business and customer evaluations of services focus on the comparative judgment of expectations versus perceived performance resulting in the two major evaluative judgments of perceived service quality and customer satisfaction. For instance, customers access service delivery by comparing their expectations prior to their service encounter. Customers also, develop perceptions during the service delivery process and then compare their perceptions with the actual service received. In this case, prior perception and individual judgment influence customer's evaluation of service provided.

Customer services according to Gronroos (2001) can be divided into high touch and high-tech services. High touch services are mostly independent to people offering the services whereas high tech services are predominantly based on the use of automated systems. Therefore, one should always remember that high-touch also includes physical resources and technology based systems that have to be managed and integrated into the service process in a customer oriented fashion (Gronroos, 2001). Consequently, electronic services include both high-tech and high-touch services. For example, high-tech services include online pay, Mobile billing, ATM machines, etc whereas high-touch services consist of instructions and personnel assistance in using the services.

Customer service delivery is differentiable and stem from the expectations of customers. Hence, it is necessary to identify and prioritize expectations for customer service and

incorporate these expectations into a process for improving customer service delivery (Kassim and Bojei, 2001). Implementing and evaluating customer service is a very complex process. Zeithaml and Bitner (1996) reported that two aspects need to be taken into consideration when evaluating customer service: *Content* and *Delivery*. Customers may be in the best position to evaluate the quality of service delivery, while the service providers are the best judges of the content of the message. Though there is a number of different aspects of services involved.

2.16 Conceptual framework

Information technology in Supply Chain Management is new to many organizations in developing countries like Ghana which is associated with several impacts when an organization decides to adopt such system. The following are just few impacts among so many that are experienced during application of the system: staff technical knowledge, availability of funds to support purchasing of computer hardware and software, installation and interrelated facilities and services, computer infrastructure, power system, security system, staff response, management support against the system and so on.

Under this study four common variables were measured to determine their influence in the application of the system. These variables are independent variables whereby inventory management performance depends on the IT systems used in supply chain management.

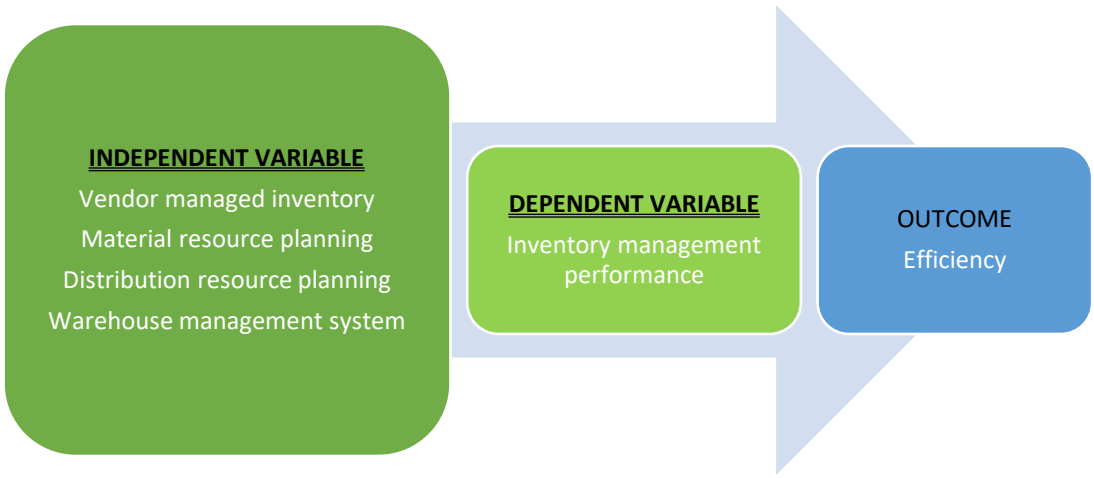

Figure 2.1 Conceptual framework on the impact of IT in Supply Chain Management

Source: Author's construction

2.16.1 Relationship between dependent and independent variables

In order for Supply Chain Management to deliver what is expected successfully it should be supported by several factors, because the system operates under influence of such factors. Some of them are management support, funds, structure and size of the business, technical knowledge, power supply, security of the system, IT infrastructure, government policies that govern IT operations.

2.17 Conclusion

The study reviewed literature on procurement, inventory management, and supply chain management. The study reviewed empirical studies on the link between information technology and supply change, it adoption and factors that influence it adoption. The review revealed that information technology enhances supply chain management which triggers organizational performance through cost reduction in inventory management. However, all these studies ignored the informal sector especially the commodity sector

which makes this study necessary to ascertain how information technology can enhance supply chain management in the commodity sub sector.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

Research methodology is instrumental to the generation of knowledge because it enables the researcher to make logical reasoning about a phenomenon itself. Kothari (2004), defines research methodology as a systematic approach through which research is undertaken. This section focuses on the research techniques adopted for this study with the aim of achieving the research objectives. It elaborates the research design and provides details regarding the population, sample and sampling techniques and the research instruments used in collecting data for the study. It also discusses the data collection methods and data analysis plan. The quality of every research is very much influenced by the techniques employed. This is because the techniques adopted go a long way to impact on the validity and reliability of the conclusions drawn. The research methodology is a set of processes used to collect and analyze data (Leedy et al, 2001).

Further, this chapter describes how the primary data was collected and processed. It also emphasizes on the secondary data collection for the literature review. The chapter further explains the data collection tools and highlights the authenticity and reliability of the data collected.

3.2 Research Design

Research design is the framework that specifies how each activity should be conducted to accomplish the research objectives, which include specification of the information required, designing instruments, selecting the samples, collecting the data and analyzing it. Aaker et al. (2004), refers to research design as the detailed blue print used to guide a research study towards its objectives. Similarly, Kothari (2004), refers to research design as a conceptual structure within which research is conducted; it constitutes the blue print for the collection, measurement and analysis of data. The study employed descriptive research design since the study tested hypothesis in relation to specific objective one as well as portraying how the use of computer applications can improve on inventory management so as to prevent theft and losses in their warehouses / Market stalls and the challenges faced by businesses in their implementation of Information and Communication Technology in the supply chain management of inventory (Kothari,2004).

3.3 Target population of the study

The population is an aggregate of elements defined prior to selection of a sample (Kinnear and Taylor, 1996). Study population is the totality of objects under investigation (Kamuzora and Adam, 2008). The population as a term refers to a large group of people

possessing one or more characteristics in common, on which a research study focuses (Cohen *et al.,* 2001). It is a unity or group of units with one or more characteristics that are of more interest to the researcher. It further refers to the totality of the object or elements under investigation also it is referred to as the entire group of people, events or interest that the researcher wishes to investigate. For this study the target research population includes procurement, stores, accounts, MIS, and user departments were the area from which the sample for the study were drawn. The estimated target population is 400 obtained through survey and the Metropolitan Assembly.

3.4 Sample Size Determination

According to Yamane (1986) sample size determination can be calculated using different approaches. However, the following simplified formula is preferred in the case of evaluative study (Yamane, 1986).

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

Where n = the total sample size

N = total population= 400

e = margin of error

Allowing a 10% margin of error gives a confidence level of 90% and hence e = 0.1

$$n = \frac{400}{1+400(0.1)^2}$$

$$n = \frac{400}{5}$$

$$n = 80$$

Therefore the calculated sample size is eighty (80). Therefore a sample size of eighty (80) was used since a 10 % margin of error to make room for uncertainties in administering and retrieving administered questionnaires has already been provided for in the equation above.

3.5 Sampling Technique

Sampling is the process of selecting things or objects when it is impossible to have knowledge of a large collection of objects (Mouton, 1996). Kothari (2004), defines sampling as the process of obtaining information about an entire population by examining only a part of it. In data collection the researcher selects the sample to represent the general picture of population in the study area. Sampling techniques refer to the procedure adopted in selecting items (respondents) for the study. It is a process that constitutes the selected respondents (Kothari, 2003). The study employed purposive and simple random sampling techniques. Purposive was employed to select the head of procurement unit and other department because they have enough knowledge on the subject under investigation. The staffs of each department were given equal chance to participate through the use of simple random sampling because they exhibit homogenous characteristics.

3.6 Data Types and Sources

3.6.1Primary Data

Primary source of data were obtained through questionnaire, interviews and various interrogations. Questions that were used in the research included closed and open-ended questions. The closed ended questions are intended to restrict respondent's answers; this provided an objective based for comparative analysis. To make analysis easier, the closed ended questions are provided with alternatives and clear instructions to interviewees. The open-ended questions are intended to give respondents the latitude of freedom to express their views in an unconstrained manner.

The questions were in two parts –sections "A" and "B". Section "A" dealt with personal data and section "B" dealt with questions for the study. In this study, the primary data will be collected through questionnaire and interview.

3.6.2 Secondary Data

Secondary data are information or data already collected by other researchers or institutions, usually for different purposed (Blumberg et al., 2008). Secondary data enable the researcher to place the study in the context of exiting knowledge as well as broader the researcher's understanding to the research topic (Blumberg et al., 2008).

Thus, secondary data provide second hand information and include both raw data and published ones (Sounders, 2000). Secondary data sources include books, journal articles, newspapers, report and publications of various associations and organization as well as other documentary reviews from internet. Thus, apart from the primary data, this study also used secondary sources.

3.7 Data Collection Method

The study employed questionnaire and interview guide.

3.7.1 Interviews

This is one among the popular methods of data collection, whereby under this technique there is direct contact between respondents and the researcher. The researcher and respondents were engaged in oral questioning and discussion. The word direct contact here does not mean face to face interview between individuals only, but also it means interaction through telephone (Adam and Kamuzora, 2008).

This is a pre-formulated written set of questions to which respondents record their answers

Usually within rather closely defined alternatives. Each item of the questionnaire is developed to address a specific objective and research question of the study. The interview methods of collecting data usually involve presentation of oral verbal stimuli and reply in terms of oral -verbal responses. This method can be used through personal interview and also through telephone interviews, Kothari (1990).The researcher had face to face interview with respondents. Here structured and unstructured interviews were held with a target population.

3.7.2 Questionnaires

White (2002) defined questionnaire as a series of questions, each providing a number of alternative answers from which the respondent can choose. Hence questionnaire can be considered in general terms in which each person is asked to respond to the same set of questions in a predetermined order. Structured questionnaire and those in which each

person is asked to respond to the same set of questions as well as those in which the questions are answered without the researcher being around are inclusive (Adam and Kamuzora, 2008).

The questionnaires were distributed in person, after obtaining permission from top management, in one week to all respondents. The researcher used closed-ended questions with 5-point Likert scale. The response categories in Likert scales have a rank order and therefore could be referred as ordinal because ordinal scale of measurement is one that conveys order (Jamieson, 2004). After this, the collected data will be analyzed using the proposed data analysis methods and the findings will be presented in simple descriptive statistics involving some tables and charts.

The choice of questionnaire as an instrument for the study stemmed from a number of advantages which make it suitable for data collection. Some of the strengths of questionnaire as research instrument are as follows:

- They are easier and quicker for respondent to answer;
- Respondents are more likely to answer sensitive questions as they are left alone to think through questions;
- Open-ended questions reduce researcher bias and enables respondents to provide information that are not known by the researcher, hence unanticipated findings can be discovered; and
- Questionnaires permit adequate answers to complex issues.

However, questionnaire as a research instrument may not be able to elicit adequate information from respondents and this may affect the outcome of the study negatively.

Both closed-ended and opened-ended questions were used to derive answers from respondents. As a way of minimizing researcher bias, the open-ended questions provided an opportunity for respondents to elaborate and provide further details while the closed ended questions gave respondents time to provide appropriate answers to the questions by choosing from possible options made available to them.

3.8 Data Analysis Method

Data analysis is a process of analyzing all the information and evaluating the relevant information that can be helpful in better decision making (Silvia and Skilling, 2006). The data analysis process aims at conversion of raw data collected from the field into information which can be understood by the researcher and the target audience. There are several steps involved in undertaking research data analysis. All data collected will be organized and checked before they are presented and analyzed to ensure completeness, accuracy, and validity. Objective one was analyzed using ordinary least square regression while objective two and three were analyzed using descriptive statistics such as mean and mode with the aid of Statistical Package for the Social Sciences (SPSS).

In dealing with objective one, we specified that inventory management is a function of IT and a vector of other control variables such as vendor managed inventory, material resource planning, and distribution resource planning

$$IM_i = \text{f}\,(I.C.T_i, CONT_i, \varepsilon_i) \quad (1)$$

Where IM_i is inventory management, $I.C.T_i$ is information communication technology proxied by warehouse management system and $CONT_i$ is a vector of the control variables

which include vendor managed inventory, material resource planning, and distribution resource planning.

Equation 1 above is modified into equation 2 below;

$$IM_i = \beta_0 + \beta_1 WMS_i + \beta_2 MRP_i + \beta_3 DRP_i + \beta_4 VMI_i + \varepsilon_i \quad (2)$$

Where WMS_i is warehouse management system which is a measure of IT, MRP_i is material resource planning, DRP_i is distribution resource planning and VMI_i is vendor management inventory. ε_i is the disturbance term, and IM is the inventory management performance. β_1, β_2, β_3 and β_4 measures the precise impact of IT, material resource planning, distribution resource planning and vendor management inventory on total inventory management. The equation above is estimated using ordinary least square regression. This is appropriate since the data is cross sectional in nature (See Brooks, 2014). Diagnostics test were performed to ascertain the validity and reliability of the model.

3.9 Validity and Reliability

To ensure validity and reliability of the data collected instruments, the instruments were piloted tested in the Tamale Commodity market. Questions that resulted in undesirable response were fine-tuned to make it more credible.

3.10 Ethical Issues

Care was taken to adhere to all ethical procedures before and during the conducting stages of the study. Clearance was sought, informed consent was obtained from all respondents who took part in the study. Questionnaires were explained to respondents to the best of their understanding. All respondents were informed that participation is voluntary.

Respondent were also assured of strict confidentiality by explaining to them that their identity will not be disclosed during the analysis stage and their views will remain confidential. They were also informed that the study will take some of their time and there will not be direct material benefits from the study to them.

There are several ethical issues, which the researcher may face during the design and gaining access, during data collection, and ethical issues associated with data processing and storage. The researcher will tackle those issues through good planning to conduct the research in line with ethical principles of not causing harm and by adapting choice of methods wherever appropriate.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents findings of the study. The main objective of the study was to assess the impact of usage of IT systems on Supply Chain Management (SCM) at the Tamale Market.

4.2 General Information

This section contains the demographic and economic information of the respondents and the enterprise.

4.2.1 Sex of respondents

Figure 4.1 represents the sex distribution of the sampled enterprise workers in the market. It indicates that females constituted 38.9% of the sampled enterprise workers in the Aboabo market. This suggests that majority of the business operators in the market are males. The finding conforms to reality in the northern region of Ghana where men are mostly family heads who have to work and earn income in order to fend for the family. Women, in the northern region where the Islamic religion dominates, are mostly house wives.

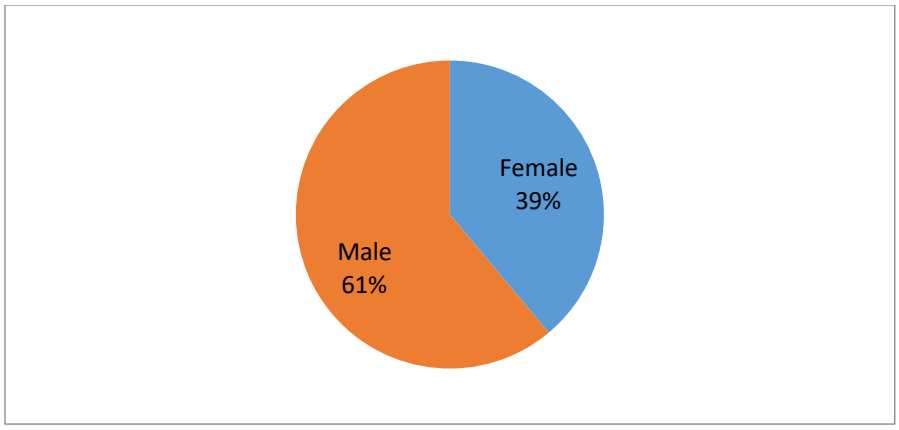

Figure 4.1: Sex distribution of respondents

Source: Field Survey, 2018

4.2.2 Respondents' age

Age distribution of the respondents is presented in Figure 4.2. It is evident from the table that 43.3% of the respondents were in the 26 to 35 age bracket with the least number of respondents falling within the 46 to 56 age bracket. The implication of the finding is that the respondents were all in the active working age bracket. This category of people constitutes the group of active IT users since they are neither minors nor aged. They can apply their IT systems' knowledge in managing their inventories successfully.

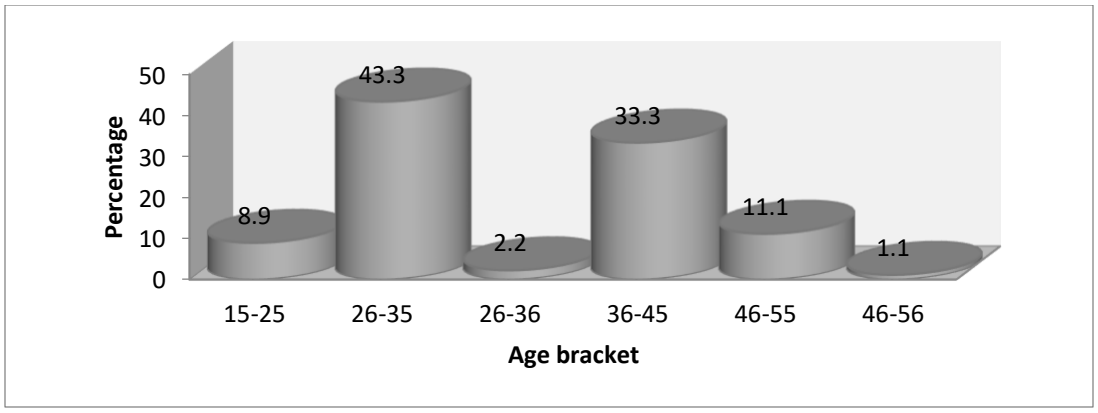

Figure 4.2: Age Distribution of Respondents

Source: Field Survey, 2018

4.2.3 Role of Respondent in Business

The respondents were requested to indicate the functional positions that they served to determine if they were qualified to give reliable and accurate information in regard to information technology systems in inventory management of enterprises in Aboabo market in Tamale. The findings are presented on Table 4.1

Table 4.1: Distribution of Respondents' Role

Role	Frequency	Percentage
MIS Officer	1	1.1
Procurement officer	1	1.1
Sales manager	31	34.4
Shop manager	47	52.2
Warehouse Keeper	10	11.1
Total	90	100.0

Source: Field Survey, 2018

It is shown in the Table 4.1 that 52.2% and 34.4% of the respondents were shop managers and sales managers respectively, whilst 1.1% each was Management Information System officers and Procurement officers.

4.2.4 Number of Employees in the Business

Table 4.2 presents the result on distribution of employees hired by the enterprises with which the respondents were working. From the table, 23.3% and 22.2% were the relatively higher proportions of the respondents who indicated that their firms employed 3 and more than 5 employees respectively. This suggests that most of the enterprises were not simple

but complex organizations whose inventories need to be managed using modern technology in order to avoid losses.

Table 4.2 Distribution of Firm's Employees

Number of employees	Frequency	Percentage
1	16	17.8
2	24	26.7
3	21	23.3
4	9	10.0
5+	20	22.2
Total	90	100

Source: Field Survey, 2018

4.3.1 Adoption of Information Technology in Inventory Management

Table 4.3 presents the extent of usage of IT systems used in inventory management enterprises in the Aboabo market in Tamale.

Table 4.3: Extent of Usage of IT systems in Inventory Management

IT usage in Inventory management	Sample size	Mean	Std. Deviation
Vendor managed inventory	90	1.63	1.033
Materials resources planning	90	1.69	1.013
Warehouse Management system	90	1.69	1.056
Distribution resources planning	90	1.71	1.019

Source: Field Survey, 2018

As shown in the Table, all the systems identified were used to a greater extent. However, vendor managed inventory (VMI) on the list had the least mean score (1.63) indicating greater use whilst distribution resource planning had the highest mean score (1.71) which indicates a relatively lesser use. On the deviation from the mean score, all the variables had smaller variations from the mean with material resource planning having the least standard deviation which implies that most of the responses were not significantly different from the mean scores. It is therefore concluded that Vendor managed inventory, Materials resources planning, Warehouse Management system and Distribution resources planning are all considerably used in managing inventory in Aboabo market in Tamale. The finding conforms to that of Martin (2005), who asserted that there has been rapid development in the use of information technology (IT) in logistic and supply chain Management. According to Martin (2005), IT in recent times is being applied in many organizations in a

wide range of areas of operations. It has provided new ways to store, process, distribute and exchange information both within an organization and with customers and suppliers in the supply chain.

4.3.2 Use of Smart Phones in Transacting Business

Table 4.4 presents the usage of smart phones in transacting businesses by enterprise workers in the Aboabo market in Tamale. It is evident from the table that 94.4% of the respondents indicated that they use smart phones in transacting businesses. Specifically, majority (90%) of them use their mobile phones for mobile money payments for goods. Others also use their mobile phones for ordering processes and mobile banking (checking their bank account balance, transferring money from bank account to mobile money wallet and the vice versa etc).

Table 4.4: Distribution of Smart Phone Usage in Transacting Business

kind of transaction	Do you transact business with Smart phone?				Grand Total
	No		Yes		
	Freq.	%	Freq.	%	
mobile banking	0	0	1	1.1	1
Mobile money payments for goods	0	0	81	90	81
NA	5	5.6	0	0	5
Ordering Processing	0	0	3	3.3	3
Total	5	5.6	85	94.4	90

Source: Field Survey, 2018

4.3.2 Use of Computers in Office

Distribution of responses on usage of computer in enterprises of respondents is presented in Table 4.5 below. From the table, 44.4% indicated that they do not use computers in their enterprises for business purposes. According to them, the reasons for not owning computers are either the high cost of acquiring the computers or they lack the knowledge of computer usage. Contrary to the high cost as a reason for not owning computers, Dave Chaffey (2004) believed that the use of information technology in S.C.M in order has the higher likelihood of reducing cost in all operations. However, it is shown in the table that majority (55.6%) indicated that they use computers in their enterprises to facilitate their operations.

Table 4.5: Distribution of Response on Use of Computers

Reason for not using computer	Use of computers in office?				Grand Total
	No		Yes		
	Freq.	%	Freq.	%	
Expensive	16	17.8	0	0.0	16
Ignorance	19	21.1	0	0.0	19
No response	5	5.6	0	0.0	5
Not applicable	0	0.0	50	55.6	50
Total	40	44.4	50	55.6	90

Source: Field Survey, 2018

4.3.3 Installation of Software

Table 4.6 presents the responses on whether or not the respondents installed I.T software on the computers in the enterprises, and the kinds of software if any. It is shown in the table that 44.4% of the respondents installed software on their computers whilst 11.1% of those who own computers do not have any software installed. The software installed include access database, internet based software, Microsoft office, software on price control, and a software on sales management.

Table 4.6: Distribution of installed software

Name of software installed	Installed software?						Grand total
	Not Applicable		No		Yes		
	Freq.	%	Freq.	%	Freq.	%	
Access Database	0	0.0	0	0.0	1	1.1	1
Internet Based Software	0	0.0	0	0.0	14	15.6	14
Microsoft Office	0	0.0	0	0.0	18	20.0	18
Not applicable	40	44.4	0	0.0	0	0.0	40
Not applicable	0	0.0	10	11.1	0	0.0	10
Price control	0	0.0	0	0.0	3	3.3	3
Sales management	0	0.0	0	0.0	4	4.4	4
Total	40	44.4	10	11.1	40	44.4	90

Source: Field Survey, 2018

4.4 Influence of Information Technology on Inventory Management Systems

The extent to which information technology adoption in the Aboabo market influenced inventory management cycle activities is shown in Table 4.7

Table 4.7: Extent to which IT Adoption Influences Inventory Management

Influence of IT on inventory management	Sample size	Mean	Std. Deviation
Easy to share information	89	1.82	.972
Enhance procurement ordering	90	1.90	1.071
Managing supplier relationship	90	1.90	1.071
Customer relation management	90	1.93	1.100
Sales process management	90	1.98	.994
Warehousing and storage management	90	1.99	1.076

Source: Field Survey, 2018

As shown in Table 4.7, I.T adoption in the Aboabo market influenced the following activities of inventory management cycle: sharing of information, enhancing procurement and ordering processes, managing supplier relationship, customer relations management,

sales process management, and warehousing and storage management. All these practices had the lower mean scores as 1.82, 1.90, 1.90, 1.93, 1.98 and 1.99 respectively. It was revealed that Easy to share information had the lowest deviation from the mean (0.972) relative to other activities.

4.5 Extent of Agreement on Impact of I.T Systems on Inventory Management Performance

The levels of agreement with regard to the impact of information technology usage on certain aspects of inventory management cycle activities in the Aboabo market are shown in Table 4.8

Table 4.8: Extent of Agreement on Impact of IT on Inventory Management Systems

Statement on Inventory Management System' indicator	Sample size	Mean	Standard Deviation
Enhanced information sharing with suppliers	90	1.80	0.877
IT has provided greater data accuracy on inventories	90	1.84	0.778
Improved the supplier relationship	90	1.84	0.833
Streamlining of supply chain by removal of inefficient intermediaries	90	1.91	0.895
Improved order processing	90	1.91	0.802
I.T has generally improved customer service	90	1.92	0.796
Enabled tracking movement of stock units in stores	90	1.97	0.893
I.T has improved speed of service to customers	90	1.98	0.848
Enhanced the receipt and dispersal of inventory entering or leaving warehouse	90	1.98	0.874
Reduction in lead time in replenishing inventory	90	1.99	0.918
IT has enhanced provision of accurate inventory information	90	2.00	0.835
Stock taking is easier in warehouse	90	2.01	0.918
ICT has reduced pilferages of inventory	90	2.01	0.923
Enables generation of real time inventory reports for effective inventory	90	2.02	0.904
Reduced cost of ordering stock	90	2.14	1.055

Source: Field Survey, 2018

From the Table 4.8, it is evident that on the average, majority of the respondents agreed that, IT enhanced information sharing with suppliers; provided greater data accuracy on inventories; improved the supplier relationship; streamlined of supply chain by removal of inefficient intermediaries; improved order processing; and generally improved customer service which have relatively lower mean scores of 1.80, 1.84, 1.84, 1.91, 1.91, and 1.92 respectively. Generally, all the positive indicators identified have been highly agreed upon by the respondents with the greatest mean score being 2.14 which is not significantly different from the code for 'agree' on the five-point Likert scale. The implication of the findings is that adoption of I.T has positive impact on inventory management particularly in the Aboabo market in Tamale.

4.5.2 Determinants of Inventory Management Performance

Table 4.9 presents the results on ordinary least square regression analysis of inventory management performance and I.T usage. Inventory management performance is the dependent variable whilst independent variables include the effects of I.T usage proxied by warehouse management system, vendor management inventory, material resource planning, and distribution resource planning. The adjusted R square (0.569) of the estimated model indicates that over 56% of the variation in the dependent variable are explained by the independent variables included in the model. The F-statistics of 8.912** and VIF value of 6.23<10 confirm the overall model is valid and absence of multicollinearity respectively.

Table 4.9: OLS Estimates of Inventory Management Performance Model

Variable	Coefficient	Standard error
Constant	2.586***	0.105
Warehouse management system	0.398***	0.064
Materials Resources planning	-0.052	0.072
Distribution resources planning	0.454**	0.130
Vendor Management System	0.148	0.308
F-statistics		
R-Square	8.912**	
Adjusted R Square	0.601	
Breusch-Pagan	0.569	
VIF	2.13	
	6.23	

Dependent Variable: inventory management performance

Note: * and ** represent 1% and 5% levels of significance, respectively.**

Source: Field Survey, 2018

From Table 4.9, IT proxy by warehouse management system had a coefficient of 0.398 significant at 1%. This confirms there is positive relationship between IT and total inventory management performance. This indicates that applying information technology

significantly enhance total inventory management performance. The coefficient of 0.398 implies that a unit increase in I.T usage for warehouse management system leads to a 0.398 unit increase in inventory management performance. This is in synch with Martin (2005), where the author opined that IT stimulates total inventory management.

Also, distribution and resource planning is statistically significant at the 5% level. The coefficient (0.454) of distribution and resource planning indicates that a unit increase in I.T usage for distribution and resource planning will result in a 0.454 unit increase in inventory management performance.

4.6.1 Challenges in IT Adoption by Enterprise in the Aboabo Market in Tamale

Table 4.10 shows the result on the challenges faced by the respondents in adopting I.T in their enterprises in order to effective and efficient inventory management in particular and operations in general. It is evident in the table that the greatest challenges that the enterprises face as small scale enterprises is lack of I.T specialist to ensure effective utilization of I.T applications without any difficulties. If a firm does not have someone within it who has a reasonable amount of knowledge for technology in general, it is sometimes dangerous in terms of system maintenance and failures, which can cause serious loss to the firm. Besides, it is highly expensive to hire the services of an external I.T expert ensure maintenance and check system failures. The next challenge based on the mean score on agreement is the high cost of installing a more robust I.T system in an organization. To a relatively lesser extent, the respondents agreed that lack of awareness about the benefits of I.T is also a reason for less usage of I.T in inventory management. The findings conform to assertion by Abdullah (2014) who categorized the challenges faced by SMEs in adopting

I.T into supporting (lack of awareness on benefits), technical (lack of I.T specialist) and administrative challenges.

Table 4.10 Extent of Agreement on Challenges in IT Implementation in Inventory Management

Challenge	Sample size	Mean	Standard Deviation
Lack of IT specialist in the enterprise	90	1.20	.807
High cost of installing IT facilities	90	1.40	.771
Lack of awareness on benefits of IT	90	1.44	.843

Source: Field Survey, 2018

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study, conclusion and recommendations based on the general findings.

5.2 Summary

The use of IT is considered as a perquisite for the effective control of today's complex supply chain and inventory management. However, IT investment in the supply chain process is said to have no guarantee for stronger organizational performance.

Empirical findings of this study indicate that enterprise ownership or management in the Aboabo market in Tamale is undertaken by both males and females with the males being slightly dominant over their female counterparts. It is also revealed that most of the enterprise employees in the market are of the active working age.

The level of adoption in commodity supply chain management

On the adoption of IT in inventory management, vendor managed inventory was relatively used to a larger extent, though usage of other systems such as materials resources planning, warehouse management system, and distribution resources planning were also highly utilized given that they all had mean scores less than 2 (the code for agree). Also, it is revealed most of the enterprise operators in the Aboabo market use smart phones in transacting businesses such as mobile banking, mobile money transfers, and ordering processes. Over half of the respondents also indicated that they use computers in their

businesses, with installed applications such as access database, internet based software Microsoft office, price control software, and sales management software.

Examining how the use of computer applications can improve inventory management in warehouses and market stalls in Tamale

With the influence of IT usage on inventory management, the study revealed that IT adoption has positive effects on inventory management activities such as easy to share information, enhance procurement ordering, managing supplier relationship, and customer relation management, among others. Specifically, the respondents largely agreed that I.T usage enhanced information sharing with suppliers, provided greater data accuracy on inventories, improved the supplier relationship, streamlined supply chain by removal of inefficient intermediaries, and enabled tracking movement of stock units in stores, among others.

Determining how IT can make commodity SCM more effective

On the determinants of inventory management performance as far as I.T adoption is concerned, the OLS estimates of the linear regression model indicated that only distribution resources planning, warehouse management system were statistically significant and had positive influence on inventory management performance.

Challenges face by businesses exploring the ICT space in commodity supply chain

They also revealed that the adoption I.T in inventory management is limited by lack of I.T specialist in the enterprises, high cost of acquiring and installing IT facilities, and lack of

awareness on the benefits of I.T, especially for small scale enterprises such as those in the Tamale-Aboabo market.

5.3 Conclusion

In conclusion, the study revealed that the usage of I.T has significant positive impact on supply chain management. However, the acquisition and installation of I.T facilities in an organization is bedeviled with considerable challenges.

5.4 Recommendations

The study recommends that enterprises in the Tamale-Aboabo market in particular as well as all enterprises in the country at large should invest more in modern technologies in order to integrate their inventory management systems. This would minimize communication costs and increase sharing of information which will result in improved efficiency and performance of the enterprises.

Also, enterprises should collaborate with government and other stakeholders in the I.T industry to educate both enterprise workers and prospective entrepreneurs on IT usage and benefits. As part of the investment on I.T, firms should ensure that they sponsor some of their employees to acquire in-depth knowledge on IT. This will produce more I.T specialists to man the I.T units of enterprises successfully.

The study also proposes that a further study is conducted on the impact of I.T used on inventory management performance in large firms in the country. This is because their level of adoption and implementation of information technology is relatively high as

compared to other categories of firms in the Tamale-Aboabo market. The findings obtained in such a study might be more comprehensive and create room for comparison.

In relation to the proposition for further study, an investigation on appropriate ways to increase formalization of information technology adoption in order to enhance adoption of modern technologies in inventory management as a tool to boost performance. This will enable enterprises to understand the benefits of I.T in inventory management systems in order to create a desire for adoption.

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APPENDIX: QUESTIONNAIRE

Dear Respondents! Thank you in advance for allocating your time to answer this questionnaire. The aim is to understand the impact of ICT in supply chain management. The data collected will be used for academic purposes only and your information will remain confidential between the researcher and you. You are requested to fill them with clarity and the answers you offer will be treated confidential. You are free in your own domain to either consent to or decline to the researcher and your answer will be treated with upmost respect.

Preamble: ***Business Profile***

1. a. Name of Respondent: ……..

1b. Gender: Male □ Female □

1c. Age of Respondent in years: …….

1d. what type of commodity business are you into? …….

1e. How many employees do you have? a. 1 b. 2 c.3 d. 4 e. 5 and above

1f. what is your role in the business? a. warehouse keeper b. sales manager c. procurement officer d. shop manager e. MIS officer

Preamble: ***Computer / Smart Phone Accessibility***

2a. Do you use computers in your office? Yes □ No □

If no, why? a. Expensive b. Ignorance c. Negligence d. Others (specify): .....

2b. What task do you perform with your computer? a. Database management b. Inventory management c. Order processing d. All above e. None of the above

2c.What is your level of computer literacy? a. Excellent b. Very good c. Good d. Poor

2d. Do you have any computer application installed in your computer to manage your business?

Yes □ No □

If yes, what is the name of the application? .....

3a. Do you have a smart phone? Yes. □ No. □

If yes,

3b. Do you use your smart phone to transact business. Yes □ No □

If yes,

3c. what kind of transaction do you do with your smart phone?

a. Mobile money payments for goods b. Order processing c. internet banking d. Others …….

Preamble: ***Internet Availability***

4a. Is there internet service in your office connected to your devices? Yes □ No □

4b. Do you have any knowledge on internet management? Yes □ No □

If yes, what is your knowledge and skills on internet? a. Excellent b. Very good c. Good d. Average e. Poor

Preamble: ***General ICT in Inventory Management***

5. In which activities do you use computer in your department? (***Tick where appropriate***)

a. Processing Orders b. Ordering items c. Inventory Management d. Finding suppliers

e. Others (mention): ……

5. How do you manage your inventory in your warehouse? (***Tick where appropriate***)

a. Computer applications b. Papers and manual counting c. Both Computer and Manual Counting

6. Has the computer software helped you in any way to curb loses in your business?

Yes □ No □

If yes, can you quantify how much it has helped you to save?

a. Ghc 100 – 499 b. Ghc 500 – 999 c. Ghc 1000 – 4999 d. above Ghc 5000

8. Which ways do you communicate with your buyers / customers? (***Tick where appropriate***)

a. Internet b. Postal letters c. Telephone d. Fax

e. All above

9. Do you think information technology in your organization is beneficial? Yes □ No □

If yes, what advantages do you see if internet and computers will be fully applied in Supply Chain Management?

……

……

…….....

10. Is there any need to conduct training in order to be able to use the computer system in your organization?

……

……

……

On a scale of 1 – 5, to what extent has the following inventory management system been adopted in your business?

1 **Very great extent, 2 Great extent, 3 Moderate extent, 4 Little extent, 5 Not adopted at all**

11. Vendor managed Inventory. 1, 2, 3, 4, 5

12. Materials Resources planning. 1, 2, 3, 4, 5

13. Distribution resources planning. 1, 2, 3, 4, 5

14. Warehouse Management System. 1, 2, 3, 4, 5

On a scale of 1 – 5, to what extent has ICT influenced the following activities of inventory management cycle in your business?

1 Very great extent, 2 Great extent, 3 Moderate extent, 4 Little extent, 5 Not adopted at all

15. Enhancing procurement and ordering processes. 1, 2, 3, 4, 5

16. Managing supplier relationship. 1, 2, 3, 4, 5

17. Makes it easy to share of information. 1, 2, 3, 4, 5

18. Warehousing and storage management. 1, 2, 3, 4, 5

19. Sales process management. 1, 2, 3, 4, 5

20. Customer relationship management. 1, 2, 3, 4, 5

On a scale of 1 – 5 what is your level of agreement of the impact of ICT on Supply chain management?

1. **Strongly agree, 2. Agree, 3. Neutral, 4. Disagree, 5. Strongly disagree**

21. Managing supplier relationships. 1, 2, 3, 4, 5

22. It has enhanced information sharing with suppliers. 1, 2, 3, 4, 5

23. It has improved the supplier relationships. 1, 2, 3, 4, 5

24. It has enhanced streamlining of supply chain by removal of inefficient intermediaries.

    1, 2, 3, 4, 5

25. It has enabled tracking movement of stock units in the warehouse/stores. 1, 2, 3, 4, 5

26. Stock taking in the warehouse is easier. 1, 2, 3, 4, 5

27. ICT has provided greater data accuracy on inventories. 1, 2, 3, 4, 5

28. Enhanced the receipt and dispersal of inventory entering or leaving warehouse. 1, 2, 3, 4, 5

29. ICT has reduced pilferages of inventory. 1, 2, 3, 4, 5

30. There is reduction in the lead time in replenishing inventory. 1, 2, 3, 4, 5

31. It has reduced cost of ordering stock. 1, 2, 3, 4, 5

32. It has improved order processing. 1, 2, 3, 4, 5

33. It has enabled generation of real time inventory reports for effective inventory management processes. 1, 2, 3, 4, 5

34. IT has enhanced provision of accurate inventory information to customers. 1, 2, 3, 4, 5

35. IT has generally improved customer service experience. 1, 2, 3, 4, 5