

**SUPPLY CHAIN PERFORMANCE AND PERFORMANCE OF  
MANUFACTURING PHARMACEUTICAL FIRMS IN KENYA**

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## **DECLARATION**

I declare that this research project is my original work and has never been submitted to any other university for assessment or award of a degree.

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This research project has been submitted with my authority as the university supervisor.

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## **DEDICATION**

This work is dedicated to my dear husband Royken and my daughters Tricia and Tracy for the inspiration they have given me throughout my study.

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First, I would like to acknowledge the support and guidance of my university supervisors Mr. Michael Chirchir and Mrs. Salome Kinyua, my moderator Dr. Magutu without forgetting all lecturers who have added great value to my life through the knowledge and skills they have imparted in me.

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## **ABSTRACT**

Companies have understood that for effective competition in a continuously changing environment, it is necessary to monitor and understand firm performance. Measurement has been recognized as a crucial element to improve business performance. In order to evolve an effective and efficient supply chain, supply chain management needs to be assessed for its performance in order to know the competitive position of a company in the market place. Attaining a world –class competitive status requires managers to realize that making process decisions to create or purchase products and services customers want and then to distribute them in ways that will satisfy the customers may initially cost more for the firm. Thus it is achieving cost performance together with acceptable levels of quality and customer service performance and then continually improving on these measures that firms must aim toward. This study sought to establish the measures of supply chain performance among manufacturing pharmaceutical firms in Kenya and to determine the relationship between supply chain performance and the performance of manufacturing pharmaceutical firms in Kenya. The study employed a descriptive research design. Data was collected using a self administered questionnaire from 25 respondents which constitute a response rate of 78%. This was sufficiently representative of the target population. Data analysis was done using SPSS with the main analysis tools being frequencies, means, standard deviation, factor analysis and multivariate linear regression. The study found out that there are six specific measures of supply chain performance namely: cash to cash cycle time, production flexibility, delivery performance, perfect order fulfillment performance, total supply chain management costs and e-business performance. It was noted that the implementation of these supply chain performance measures led to improved performance of the firm. It was recommended that all manufacturing pharmaceutical firms should seek to implement these six supply chain performance determinants for overall performance of their firms. It was suggested that future studies could focus on agent and distributing pharmaceutical firms in Kenya since this study concentrated only on manufacturing pharmaceutical firms. One limitation of the study was that it did not fully focus on firm performance since it just gave a highlight. It was therefore suggested that an in –depth analysis of manufacturing firms’ performance using a balance score card can be considered as an area for further study.

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## LIST OF ABBREVIATIONS/ACRONYMS

<b>CIPS:</b>	Chartered Institute of Purchasing and Supply
<b>B2B:</b>	Business-to-Business
<b>B2C:</b>	Business-to-Customer
<b>BSC</b>	Balance Score Card
<b>EDL:</b>	Essential Drug List
<b>ERP</b>	Enterprise Resource Planning
<b>E-SC:</b>	Electronic Supply Chain
<b>GMP:</b>	Good Manufacturing Practices
<b>GSK:</b>	GlaxoSmithKline
<b>ICT:</b>	Information and Communications Technology
<b>KNPP:</b>	Kenya National Pharmaceutical Policy
<b>KEMSA:</b>	Kenya Medical Supplies Agency
<b>MEDS:</b>	Mission for Essential Drugs and Supplies
<b>NQCL:</b>	National Quality Control Laboratory
<b>PMS:</b>	Performance Measurement Systems
<b>SC:</b>	Supply Chain
<b>SCM:</b>	Supply Chain Management
<b>SCPMS:</b>	Supply Chain Performance Measurement Systems
<b>TQM :</b>	Total Quality Management
<b>TRIPS:</b>	Trade-Related-Intellectual Property Services

**WHO:** World Health Organization

# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the Study

It is important to measure the performance of the complete supply chain (SC) and its individual processes. The performance measurement process has evolved since the mid-eighties of the last century when its foundations were formalized and integrated into the management of organizations (Folan & Browne, 2005). Inter-organizational systems focus on measuring the performance of SC. If the performance of any SC is not monitored through measurement, many things could go wrong. Measurement is important as it affects behavior that impacts on SC performance. As such, performance measurement provides the means by which a company can assess whether its supply chain has improved or degraded. A purchasing and SC performance measurement system represents a formal systematic approach to monitor and evaluate purchasing performance (Monczka et al., 2009). Although this sounds easy, it is often easy to develop measures that could be harmful, depending on performance objectives, rather than supporting long-term performance. For example, the ability to win significant price concessions from a supplier is still a major objective for certain price or cost performance measures (Handfied et al., 2009).

Many firms look to continuous improvement as a tool to enhance their core competitiveness using Supply Chain Management (SCM). Many companies have not succeeded in maximizing their supply chain potential because they have often failed to develop the performance measures and metrics needed to fully integrate their supply chain to maximize effectiveness and efficiency. (Joel et al., 2009) state that firms need to develop an entire system of meaningful performance measures to become and then

remain competitive, particularly when managing supply chain imperatives. (Handfield et al., 2009) posit that a supply chain performance measurement system should directly support corporate goals and objectives. They further argue that there is need to create measurement systems that are responsive to change. Measuring SC performance can facilitate a greater understanding of the SC and improve its overall performance (Charan et al., 2008). Interest on performance measurement has notably increased in the last 20 years, (Taticchi et al., 2010). Companies have understood that for effective competition in a continuously changing environment, it is necessary to monitor and understand firm performances.

### **1.1.1 Supply Chain Performance**

(Nagurney 2006) defines supply chain as a system of organizations, people and activities, information, and resources involved in moving a product or service from supplier to customer. Supply chain activities transform natural resources, raw materials, and components into a finished product that is delivered to the end customer. In sophisticated supply chain systems, used products may re-enter the supply chain at any point where residual value is recyclable. (Investopedia 2014) argues that SC is the network created amongst different companies producing, handling and/or distributing a specific product. Specifically, SC encompasses the steps it takes to get a good or service from the supplier to the customer. SC includes multiple companies such as suppliers, manufacturers and the retailers. Supply chains include every company that comes into contact with a particular product, assembling it, delivering it and selling it.

(Industry Direct Inc. 2005) note that, companies of all sizes are realizing that they no longer have complete control over their market success. This is because they rely heavily on the performance of their supply chain trading partners. Market-leading retailers know this, and they are looking for partners that work to ensure their success. Many large companies are now insisting that their small and medium industrial suppliers help them improve supply chain cost, responsiveness and reliability. Those that have not invested heavily in supply chain management (SCM) practices or solutions beyond Enterprise Resource Planning (ERP) to date are now driven to seriously consider making the investment. Supply chain improvements will not only improve internal performance, but will also create benefits that will ripple through to customers and partners as well.

The overall performance of the supply chain significantly affects the financial health of all member companies. Therefore, an effective supply chain performance measurement process should be able to directly address performance areas that create sustainable profitability and financial strength (Nevad and Dustan 2011). In order to accomplish this requirement, the performance measurement process will need to provide a reliable indication of the contribution of supply chain operations to the areas like growth, cost minimization, working capital efficiency and fixed asset utilization. Key performance indicators are measurements that directly relate to key business requirements. KPI come in various forms from simple reporting measurements to very complex, cross correlated analytic results. (Joel et al., 2009) argue that supply chain performance measurement systems vary substantially from company to company. Thus it is achieving cost



performance together with acceptable levels of quality and customer service performance and then continually improving on these measures that firms must aim toward.

(Keah-Choo et al., 2005) argue that PMS for supply chains must effectively link the supply chain trading partners to achieve breakthrough performance in satisfying the end users. There is an emerging requirement to focus on the performance measurement of the SC in which the company is a partner argues (Charan et al., 2008). Companies have understood that for effective competition in a continuously changing environment, it is necessary to monitor and understand firm performances. (Tacticchi et al., 2010) note that measurement has been recognized as a crucial element to improve business performance. In order to evolve an effective and efficient SC, SCM needs to be assessed for its performance in order to know the competitive position of a company in the market place. (Gunasekaran & Kobu 2007) presented the following purposes of a performance measurement: Identify success, identify whether customer needs are met, better understanding of processes, identifying bottlenecks, waste, problems and improvement opportunities, providing factual decisions, enabling progress, tracking process and facilitating a more open and transparent communication and co-operation.

### **1.1.2 Firm Performance**

In recent years, researchers and practitioners have expressed concerns with the traditional management accounting systems (MAS), traditional management control systems (MCS) and traditional performance measurement systems (PMS). It all started with the book “Relevance Lost - Rise and Fall of Management Accounting” by Johnson and Kaplan in 1987. They have argued that the traditional management accounting systems which was

developed during the industrial age is no longer adequate in today's rapidly changing, dynamic, and competitive environment and that the information provided under the traditional management accounting systems is not useful, not timely, and not good enough for management planning, controlling and decision making. With regard to management control system, traditional management control system, as developed by Anthony (1965), has overlooked the elements of non-financial measures, strategies and operations that are essential in a good control system. Traditional management control systems design, in particular performance measurement system, relies on short-term profit measures and, is not adequate to reflect effectiveness in today's business environments. In addition, the changing nature of value creation complicates the performance measurement process whereby the focus now is on managing intangible assets (e.g. customer relationships, innovative products and services, high-quality and responsive operating processes) which are non-financial in nature, rather than managing tangible assets (e.g. fixed assets and inventory) which are financial in nature (Kaplan & Norton, 2001). As a result, many organizations have experienced the decreasing book value of tangible assets (Brewer, 2002; Kaplan & Norton, 2001). Thus, the traditional performance measurement tools designed for industrial-age economy, which emphasize on financial measures and tangible assets, are no longer able to capture the changing nature of today's business environment. New performance measurement systems, so called strategic performance measurement systems have been developed. One of the famous SPMS is the balanced scorecard (BSC), originated by Kaplan and Norton in (1992). Kaplan and Norton (2001) claims that BSC helps to overcome strategy implementation by providing a framework to build strategy-focused organizations.

### **1.1.3 Pharmaceutical Firms in Kenya**

There are 32 companies listed as local pharmaceutical manufacturers in Kenya (Kenya's Pharmaceutical Industry 2005). Amongst these, there is only one multinational, GlaxoSmithKline (GSK). Together, these companies constitute an important pharma manufacturing centre in the region. Some firms have already made the investment in plant and equipment to meet World Health Organization (WHO) basic good manufacturing practices (GMP) standards. Unsatisfactory and inadequate access to essential drugs and other healthcare commodities is a key limitation that impacts on people's health in most developing and least developed countries (Economic Survey 2004 by Central Bureau of Statistics and Ministry of Planning). The main legislation for the control of pharmacy in Kenya is Pharmacy and Poisons Act, Cap 244. Its main purpose is to regulate the profession of pharmacy and control the manufacturing, trade and distribution of pharmaceutical products. The Industry Property Act, 2001 provides for the promotion of inventive and innovative activities to facilitate the acquisition of technology by granting and regulating patents, utility models, technical innovations and industrial designs. It is popularly known as the "Patent Act". Kenya acceded to the Trade-related intellectual Property Services (TRIPS) agreement by enacting this legislation in 2001.

The Anti-Counterfeit Act, December 2008, was legislated to prohibit trade in counterfeit goods and pharmaceuticals are not exempted. The Kenya Public Procurement and Disposal Act, 2005 provides for the establishment of procedures for public procurement. The act also provides for pre-qualification of suppliers. The National Quality Control

Laboratory (NQCL) was established as the technical arm of PPB to provide for the examination and testing of drugs and to ensure quality control. Kenya procures medicines mainly through the Kenya Medical Supplies Agency (KEMSA). The agency also procures for some donor partners. Many Essential Drug List (EDL) medicines cannot be purchased because of budgetary constraints. Mission for Essential Drugs and Supplies (MEDS) is another large –scale, bulk procurer of medicines.

## **1.2 Research Problem**

Monitoring the supply chain performance measurement could help give a firm competitive edge over the others. (Kurien 2009) has done a study that focuses on performance measurement practices in supply chain management. (Gunasekaran et al., 2006) argue that all participants in the supply chain should be involved and committed to common goals, such as customer satisfaction throughout the supply chain and enhanced competitiveness. Several studies have been carried out in the past in the area of supply chain performance measurement. Some of them include: (Tangen 2004) who states that even though remarkable progress has been made over the recent years in the design and performance measurement frameworks and systems, many companies are still primarily relying on traditional financial performance measures. Studies reveal that some of the best practices proposed as mechanisms for improving overall SC performance and overall firm performance may not have the degree of impact often presented in the studies (Lockamy et al., 2004). It shows that some best practices help to improve SC performance only in specific areas.

(Aronovich et al., 2010) provided a guide to key performance indicators for public health managers. They found out that positive health outcomes are highly dependent on how

well the health delivery system (health information, financing, personnel and supply chain including supplies) is performing. They further looked at several types of indicators of supply chain performance and their harmonization. However, this study focused on an already developed economy; the United States of America. (Mageto et. al., 2012) established that there is a direct relationship between supply chain performance and responsiveness. They however did not focus on supply chain and firm performance. Despite the many studies that have been done in the area of supply chain performance measurement, none of them has addressed supply chain performance and performance of pharmaceutical firms in Kenya. There have been attempts internationally to study the supply chain among pharmaceutical firms, but all these focused on developed economies. Kenya is an underdeveloped economy hence this forms a research gap. It is for this reason that this study seeks to answer the question: what is the relationship between supply chain performance and performance of manufacturing pharmaceutical firms in Kenya?

### **1.3 Research Objectives**

The objectives of the study were:

- i. To establish the measures of supply chain performance among manufacturing pharmaceutical firms in Kenya.
- ii. To determine the relationship between supply chain performance and performance of manufacturing pharmaceutical firms in Kenya.

## **1.4 Value of the Study**

This study is expected to be of significance to various stakeholders in the manufacturing pharmaceutical firms. Firstly, it will benefit the management since it will establish the relationship between supply chain performance and performance of manufacturing pharmaceutical firms in Kenya. It will therefore make it possible for management to know the areas within the supply chain that require improvement for higher profit margins. The supply chain is a fast growing field and the findings of this study will go a long way in informing supply chain experts on areas that require their attention especially at their work places since the pharmaceutical industry is a sensitive one and any single mistake could lead to loss of life.

The study will also benefit many stakeholders since it will inform the policy makers on the areas of the supply chain that require policy interventions for the purpose of providing an efficient supply chain.

This study will also form a basis for future researchers and scholars to identify academic gaps on areas of supply chain performance and firm performance.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This chapter reviewed both theoretical and empirical literature related to the study. The theories reviewed were: agency theory, contingency theory and systems theory. This chapter concluded by stating the research gaps of the study.

### **2.2 Theoretical Review**

This section comprised a review of theories that were relevant to the study and informed the theoretical background of the study.

#### **2.2.1 Agency Theory**

Agency theory relates to business relationships that consist of a “principal” and an “agent” who are engaged in cooperative behavior, but have differing goals and differing attitudes towards risk. The mechanism for controlling the relationship is the contract between the principal and the agent and, depending on the situation; the contract will be behavior-based or outcome-based. The heart of the principal-agent theory is the trade-off between the cost of measuring behavior and the cost of measuring outcomes and transferring risk to the agent (Eisenhardt., 1989).

This theory is relevant to the study as it looks at the relationship between principles and agents yet it is strongly believed that perceived procedural and distributive justice could enhance the performance of the supply chain by encouraging collaboration between the principals and agents (Griffith et al., 2006). Therefore fostering a working relationship between the principal and the agent along the supply chain could lead to improvement in firm performance.

### **2.2.2 Structural Contingency Theory**

Early work of (Burns & Stalker 1966) and Lawrence & Lorsch 1967) developed this theory, and later theoretical developments helped explain those results (Thompson, 1967; Galbraith, 1973). The theory posits that organizations will be effective if managers fit the characteristics of their organization, such as structure, with contingencies in the environment (Donaldson 2001). Under-performing companies may decide to adopt a new business model (configuration) that better fits their environment. The theory draws specifically from the contingency theory, which argues that there is no best way to design an organization and that no theory or method can be applied in all circumstances (Thompson 1967). The heart of structural contingency theory lies in how a static, state of fit between structures and contingency results in high performance, though (Galunic & Eisenhardt 1994) challenge this by outlining that, through being static, structural contingency theory fails to deal with organizational change and adaptation. When applying structural contingency theory to SCM, individual parts of the supply chain should be aligned and organized in such a way that achieves the best performance. If an ideal model can be established for supply chain integration and structural contingency theory to the pharmaceutical industry, the supply chain needs to be organized in a way that best 'fits' the clients' needs and expectations in the environment. This theory is relevant to the study as it explains how to align the individual parts of the SC to achieve the best firm performance. Once this is done, then it is possible for the researcher to



determine the relationship between performance of the supply chain and firm performance.

### **2.2.3 Systems Theory**

This theory has several principles and with respect to the first principle, there are two issues that organizations should consider in terms of their supply chains. This principle indicates that the longer the supply chain in terms of its links (that is, third, fourth or more party logistics providers are involved (Copacino, 1997:p43; Foster, 1999: p35; Parker, 1999: p17), the less adaptable the supply chain will be to possible changes needed for it to survive. As discussed by various scholars (Forrester, 1961; Senge, 1990; Fowler, 1999), the ‘physics’ of a system limits its achievements, and the possible emergence of stability and control problems may lead to the system’s performance malperformance.

The second principle of the systems theory states that supply chains offer the opportunity to outsource functions to other organizations (Chase, 1998:p70; Lawrence, 1999: p52; Stundza, 1999: p69), by adopting new techniques such as vendor-managed inventory, as a way to streamline its operations (Holmstrom, 1998:p3). High activity supply chains will need more management resources to ensure that benefits do emerge from them as compared to low activity chains. The third principle indicates that supply chains are not monolithic organizations artifacts but can be broken down into a number of smaller sub-systems. (Yourdon 1989) also applied this principle in the development of structured systems methodology. Rather than seeing organization strategy/structure, information technology and human factors as different static and separate dimensions of the Generic Supply Chain Model (Caddy and Helou, 1999), they can, in fact be considered as

dynamic sub-systems participating and interacting within the one supply chain system. In the fourth principle of the systems theory, (Yourdon 1989) stated that information system, even though they are artificial constructs, do in fact grow.

With respect to supply chains; the amount of goods, services, products, information or knowledge exchanged through the supply chain may grow. Furthermore, organizations should realize that although information systems and supply chains are artificial constructs, and, therefore, are not living systems; this does not mean that they are static. They are indeed very dynamic and will evolve and change over time as they interact with a changing external environment. The above four general systems theory principles applied by (Yourdon 1989) to the field of information systems are considered with respect to supply chains. Their application indicates that a deeper understanding of supply chain management chains and their management could be gained. This theory is relevant to this study as the four general principles of the theory are applied to information systems considered with respect to the supply chain. Yet one of the measures explored is supply chain e-business performance. It will therefore give the researcher insights during the analysis of the data.

### **2.3 Supply Chain Performance**

The importance of performance in the context of SCM cannot be overstated. Timely and accurate assessment of overall system and individual system component performance is paramount. An effective performance measurement system provides the basis to understand the system, influences behavior throughout the system, and provides information regarding the results of system efforts to supply chain members and outside

stakeholders (Nenad and Dusan 2011). (Joel et al., 2009), identifies five world class performance measures along the supply chain. These include: quality, cost, flexibility, dependability and innovation. They further argue that a performance criterion that guides the firm's decision making to achieve strategic objectives must be easy to implement, understand and measure; they must be flexible and consistent with the firm's objectives; and they must be implemented in the areas that are viewed as critical to the success of the firm. (Gunasekaran et al., 2004) develop a framework for supply chain performance measurement. The article provides a detailed measurement and metrics classification' and uses a survey aiming at assessing importance within each metric group. Three main classes of performance measurement are discussed by (Martin and Patterson 2009): inventory, cycle time and financials. Effects of supply chain relations (organizational structure, partnering, supplier agreement and process improvements) on performance measures selected are investigated via survey-based study.

(Keah-Choon et al. 2005) posit that to achieve superior customer service levels at competitive prices, specific measures must be adopted for the supply chain itself, allowing trading partners to adjust their specific performance, to further align with supply chain objectives. These are discussed below:

Total supply chain management costs which are costs to process orders, purchase materials, purchase energy, comply with environmental regulations, manage inventories and returns and manage supply chain finance, planning and information systems, (Joel et al., 2009). Leading supply companies are spending from 4 to 5 percent of sales on supply chain management costs, while the average company spends about 5 to 6 percent.

Inventory holding costs measure the annual cost of carrying inventory at a specific facility. (The Aberdeen Group 2007) argue that it is important for management accountants and supply chain managers to understand and know the true costs of their supply chains and not to rely solely on the outsourced providers. A best practice for identifying supply chain costs is to “map” the supply chains and develop process models that describe what is taking place in the company’s supply chains, (Enslow 2006).

Supply chain cash-to-cash cycle time which is the average number of days between paying for raw materials and getting paid for the product, for the supply chain trading partners (calculated by inventory days of supply plus days of sales outstanding minus average payment period for material) (Wisner 2009). This measure shows the impact of lower inventories on the speed of cash moving through firms and the supply chain. Top supply chain companies have a cash-to-cash cycle time of about 30 days, which is far less than the average company. These trading partners no longer view “slow paying” as a viable strategy. World-class firms closely monitor and manage their working capital along the supply chain, (Gomm, 2010, Otto and Obermaier, 2009) because the way in which firms manage their working capital has a strong impact on their profitability, (Garcia-Teruel and Martinez-Solano, 2007; Lazaridis and Tryfonidis, 2006).

Supply chain production flexibility which is the average time required for supply chain members to provide an unplanned, sustainable 20 per cent increase in production. The ability for the supply chain to quickly react to unexpected demand spikes while still operating within financial targets provides tremendous competitive advantage. One common supply chain practice is to maintain stocks of component parts locally for supply

chain customers to quickly respond to unexpected demand increases. Average production flexibility for best –in-class supply chains is from one to two weeks, Joel et al.,(2009 Flexibility provides an alternative means of coping with demand uncertainty. (Price Water House Coopers survey report 2013) notes that supply chain performance will depend on the ability to respond quickly to changes in demand and supply through the ups and downs of business cycles, as well as during crises. Flexibility will continue to grow in importance with the rise of emerging markets and a proliferation of new products. Consequently, companies will need to consider different strategies, such as segmenting supply chains, partnering more closely with vendors, and increasing transparency and risk management. The good news is that sophisticated new technologies are making supply chains more transparent and efficient.

Supply chain delivery performance is the average percentage of orders for the supply chain members that are filled on or before the requested delivery date. In the top-performing supply chains, delivery dates are being met from 94 to 100 per cent of the time. For average firms, delivery performance is approximately 70 to 80 per cent. Updating customers on the expected delivery dates of orders is becoming a common e-service for many supply chains, (Joel et al., 2009). Today's manufacturing industry is characterized by strong interdependencies between companies operating in globally distributed production networks. The operation of such value-added chains has been enabled by recent developments in ICTs and computer networking. To gain competitive advantages and efficiency improvements such as reduced inventory and higher delivery reliability, companies are introducing information exchange systems that communicate demand to suppliers and production progress information to customers in the network

(Rupp & Ristic, 2004). There are several performance sub measures connected to delivery e.g: on- time delivery

Supply chain perfect order fulfillment is the average percentage of orders among supply chains that arrive on time, complete and damage free (Wisner et al., 2009). This is quickly becoming the standard for delivery performance and represents a significant source of competitive advantage for top-performing supply chains and their member companies. (William et al., 2013) argue that manufacturers and retailers need to consider the following variables in developing their own version of the perfect order: Market context- Businesses need to take into account the current conditions and realities of their vertical industry segment. For example, lead times and customer needs vary widely, even within the same broad industry. A maker of telephone poles, for example, will not be under the same pressing time requirements as a supplier to the electronics industry, although both are manufacturers; Demand and trend data- Using the trending patterns that can be gathered via social, mobile and analytics data and their influence on the destination context (when, what, how much), companies need to determine the necessary planning or configuration requirements; Infrastructure and capabilities- Can the manufacturer and its suppliers produce the products the market desires and deliver them quickly and with enough scale to meet new market and segment demands?

Supply Chain E-business Performance is the average percentage of electronic orders received for all supply chain members. In 1998, only 2 percent of all firms' purchase orders were made over the internet. By 2007, for example, office supply retailer staples said that 90 per cent of their orders came in electronically. Additionally, use of e-

procurement can save up to 90 percent of the administrative costs of ordering (Joel et al., 2009). Today, they note, supply chain companies are investing heavily in e-based order-receipt systems, marketing strategies and other forms of communication and research using the internet. (Sunil and Van 2006) studied the impact of e-business on supply chain performance and came up with the following as findings: Setting up an e-business affects both revenues and costs for a firm.

E-business allows firms to enhance revenues by direct sales to customers. Providing on-line product and other information across the supply chain allows flexibility on price, product portfolio and promotions. The Internet, they add, also makes information located at a central source (the seller's web server) available to anyone with Internet access, so that a change in price, product portfolio or promotions only requires one database entry. On-line product information allows a much faster time to market as a product can be "introduced" as soon as a first unit is available. This is particularly valuable in industries with short product life cycles, where e-business provides an advantage over a "physical" product information model, (Sunil and Van 2006).

## **2.4 Firm Performance**

Sole reliance on financial or accounting based performance measures is inadequate in the new manufacturing environment (European Journal of Business and Management Vol.5, No.9, 2013). Increased awareness on the importance of non-financial performance measures in providing long-term value creation and long-term strategic focus as well as their effects on firm performance has led to several innovations in the area of performance measurement system. One of the widely known innovations in this area is called balanced scorecard (BSC) which has been originated by Kaplan and Norton in

1992. The BSC supplements the traditional financial measures with non-financial measures focused on at least three other perspectives – customers, internal business processes, and learning and growth.

According to Chaudron (2005), BSC is a way of: measuring organizational, business unit or departmental success; balancing long-term and short-term actions; balancing the following different measures of success; Financial; Customer; Internal Operations; Human Resource Systems & Development (learning and growth); tying the firm's strategy to measures of action. Much of the success of the scorecard depends on how the measures are agreed, the way they are implemented and how they are acted upon (Bourne, 2007). Kenneth and Brian (2006) state that the balanced score card is not only a measurement system but also a framework that enables organizations to clarify their vision and strategy and translate them into action. The balanced scorecard suggests that we view the organization from four perspectives. The advantage of the scorecard is that it presents many of the seemingly disparate elements of an organization's agenda in a single report. It also encourages managers to consider all relevant operational measures at the same time. Based on the company's purchasing and supply strategies, the balanced scorecard would then be connected to a specific set of appropriate performance measurements. The result will be a scorecard by department or people with specific key performance indicators (Handfield et al 2009).

Financial perspective -the financial performance measures define the long-run objectives of the business unit (Kaplan & Norton, 1992).Financial measures indicate whether the



organization's strategy implementation and execution are contributing to bottom-line improvement. A well-designed financial control system can actually enhance an organization's management system. The performance measures in this perspective include improved cost structure and increased assets utilization using the productivity improvement strategy, on one hand and on the other hand enhanced customer value and expanded revenue opportunities through revenue growth strategies. The financial perspective emphasizes cost efficiency, that is, the ability to deliver maximum value to the customer at minimum cost and sustained stakeholder value (Gekonge, 2005).

Customer perspective- this captures the ability of the organization to provide quality goods and services, the effectiveness of their delivery, and overall customer service and satisfaction. This will result from price, quality, availability, selection, functionality, service, partnerships and brand value propositions, which will lead to increased customer acquisition and retention (Gekonge, 2005). The BSC demands that managers translate their general mission statement on customer service into specific measures that reflect the factors that really matter to customers (Kaplan & Norton, 1992). Customers' concerns tend to fall into four categories: time, quality, performance and service, and cost. Satisfied customers buy a product again, talk favorably to others about the product, pay less attention to competing brands and advertising, and buy other products from the company (Kotler & Armstrong, 2004). Recent management philosophy has shown an increasing realization of the importance of customer focus and customer satisfaction in any business (Chabrow, 2002; Holloway, 2002; Needleman, 2003).

Internal processes perspective- Gekonge (2005), argues that internal processes perspective focuses on the internal business results that lead to financial success and satisfied customers. To meet the organizational objectives and customers' expectations, organizations must identify the key business processes at which they must excel. These key business processes are monitored to ensure that outcomes will always be satisfactory. The internal processes perspective reports on the efficiency of internal processes and procedures. The premise behind this perspective is that customer-based measures are important, but they must be translated into measures of what the organization must do internally to meet its customers' expectations (Kaplan & Norton, 1992).

Innovation, learning and growth perspective -The learning and growth perspective examines the ability of employees (skills, talents, knowledge and training), the quality of information systems (systems, databases and networks) and the effects of organizational alignment (culture, leadership, alignment and teamwork), in supporting the accomplishment of organizational objectives (Gekonge, 2005). Processes will only succeed if adequately skilled and motivated employees, supplied with accurate and timely information and led by effective leadership, are driving them. They will lead to production and delivery of quality products and services; and eventually successful financial performance (Gekonge, 2005).

The BSC therefore emphasizes performance measurement and management in four key business areas. These four perspectives provide a comprehensive evaluation of the organization than the traditional emphasis on tangible and financial assets of the

organization. This is because learning improves the internal business processes; this improvement leads to improved customer satisfaction; which in turn leads to improved financial results. The BSC emphasizes improvement and if an organization does not continually improve, it will eventually lose out to competitors that do. Incorporating these perspectives in the BSC offers a framework for translating strategic objectives into performance measurements that gauge the effects of implemented strategies and provide feedback on the performance of strategic initiatives. The BSC offers some useful generic performance measurements that apply to practically all organizations. Firms, small or large, need to know how they measure up to their own goals and standards, and the BSC can give them the advantage they need to evaluate themselves accurately and, as a result, place themselves in a better position to compete (European Journal of Business and Management Vol.5, No.9, 2013).

## **2.5 Empirical Review**

Top management needs financial measures for management level decisions, but lower management and workers need operational measures for daily business. (Kurien and Gureshi 2011) argue that a PMS should be derived from the company's objectives. A PMS ought to consist of various types of performance measures covering all important aspects as representing the success of a company. There must in turn be a balance between the various performance measures in the SCPM. As the performance measures by which employees are evaluated greatly impact their behavior, an improper set of measurements can lead to dysfunctional or unanticipated behavior. A PMS must therefore guard against sub- optimization, possibly by establishing a clear link from the top of the

company all the way to the bottom to ensure that employee behavior is consistent with corporate goals (Tangen, 2004).

To create appropriate necessary action it is necessary to use a limited number of performance measures. (Charan et al 2008) argue that for better results on implementation of SCPM, top management should focus on the high-driving power enablers such as awareness of PMS in SC, commitment by the top management, consistency with strategic goals, funding for PMS implementation, and effective information systems. Enablers of SCPMS implementation as suggested by (Charan et al., 2008) are: effective information system; employee commitment; dynamic, inter-connectable, cross functional and usable SCMS; partnership with dealers, distributors and retailers; appropriate performance metrics; overcoming mistrust; funds for PMS implementation; commitment by top management about PMS in SC and consistence with strategic goals. (Robinson and Malhotra 2005) focus on quality management requirements of the new supply chain era and mention supply chain quality management concept, emphasizing the commitment to quality both inter- and intra-organizationally again basing on the supply chain organization reference (SCOR) model and balanced scorecard approach. This review clearly put forward the problems of today's performance measurement systems. In today's competitive age, it is proven that many companies have not succeeded in maximizing their supply chain's potential because they have often failed to develop the performance metrics needed to fully integrate their supply chains to maximize effectiveness and efficiency (Gunasekaran et al., 2004) and (Gunasekarean and Kobu 2007).

An organizational culture is a combination of factors including nationality, the tasks performed by the organization, information technology and the people working in the organization. (Eve 2013). Thakkar et al., (2009) notes that strategy, leadership, culture and capability are four critical factors that have a role in effective implementation of SCPM. Each of these elements is inter connected with each other and simultaneously exercises the influence on implementation of suggested frameworks.

## **2.6 Summary and Research Gaps**

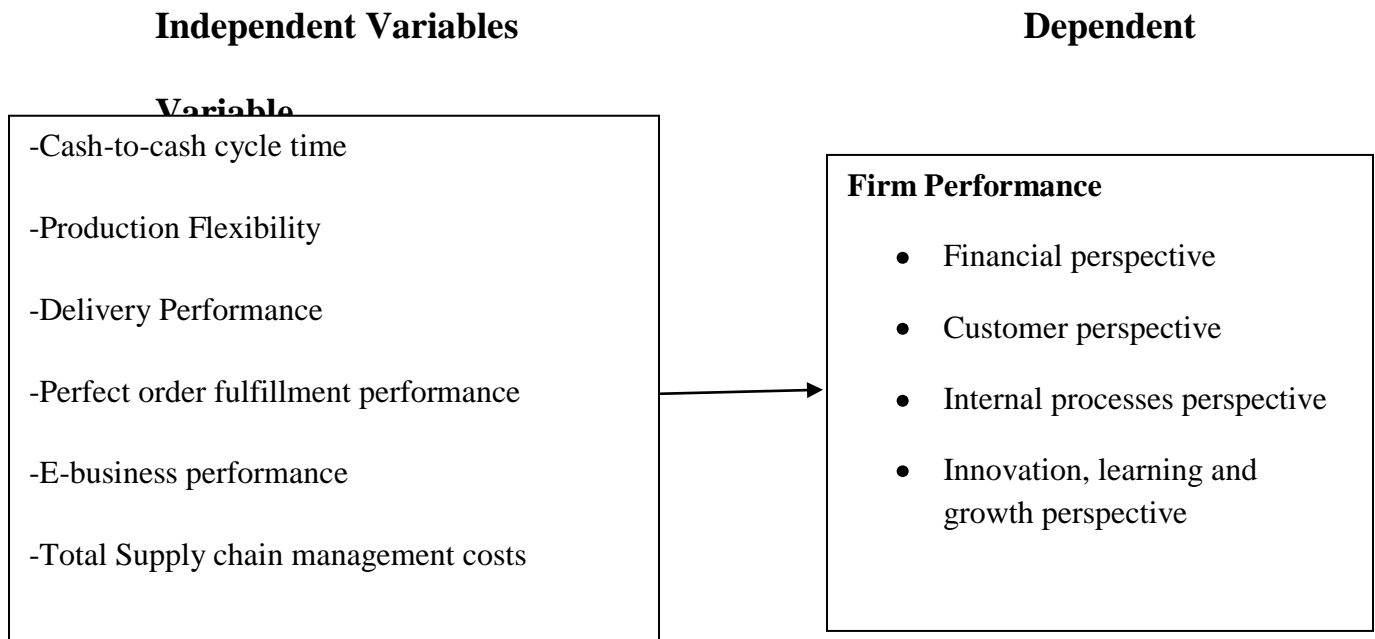
This chapter reviews the various theories that are relevant to the study. In addition, the empirical literature brings out the fact that supply chain performance is key, in ensuring organizational efficiency and effectiveness. A number of studies have been conducted on supply chain performance by many scholars. Many of these scholars propose the need to review PMS and suggest techniques for such review. However, not much has been done about the relationship between supply chain performance and firm performance.

In addition, many of the studies available have been carried out in developed countries. The study available about Kenya by Eve (2013) was carried out on commercial banks. Mageto et al., (2012) also carried out a similar research but however, it was concerned with just one factor affecting supply chain performance, which is responsiveness. The study available by Elizabeth (2013) though it is on pharmaceutical firms in Kenya, it focuses on sales performance. Hence there is need to carry out a research on the relationship between supply chain performance and firm performance in the Kenyan context.

## 2.7 Conceptual Framework

Yosef (2009) defined conceptual framework as a network, or a 'plane', of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena. The concepts that constitute the conceptual framework support one another, articulate their respective phenomena, and establish a framework-specific philosophy. The variables of this study comprised one dependent variable (firm performance) and six independent variables (management costs, cash-to-cash cycle time, production flexibility, delivery performance, perfect order performance, e-business performance).

**Figure 2.7 Conceptual Framework**



Source: (Research data 2014)

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter presents the methodology used to carry out the study. This includes the research design, the target population, data collection instruments used, data collection techniques, pilot test, data analysis method and presentation. This research methodology aimed at enabling the researcher to obtain the data, process it and interpret the results.

### **3.2 Research Design**

The study used a descriptive research design. This research design was most appropriate since objectives of the research were to investigate the measures of supply chain performance in pharmaceutical firms in Kenya and to determine the relationship between supply chain performance and performance of pharmaceutical firms in Kenya. This research design has been used successfully by past researchers including (Kambua 2013) who studied implementation of e-procurement practices among private hospitals in Nairobi, Kenya.

### **3.3 Population of Study**

The population of interest in this study was all the 32 manufacturing firms in Kenya. For the purpose of this study, a census of 32 pharmaceutical manufacturing firms in Kenya was used. This is because of the relatively small number of these firms (Kenya Factbook 16th Edition, 2001 & The Kenya Telephone Directory 2004).

### **3.4 Data Collection**

Primary data was used in the study. The questionnaire was administered to the respondents at their place of work. The instrument contained variables for supply chain performance and firm performance. A 5-point Likert-type scale was used to grade responses. The questionnaire contained 3 sections: Section A contained bio data; section B contained information on supply chain performance while C sought secondary data on firm performance. All the responses falling in different categories in the questionnaire were categorized according to the variables under investigation. Since the research was being conducted in various locations across Nairobi, the researcher used a team of research assistants to distribute the questionnaires to the various respondents. Follow-up was done through telephone calls and site visits to ensure the respondents have filled the questions after the agreed time. The questionnaire was subjected to a pilot test before final administration to the respondents. A convenient sample of six (6) respondents was selected and given the questionnaire to fill in the presence of the researcher. The results were used to check for face validity of the instrument and to refine the instrument for clarity. The pilot test aided the researcher in clearing any ambiguities and in ensuring that the questions posed measured what it is intended to measure.

### **3.5 Data Analysis**

The data collected was summarized and screened to identify missing information and improper responses. Data was put into SPSS software for purposes of analysis. Quantitative data was coded and analyzed using descriptive statistics including factor



analysis, measures of central tendency and measures of variability and presented using charts, tables and narratives.

Regression was used to determine the relationship between supply chain performance variables and firm performance variables. A standard linear regression model was used in the study: given as  $Z =$  Where  $z = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e$  where

$a = z$  intercept, where  $x$  is zero, and  $b_1, b_2, b_3,$  and  $b_4$  are regression weights attached to the variables. The variables  $x_1, x_2, x_3,$  and  $x_4, x_5$  and  $x_6$  were: cash to cash cycle time, production flexibility, delivery performance, perfect order fulfillment performance, e-business performance and total supply chain management costs respectively.

## CHAPTER FOUR

### DATA ANALYSIS, INTERPRETATION AND DISCUSSIONS

#### 4.1 Introduction

This chapter presents the data analysis results, as well as interpretation and discussion of findings. The study had two objectives: to establish the measures of supply chain performance of manufacturing pharmaceutical firms in Kenya and to determine the relationship between supply chain performance and the performance of manufacturing pharmaceutical firms in Kenya. Data analysis was done using frequencies, correlation and regression. Results are presented in tables and charts.

##### 4.1.1 Response Rate

The study targeted all the 32 manufacturing pharmaceutical firms in Kenya. The table below presents the response rate.

**Table 4.1: Response rate**

	<b>Targeted (count)</b>	<b>Received (count)</b>	<b>Response rate</b>
Respondents	32	25	78%

Source: Research data (2014)

From the table 4.1, 25 out of the 32 manufacturing pharmaceutical firms responded to the questionnaire representing a 78% response rate. This response rate was considered high

enough and representative (Letting, 2011). The 22% who did not return the questionnaires cited busy schedules as the main reason for lacking time to fill them.

## **4.2 Characteristics of Respondents**

This section consists of information that describes basic characteristics such as age, years of work experience and education level of the respondents.

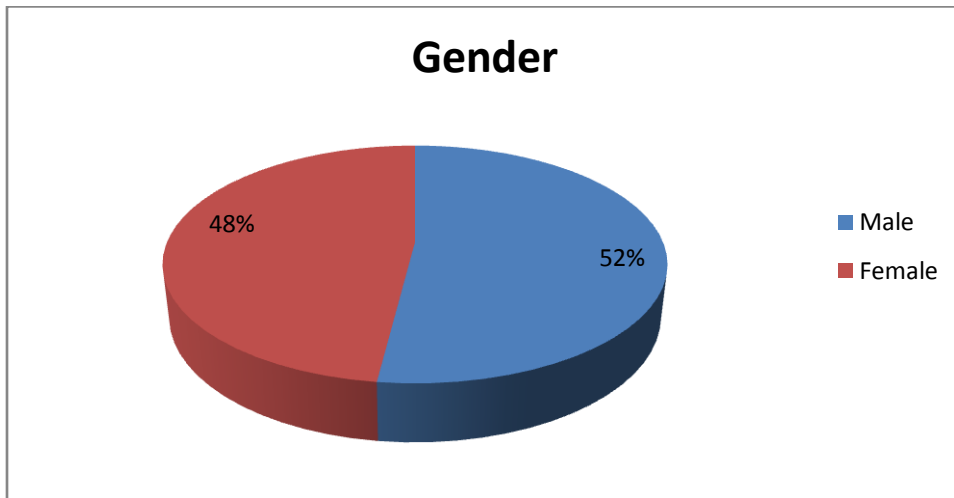
### **4.2.1 Gender**

The study sought to establish the gender of employees among manufacturing pharmaceutical firms in Kenya.

**Table 4.2: Distribution of respondents by gender**

<b>Gender</b>	<b>Frequency</b>	<b>Percent (%)</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
Male	13	52	52	52
Female	12	48	48	100
Total	25	100	100	100

**Figure 4.1: Distribution of respondents by gender**



Source: (Research Data 2014)

It is evident from the findings as illustrated in Figure 4.1 that 52% of the employees in pharmaceutical firms in Kenya are male and 48% of the employees in pharmaceutical firms in Kenya are female. The results confirm that most of the employees in pharmaceutical firms in Kenya are male.

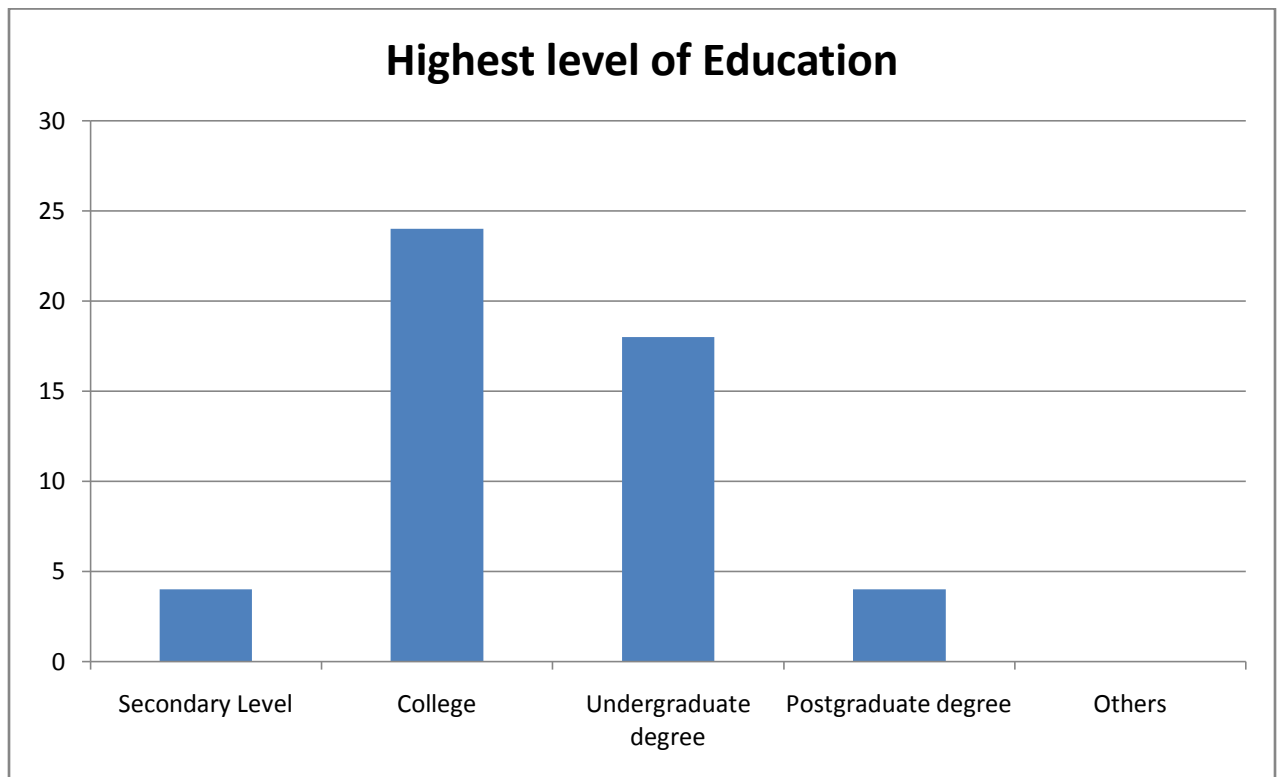
#### **4.2.2 Highest Level of Education**

The study sought to establish the level of education of employees in pharmaceutical firms in Kenya.

**Table 4.3: Highest level of education of employees**

	Frequency	Percent (%)	Valid Percent	Cumulative Percent
Secondary Level	2	8	8	8
College	12	48	48	56
Undergraduate degree	9	36	36	92
Postgraduate degree	2	8	8	100
Others	0	0	0	100
Total	25	50	50	100

**Figure 4.3: Highest level of education of employees**



Source: (Research data 2014)

The findings from the study as illustrated in figure 4.3 confirm that approximately 48% of the employees in Pharmaceutical firms in Kenya are college graduates, 36% have undergraduate degree, , 8% have a postgraduate degree and 8% are secondary school graduates. This was relevant to the study since it impacted on the kind of responses given. It was noted that majority of the respondents were college graduates.

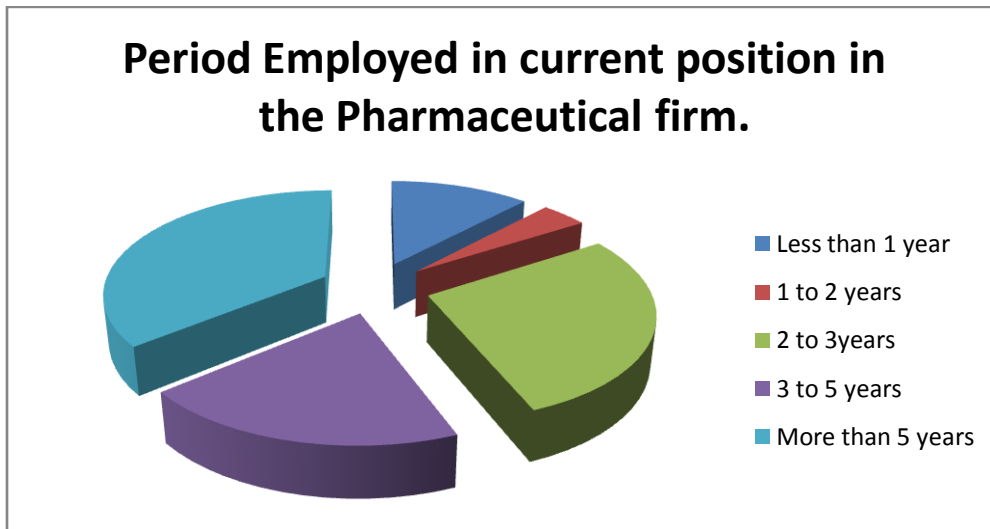
### **4.2.3 Period of Employment in Current Position**

Figure 4.4 presents the period that the employees have been working in pharmaceutical firms in Kenya. The findings indicated that most of the respondents had worked for more than five years while fewest respondents had a working experience of between 1 and 2 years. This explains that majority of the respondents in the firms had the highest working experience in supply chain department.

**Table 4.4: Period Employed in Pharmaceutical Firms.**

	<b>Frequency</b>	<b>Percent (%)</b>	<b>Cumulative Percent</b>
Less than 1 year	3	12	12
1 to 2 years	1	4	16
2 to 3years	7	28	44
3 to 5 years	5	20	64
More than 5 years	9	36	100
Total	25	100	100

**Figure 4.3: Period employed in pharmaceutical firm.**



Source: (Research data 2014)

### **4.2.3 Years of Firm's Operation in the Industry**

Table 4.5 shows that most pharmaceutical firms in Kenya have been in operation for more than 3 years working experience. These results indicate that the pharmaceutical industry has been in existence for a long time and it serves as a best avenue to conduct this survey on the relationship between supply chain performance and performance of pharmaceutical firms in Kenya.

**Table 4.5: Years of firm's operation in the industry**

	<b>Frequency</b>	<b>Percentage</b>	<b>Cumulative %</b>
Less than 1 year	0	0	0
1 to 2 years	0	0	0
2 to 3 years	6	24	24
3 to 5 years	8	32	56
More than 5 years	11	44	100
Total	25	100	100

### **4.3. Descriptive results on measures of supply chain performance among manufacturing pharmaceutical firms in Kenya**

This section presents the descriptive results on measures of supply chain performance among pharmaceutical firms in Kenya.

#### **4.3.1 Cash to Cash Cycle Time**

Table 4.6 displays results of data analysis regarding the views of the respondents on cash to cash cycle time among pharmaceutical firms in Kenya. Results indicated that 68% of the respondents support that the firm pays its suppliers in time. 84 % of the respondents agreed that their firm delivers goods to its customers on time. The results also indicated that the firms have in place supplier manufacturing cycle time to respond to demand changes and that the firm suppliers have the ability to adjust quickly by 50% within two weeks of scheduled delivery time. This is supported by response rates of 64% and 56% respectively. 84% respondents agreed that the firm had efficient internal systems that ensured reduction through elimination of delays with another 84% supporting that their firms keenly observed due dates, scheduled or promised. The overall mean score was 3.715 which means that more respondents agreed with the questionnaires' statement.



**Table 4.6: Cash to Cash Cycle Time**

<b>Statement</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Rank</b>
The firm delivers goods to its customers on time	4.16	0.24	(1)
The firm has in place supplier manufacturing cycle time to respond to demand changes	3.88	0.62	(2)
The firm has keenly observes due dates, scheduled or promised.	3.76	0.58	(3)
The firm pays its suppliers in time	3.64	0.76	(4)
The firm's suppliers have the ability to adjust quickly by 50% within two weeks of scheduled delivery	3.60	0.50	(5)
The firm has efficient internal systems that ensure reduction through elimination of delays.	3.25	0.48	(6)
<b>Average</b>	<b>3.715</b>	<b>0.53</b>	

### **4.3.2 Production flexibility**

Table 4.7 presents responses on production flexibility in pharmaceutical firms in Kenya. (Sixty eight) 68% agreed that the firm had enough employees to meet the labour requirements of the firm. The firm had adequate customer service staff to cater for customer complaints and needs. This statement was supported by 64% positive response rate from the respondents. Sixty (60%) of the respondents and 56% respectively agreed to the statement that the firm responds quickly in case of order changes and that the firm's production rate is sufficient to meet any unexpected demands . On a 5 point scale the mean score of the responses was 3.685 which indicate that there was a higher level of agreement on the questionnaire statements by respondents.

**Table 4.7: Production Flexibility**

<b>Statement</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Rank</b>
The firm's production rate is sufficient to meet any unexpected demands	3.84	0.66	(1)
The firm has adequate customer service staff to cater for customer complaints and needs	3.80	0.72	(2)
The firm has enough employees to meet the labor requirements of the firm	3.68	0.76	(3)
The firm responds quickly in case of order changes	3.42	0.84	(4)
<b>Average</b>	<b>3.685</b>	<b>0.75</b>	

### **4.3.3 Delivery Performance**

Table 4.8 presents responses on delivery performance of firms. (Eighty) 80% agreed that the firm keeps its delivery promises to customers. The suppliers deliver the raw materials required in the right quantity on time. These statements are supported by 68% agreed response rate of the respondents. Sixty eight (68%) and 64% respectively agree to the statements customers complaints are dealt with on time and that the firm takes the shortest time possible to process warranty claims. Another 64% agreed to the statement that the firm does not go beyond two days late in delivering its products. On a 5 point scale the mean score of the responses was 3.816 which indicate that there was a higher level of agreement on the questionnaire statements by respondents.

**Table 4.8: Delivery Performance**

<b>Statement</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Rank</b>
The firm keeps its delivery promises to its customers	4.12	0.63	(1)
The suppliers deliver the raw materials required in the right quantity on time	3.84	0.60	(2)
The firm does not go beyond two days late in delivering its products	3.80	0.62	(3)
Customer complaints are dealt with on time	3.72	0.85	(4)
The firm takes the shortest time possible to process warranty claims	3.60	0.65	(5)
<b>Average</b>	<b>3.186</b>	<b>0.67</b>	

#### **4.3.4 Perfect Order Fulfillment Performance**

Table 4.9 displays results of data analysis regarding the views of the respondents on perfect order fulfillment performance in pharmaceutical firms in Kenya. Results indicate that 84% of the respondents supported the fact that the firm delivers its orders on time. 68% of the responses received agreed that their firm delivers goods to its customers that are defective free. The results also indicated that the firms delivered goods to customers in the right quantity and that the suppliers that deliver raw materials to the firm are quality certified. This is supported by an agreed response rate of 84% and 56% respectively. 68% respondents agreed that in case of defects in any of their products, the firm moves with speed to correct it. The overall mean score of 3.912 which means that more respondents were agreeing with the questionnaires' statements.

**Table 4.9: Perfect Order fulfillment performance**

<b>Statement</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Rank</b>
The firm delivers its orders on time	4.12	0.18	(1)
The firm delivers goods that are defective free	3.84	0.12	(2)
In case of defects in any of our products, my firm moves with speed to correct it	3.80	0.32	(3)
The firm delivers goods to customers in the right quantity	3.72	0.11	(4)
Suppliers that deliver raw materials to this firm are quality certified	3.60	0.47	(5)
<b>Average</b>	<b>3.912</b>	<b>0.24</b>	

#### **4.3.5 E-Business performance**

Table 4.10 presents responses on E-Business performance among pharmaceutical firms in Kenya. (Sixty) 60% of respondents agreed that their firms had invested heavily in e-supply chain. (Sixty four) 64% of the respondents agreed that e-supply chain infrastructure is compatible with other existing technologies in the firm. 64% of the respondents agreed that the suppliers for the firm have necessary infrastructure to support e-supply chain. Sixty (60%), 68% and 52% respectively agreed to the statement that the system had helped in monitoring inventory flow, the system had helped in reducing follow up time and that the system had helped reduce ordering time. On a 5 point scale the mean score of the responses was 3.60 which indicate that there was a higher level of agreement on the questionnaires' statements by respondents.

**Table 4.10: E-Business performance**

<b>Statement</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Rank</b>
The system has helped in reducing follow up time	3.76	1.22	(1)
The system has helped reduce ordering time	3.72	1.01	(2)
E-supply chain infrastructure is compatible with other existing technologies in the firm	3.60	0.65	(3)
The firm has invested heavily in e-supply chain	3.56	0.75	(4)
The system has helped in monitoring inventory flow	3.48	1.39	(5)
Suppliers for the firm have necessary infrastructure to support e-supply chain	3.48	1.39	(6)
<b>Average</b>	<b>3.60</b>	<b>0.84</b>	

### **4.3.6 Total supply chain management costs**

Table 4.11 presents responses on total supply chain management costs amongst manufacturing pharmaceutical firms in Kenya. 56% of the respondents agreed that the firms spent between 4 to 5 percent of sales on management costs. 68% of the respondents agreed that customers are compensated for purchasing any defective goods. (68%) and another (68%) of the respondents agreed that the firms measured field failure rates by purchase items and by suppliers and that the firms accommodated supplier ideas on cost cutting. Seventy two (72%) and 80% respectively agreed to the statement that employee turnover in the firm was frequent and that the firm had standby techniques in case of machine breakdown. 68% of the respondents agreed that the firms did not require rush orders to meet delivery rates. Finally 80% of the respondents agreed to the statement that e-supply chain system had reduced operation costs for the firm. On a 5 point scale the

mean score of the responses was 3.75 which indicated that there was a higher level of agreement on the questionnaire statements by respondents.

**Table 4.11: Total supply chain management costs**

<b>Statement</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Rank</b>
e-supply chain system has reduced operation costs for the firm	4.04	1.01	(1)
The firm has standby technicians in case of machine breakdown	4.00	0.75	(2)
The firm accommodates supplier ideas on cost - cutting	3.76	0.64	(3)
The firm does not require rush orders to meet delivery rates	3.76	0.59	(4)
The firm measures the field failure rates by purchase item and by supplier	3.72	1.01	(5)
Employee turnover in firm is frequent	3.68	0.60	(6)
Customers are compensated for purchasing any defective goods	3.64	1.19	(7)
The firm spends between 4 to 5 percent of sales on management costs	3.40	0.63	(8)
<b>Average</b>	<b>3.75</b>	<b>0.80</b>	

### **4.3.7 Firm performance**

Table 4.12 presents responses on firm performances in pharmaceutical firms in Kenya. (Eighty) 80% of respondents agreed that the firms had a well defined financial control system. (Seventy six) 76% of the respondents agreed that the firms focus on customer satisfaction enhanced perfect order fulfillment. 68% of the respondents agreed that their

firms' internal processes were streamlined to ensure overall customer satisfaction. (72%), 72% and 80% respectively agreed to the statement that the employees of the firm underwent induction training upon employment, the firm had invested heavily in e-business and this had enhanced perfect order fulfillment and that the firms closely monitored the ability of the employees and this had enhanced perfect order fulfillment. On a 5 point scale the mean score of the responses was 3.60 which indicated that there was a higher level of agreement on the questionnaires' statements by respondents.

**Table 4.12: Firm performance**

**Section C: Firm Performance**

<b>Statement</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Rank</b>
The firm has invested heavily in e-business and this has enhanced perfect order fulfillment	3.96	0.91	(1)
The firm has a well defined financial control system	3.92	0.59	(2)
Our focus on customer satisfaction enhances perfect order fulfillment	3.92	0.98	(3)
Our internal processes are streamlined to ensure overall customer satisfaction	3.88	0.75	(4)
Our employees undergo induction training upon employment.	3.88	1.19	(5)
The firm closely monitors the ability of the employees and this has enhanced perfect order fulfillment	3.88	1.01	(6)
<b>Average</b>	<b>3.91</b>	<b>0.90</b>	

#### **4.4 Inferential statistics on the relationship between supply chain performance of manufacturing pharmaceutical firms in Kenya.**

Inferential analysis was conducted to generate correlation results, model of fitness and regression coefficients.

##### **4.4.1 Correlation Analysis**

Table 4.13 presents the correlation test results which indicate that the delivery performance had a strong correlation of (.983) and the same was statistically significant to explain performance measurement as  $p = .003 < .05$  cash to cash cycle time also had a strong correlation of (.979) and  $p = .004 < .05$ . Production flexibility on the other hand had a correlation of (.942) and a p value of  $.017 < .05$ . Perfect order fulfillment performance correlation of (.988), and  $p = .002 < .05$ . E-business performance had a correlation of .979 and  $p = .004 < .05$ . Finally total supply chain management costs had a correlation of (.992) and  $p = .001 < .05$ . On an overall basis, all the variables were statistically significant as they all had a strong positive correlation and a p value less than .05.

##### **4.4.2 Regression Analysis**

The study sought to establish the joint relationship between the factors identified from factor analysis with supply chain performance. A multivariate linear regression equation was fitted to the data with the identified factors as the independent variables and supply chain performance as the dependant variable. The results were as shown in the table below. Table 4.13 shows the coefficients.



**Table 4.13 Regression Coefficients**

Correlations								
		firm performance	delivery performance	cash to cash cycle time	production flexibility	perfect order fulfillment performance	e-business performance	total supply chain management costs
firm performance	Pearson Correlation	1						
	Sig. (2-tailed)							
total supply chain management costs	Pearson Correlation	.983	1					
	Sig. (2-tailed)	.003						
cash to cash cycle time	Pearson Correlation	.979	.993	1				
	Sig. (2-tailed)	.004	.001					
delivery performance	Pearson Correlation	.942	.957	.937	1			
	Sig. (2-tailed)	.017	.011	.019				
perfect order fulfillment performance	Pearson Correlation	.988	.991	.993	.966	1		
	Sig. (2-tailed)	.002	.001	.001	.008			
e-business performance	Pearson Correlation	.979	.952	.933	.891	.940	1	
	Sig. (2-tailed)	.004	.012	.021	.043	.017		

production flexibility	Pearson Correlation	.992	.984**	.988*	.911	.983	.970**	1
	Sig. (2-tailed)	.001	.002	.001	.031	.003	.006	

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

**Table 4.14 Regression Coefficients**

**Table 4.13 Regression Coefficients**

		Coefficients <sup>a</sup>				
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.635	.786		-1.058.	.146
	total supply chain management costs	-.470	.112	-.450	-4.75	.000
	cash to cash cycle time	.479	.158	.433	4.208	.001
	delivery performance	-.630	.111	-.573	-3.259.	.000
	perfect order fulfillment performance	.024	.172	.058	.172	.132
	e-business performance	.300	.081	.211	1.96.	.059
	production flexibility	.629	.099	.415	4.854.	.001

a. Dependent Variable: firm performance

The model used to link the independent variables to the dependent variable was:

$$Z = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + E$$

Where Z= Firm Performance

a = Constant term

X<sub>1</sub> = delivery performance

X<sub>2</sub> = cash to cash cycle time

X<sub>3</sub> = production flexibility

X<sub>4</sub> = perfect order fulfillment performance

X<sub>5</sub> = e-business performance

X<sub>6</sub> = total supply chain management costs

E= Error term

From table 4.14 the equation obtained was as follows:

$$FP = -1.635 + -.630*DP + .479*CC + .629*PF + .024*PO + .300*EB + .470*TS$$

Where:

DP= delivery performance

CC = cash to cash cycle time

PF = production flexibility

PO = perfect order fulfillment performance

EB = e-business performance

From Table 4.14 above, delivery performance has a significantly significant relationship with firm performance ( $\beta = -.630$ ;  $p = .000 < .05$ ), cash to cash cycle time has a significantly significant relationship with firm performance ( $\beta = +.479$ ;  $p = .001 < .05$ ). Production flexibility has a significantly significant relationship with firm performance i.e. ( $\beta = .629$ ;  $p = .001 < .05$ ), perfect order fulfillment performance has an insignificant relationship with firm performance i.e. ( $\beta = +.024$ ;  $p = .132$ ), e-business performance has an insignificant relationship with firm performance i.e. ( $\beta = .300$ ;  $p = .059$ ), while total supply chain management costs have a significantly significant relationship with firm performance i.e. ( $\beta = -.470$ ;  $p = .000 < .05$ ). Four of the variables had a significantly significant relationship with firm performance i.e. ( $p < .05$ ) while two had an insignificant relationship with firm performance i.e. ( $p > .05$ ).

#### 4.5 Analysis of Variance (ANOVA)

**Table 4.15 ANOVA**

ANOVA <sup>b</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	80.350	1	80.350	69.539	.004 <sup>a</sup>
	Residual	3.466	3	1.155		
	Total	83.817	4			
a. Predictors: (Constant), cash to cash cycle time						
b. Dependent Variable: firm performance						

From table 4.14 above, p-value = .000 which is less than 5%. This indicates that the model is statistically significant and that the identified factors have a statistically significant relationship with firm performance.

## 4.6 Model summary

**Table 4.16 Model summary**

<b>R</b>	<b>R square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the estimate</b>
.979	.959	.945	1.07493

From table 4.15, it can be revealed that the six independent variables, that is: delivery performance, cash to cash cycle time, production flexibility, perfect order fulfillment performance, total supply chain management costs and e-business performance account for 97.9% of the variability in firm performance. This is because the coefficient of determination was found to be .979 indicating that this is a very good model according to the rule of thumb used by practitioners basing on the threshold for a good fit.

## **CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter presents summary of findings, conclusions and recommendations. It is organized as follows: first it presents the summary of findings organized as per research objectives, then the conclusions drawn from those findings and finally both policy recommendations and suggestions for further study.

### **5.2 Summary of Findings and Discussions**

The study sought to establish determinants of supply chain performance among manufacturing pharmaceutical firms in Kenya and to determine the relationship between supply chain performance and performance of manufacturing pharmaceutical firms in Kenya. Regarding the determinants of supply chain performance, the study found out there are six determinants of supply chain performance namely: cash-to-cash cycle time, production flexibility, delivery, perfect order fulfillment performance, e-business performance and total supply chain management costs.

The study revealed that most pharmaceutical firms in Kenya had invested heavily in e-supply chain. The system had helped in monitoring inventory flow among the manufacturing pharmaceutical firms in Kenya. It had also helped greatly in reducing follow up time. The system had in addition helped reduce ordering time in most of these firms in Kenya. Investing in e-supply chain had generally improved the performance of the firm since suppliers for the firms also had necessary infrastructure to support e-supply chain. This was in line with the findings of (Joel et al., 2009) who stated that supply chain

companies are investing heavily in e-based order-receipt systems, marketing strategies and other forms of communication and research using the internet.

The study also revealed that most pharmaceutical firms in Kenya had production rate which was sufficient to meet any unexpected demands. This was attributed to the firm having suppliers deliver the raw materials required in the right quantity and at the require time and also because most of the firms had enough employees to meet their labor requirements.

The study also revealed that most manufacturing pharmaceutical firms in Kenya had adequate customer service staff to cater for customer complaints and needs which made most of them to respond quickly in case of order changes and that made the firms to keep its delivery promises to its customers.

The study also discovered that most pharmaceutical firms in Kenya had a well defined financial control system. Most the firms focused on customer satisfaction which enhanced perfect order fulfillment. Most of the firms had internal processes streamlined to ensure overall customer satisfaction. This was attributed to the induction training which employees undergo upon employment and because most of the firms closely monitored the ability of their employees. The study also revealed that most of the firms had invested heavily in e business and this had enhanced perfect order fulfillment.

These revelations were in collaboration with (Keah-Choon et al. 2005) who states that to achieve superior customer service levels at competitive prices, specific measures must be adopted for the supply chain itself, allowing trading partners to adjust their specific performance, to further align with supply chain objectives. These specific measures he

discusses include cash to cash cycle time, production flexibility, delivery performance, perfect order fulfillment performance, business performance and total supply chain management costs.

The study therefore clearly indicates the performance of most manufacturing pharmaceutical firms in Kenya had been enhanced due to them investing heavily in supply chain systems and therefore implementing the six supply chain performance measures.

### **5.3 Conclusions**

From the above findings the following conclusions were deduced. Supply chain performance measures have been implemented to varying extents among manufacturing pharmaceutical firms in Kenya. The aggregate implementation level for all the manufacturing pharmaceutical firms is above average, indicating that most manufacturing pharmaceutical firms appreciate the following as determiners of supply chain performance: cash-to-cash cycle time, production flexibility, delivery performance , perfect order fulfillment performance, e-business performance and total supply chain management costs. Overallly, the regression model was found not to be suitable for this study meaning that there are other factors that determine firm performance aside from the six mentioned.

### **5.4 Recommendations**

From the above conclusions, the following recommendations were arrived at: Firstly, in order to achieve superior customer service levels at competitive prices, manufacturing



pharmaceutical firms must adopt specific measures for the supply chain itself. This would further lead to improved firm performance. These measures include: cash-to-cash cycle time, production flexibility, delivery performance, perfect order fulfillment performance, e-business performance and total supply chain management costs. This would really help to better the performance of these firms since the findings indicate that there is a strong correlative relationship between supply chain performance and the overall performance of the firm.

#### **5.4.2 Limitations and Suggestions for Further Research**

Since the study focused only on manufacturing pharmaceutical firms in Kenya, future studies can consider expanding the scope by including pharmaceutical agents and distributors.

The study did not fully concentrate on firm performance, a highlight is just given, and therefore an in-depth analysis on manufacturing pharmaceutical firms' firm performance using the balance score card can be considered as an area for further study.

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## Appendix 1: Questionnaire

This questionnaire intends to collect information on supply chain performance measures among pharmaceutical firms in Kenya. The information sought in this questionnaire is meant for academic purpose and your responses and statements will be handled with utmost confidentiality. Kindly answer the questions by ticking in the boxes or writing a brief statement where applicable.

### Section A: Bio Data

1. Gender:

- a) Male
- b) Female

2. Highest Level of education

- a) Secondary level
- b) College
- c) Undergraduate degree
- d) Postgraduate degree
- e) Other (s) (Please specify) .....

3. Number of years in your current position

- a) Less than one year
- b) 1 to 2 years
- c) 2 to 3 years
- d) 3 to 5 years
- e) More than 5 years

4. For how long has your firm been in operation?

- a) Less than one year
- b) 1 to 2 years
- c) 2 to 3 years
- d) 3 to 5 years
- e) More than 5 years

**Section B: Supply Chain Performance Measures**

To what extent do you agree with the following statements regarding supply chain performance measures in your firm? Use a scale of 1 – 5 where: 1 is strongly disagree, 2 disagree, 3 neutral 4 agree and 5 strongly agree.

**Cash-to-Cash Cycle Time**

Statement	1	2	3	4	5
The firm pays its suppliers in time					
The firm delivers goods to its customers on time					
The firm has in place supplier manufacturing cycle time to respond to demand changes					
The firm’s suppliers have the ability to adjust quickly by 50% within two weeks of scheduled delivery					
The firm has efficient internal systems that ensure reduction through elimination of delays.					
The firm has keenly observes due dates, scheduled or promised.					

### **Production Flexibility**

<b>Statement</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
The firm has enough employees to meet the labor requirements of the firm					
The firm has adequate customer service staff to cater for customer complaints and needs					
The firm responds quickly in case of order changes					
The firm's production rate is sufficient to meet any unexpected demands					

### **Delivery Performance**

<b>Statement</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
The firm keeps its delivery promises to its customers					
The suppliers deliver the raw materials required in the right quantity on time					
Customer complaints are dealt with on time					
The firm takes the shortest time possible to process warranty claims					
The firm does not go beyond two days late in delivering its products					

### **Perfect Order Fulfillment performance**

<b>Statement</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
The firm delivers its orders on time					
The firm delivers goods that are defective free					
The firm delivers goods to customers in the right quantity					
Suppliers that deliver raw materials to this firm are quality certified					
In case of defects in any of our products, my firm moves with speed to correct it					

### E-Business Performance

Statement	1	2	3	4	5
The firm has invested heavily in e-supply chain					
E-supply chain infrastructure is compatible with other existing technologies in the firm					
Suppliers for the firm have necessary infrastructure to support e-supply chain					
The system has helped in monitoring inventory flow					
The system has helped in reducing follow up time					
The system has helped reduce ordering time					

### Total Supply Chain Management Costs

Statement	1	2	3	4	5
The firm spends between 4 to 5 percent of sales on management costs					
Customers are compensated for purchasing any defective goods					
The firm measures the field failure rates by purchase item and by supplier					
The firm accommodates supplier ideas on cost - cutting					
Employee turnover in firm is frequent					
The firm has standby technicians in case of machine breakdown					
The firm does not require rush orders to meet delivery rates					
e-supply chain system has reduced operation costs for the firm					



### Section C: Firm Performance

Statement	1	2	3	4	5
The firm has a well defined financial control system					
Our focus on customer satisfaction enhances perfect order fulfillment					
Our internal processes are streamlined to ensure overall customer satisfaction					
Our employees undergo induction training upon employment.					
The firm has invested heavily in e-business and this has enhanced perfect order fulfillment					
The firm closely monitors the ability of the employees and this has enhanced perfect order fulfillment					

## Appendix 2: List of Pharmaceutical Firms

<b>Company Name</b>	<b>Location</b>
African Cotton Industries Limited	Nairobi
Alpha Medical Manufacturers	Nairobi
Aventis Pasteur SA East Africa	Nairobi
Beyer East Africa Limited	Nairobi
Beta Healthcare (Shelys Pharmaceuticals)	Nairobi
Biodeal Laboratories Limited	Nairobi
Bulk Medicals Limited	Nairobi
Cosmos Limited	Nairobi
Dawa Pharmaceuticals Limited	Nairobi
Didy Pharmaceuticals Ltd	Nairobi
Diversey Lever	Nairobi
Eli-lily (Sisse) SA	Nairobi
Elys Chemicals industries Limited	Nairobi
Gesto Pharmaceuticals Limited	Nairobi
Glaxo SmithKline	Nairobi
High Chem East Africa Ltd	Nairobi
Ivee Aqua EPZ Limited	Nairobi
KAM Pharmacy Limited	Nairobi
Laboratory and Allied Limited	Nairobi
Mac's Pharmaceutical Ltd	Nairobi
Manhar Brothers (Kenya) Ltd	Nairobi
Medivet Products Limited	Nairobi
Novartis Rhone Poulenc Ltd	Nairobi
Novelty Manufacturers Ltd	Nairobi
Pfizer Corp (Agency)	Nairobi
Pharm Access Africa Limited	Kajiado

Pharmaceutical Manufacturing Co (K) Ltd	Nairobi
Pharmaceutical Products Limited	Nairobi
Philips Pharmaceuticals Limited	Nairobi
Regal Pharmaceutical Ltd	Nairobi
Revital Healthcare (EPZ) K	Nairobi
Universal Pharmaceutical Limited	Nairobi

**Source: Kenya's Pharmaceutical Industry 2005**



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**TO WHOM IT MAY CONCERN**

The bearer of this letter CHARITY SHIMULI DKEICH

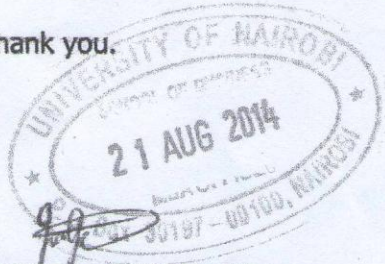
Registration No. D61/75373/2012

is a bona fide continuing student in the Master of Business Administration (MBA) degree program in this University.

He/she is required to submit as part of his/her coursework assessment a research project report on a management problem. We would like the students to do their projects on real problems affecting firms in Kenya. We would, therefore, appreciate your assistance to enable him/her collect data in your organization.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organizations on request.

Thank you.



**PATRICK NYABUTO**  
**MBA ADMINISTRATOR**  
**SCHOOL OF BUSINESS**