INFORMATION INTEGRATION ON SUPPLY CHAIN MANAGEMENT: A CASE STUDY OF FOOD PROCESSING FIRMS IN KENYA

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DECLARATION

I declare that this is my original work and has never been presented to any other university for any academic credit purpose.

Signed: …… Date……

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D61/70919/2007

This project has been submitted for examination with my approval as University supervisor.

Signed: …… Date……

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DEDICATION

I humbly dedicate this research project to my parents Mr. and Mrs. Ezra Opiyo Ngoje for their Moral and financial support that has seen me through this course. May The Almighty GOD continue blessing them abundantly.

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LIST OF ABBREVIATIONS

CIPS	-	Chartered Institute of Purchaseing and Supply
CAPS	-	Chartered Association of Purchasing and Supply
IISCM	-	Information Integration on Supply Chain Management
IS	-	Information Systems
IT	-	Information Technology
SC	-	Supply Chain
SCI	-	Supply Chain Integration
SCM	-	Supply Chain Management
XML	-	Extensible Markup Language
LIS	-	Logistics Information System

ABSTRACT

According to Gavirneni 2002; Hult et al. 2004; Kulp et al. 2004; Lee 2004; Li 2002; Liu et al. 2005; Soliman and Janz (2004), the central aim of information integration on supply chain management is to ensure that organizations can reap significant returns to investment, some which include decreased order cycle times, increased agility to respond to customer demand, and increased firm profitability. A synergic supply system between companies needs to be created so as to compress information time so that the information circulating through the system is fresh and meaningful. Customers consistently demand that products are delivered faster, on time, and with no damage. This can only be achieved with proper coordination of efforts by linking systems and processes to create synergy.

The main purpose of this study was to examine information integration on supply chain management among food processing firms in Nairobi. The study adopted the exploratory survey design to study the information integration on SCM in food processing firms in Nairobi. The target population was all private food processing entities in Nairobi, who are members of KAM. Using the stratified sampling method, 30 firms was picked to constitute the sample. This represented 30 % of the sampling population. The primary data collection instrument that was used to collect data was the questionnaire. Descriptive statistics was used to analyze the data.

From the study findings, the researcher concludes that the current Information systems among the food processing firms in Nairobi satisfy supply chain communications requirements in the organization as there is smooth communication flow between the customers and the firm thus leading to satisfaction of both. The food processing firms have integrated information technology in order processing, dispatch, distribution, purchasing, transport management, production and inventory control. This has reduced time in servicing customer orders, increased financial performance of the organization, increased customer service levels, increased timely deliveries. The study recommends that to improve information integration on supply chain management, the management

should make sure that all the respective heads of departments have full and clear information on time to enhance easy decision making, using the latest model of software and hardware available in the market, training of staff, adopt real time solutions in ICT and increase external linkages with customers.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Information integration is a leading aim for many supply-chain managers (Stanley, Donald, Gregory M and Matthew, 2005). In particular, advances in information integration have enabled supply chains to reap significant returns to investment, some which include decreased order cycle times, increased agility to respond to customer demand, and increased firm profitability (Gavirneni 2002; Hult et al. 2004; Kulp et al. 2004; Lee 2004; Li 2002; Liu et al. 2005; Soliman and Janz 2004). The ability for a firm to transfer knowledge across department, company, and global boundaries is a competitive advantage for many organizations in the 21st century marketplace (Fink and Holden 2005; Phan 2003). For example, using information integration, 7-Eleven in Japan captured point of sale data and basic shopper demographics to help managers understand what drives demand for its stock-keeping units. Combining this information with reactive supply chain partners enabled 7-Eleven Japan to continually satisfy changing customer preferences, achieve the highest sales per square foot in Japan's convenience-store industry, and to attain 55 times inventory turnovers per year (Gottfredson *et al.* 2005; Lee and Whang 2001).

Many conceptual papers have addressed the value of Information Technology integrations in supply chain management (van Hoek 2001, Lee & Whang 2001, Levary 2000, and Cross 2000). Levary (2000) suggests that information technology in supply chain management provides reduction of cycle time, reduction of inventories, minimization of bullwhip effect, and improvement of effectiveness of distribution channels. In many organizations, managers along the supply chain continue to face hindrances to information integration. Some of the most mentioned hindrances are unwillingness to share information, inadequate technology and information systems, misinterpretation of feedback among chain partners, and lack of trust (Barratt 2004; Bender 2000; Janssen 2004; Kwon and Shu 2004; Lee *et al.* 1997; McCarter *et al.*

forthcoming; Sterman 1989). Therefore, despite “elegant technological solutions, an agile, adaptive supply chain remains an elusive goal” (Harvard Business Review 2003:64).

Supply Chain management (SCM) according to Cox et al (1995) is the function within and outside a company that enables the value chain to make products and provide services to the customer. It is the network of entities through which the materials flow. Those entities may include suppliers, carriers, manufacturing sites, distribution centers, retailers and customers. Lummus and Albert (1997). SCM co-ordinates and integrates all these activities into a seamless process. When it comes to Supply Chain Integration, several authors have alluded to evidence suggesting that more is better than less and to the consequences of not fully integrating (Frohlich and Westbrook, 2001; Vickery et al., 2003).

1.1.1 Information Integration

One of the major transformations in the rapidly evolving digital economy occurs in the supply chains of both traditional and e-commerce companies. Information technology has enabled channel partners to trade goods, share information, and integrate their processes, thereby reshaping the inter-organizational dynamics and resulting in more efficient channels. Electronic integration of data and the automation of business practices has driven costs down and built sales by better satisfying consumer needs. In an increasingly global marketplace most companies are competing with relatively similar machines, technology, and expertise. Consequently business strategy is becoming the cornerstone to establishing the world class enterprise

Information technology includes a set of powerful tools that can lead to the failure or success of a supply chain process. With the development of information systems (IS) and information technologies the use of information sharing and decision making is growing at a very fast pace. Information Technology solutions are no longer likely to provide strategic advantage, but imply the business basics. The competitive advantage for

organization(s) originates from development of creative information technology strategies and implementing them. IS's enable existing strategies to be realized, Information flows provide the linkage that allows the supply chain to operate efficiently. Information technology is needed to handle routine transactions in an efficient manner. It can also play a critical role in facilitating the timely sharing of planning, production and purchasing information; capturing and analyzing production, distribution and sales data at new levels of detail and complexity. Information technology provides an integrating tool that makes it possible to convert data into meaningful pictures.

1.1.2 Supply Chain Management

The definition of supply chain management as developed by the members of The Global Supply Chain Management Forum (at the Ohio State University) in 1994 and modified in 1998: "Supply chain management is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders."

De Kluyver and Pearce (2009) say the ultimate goal of strategy is "long-term, sustainable superior performance." Such superior performance depends on the ability of an organization to become a fully integrated partner in the supply chain (SC) (Cooper et al; 1997), this requires that organizations adopt a SC strategy that focuses on how both internal and external business processes are integrated and coordinated throughout the SC to better serve customers and consumers while enhancing the performance of the individual SC members (Cohen and Roussel; 2005). Examples of business processes that must be integrated include manufacturing, purchasing, selling, logistics and the delivery of real-time, seamless information to all SC partners.

Managing at the level of SC requires a new focus and new ways of thinking as pointed out by Lambert et al (1998). Managers must learn to communicate, co-ordinate and co-operate with SC partners. Stank et al (2005) described SCM as a "strategic level concept". Ho et al (2002) conceptualized SCM as having three core elements: value

creation, integration of key business processes and collaboration. Based on this conceptualization, they define SCM as "the philosophy of management that involves the management and integration of a set of selected key business processes from end user through original suppliers that provide products, services and information that add value for customers and other stakeholders throughout the collaborative efforts of the SC members"

1.1.3 Food Processing Firms in Nairobi

Manufacturing is an important sector in Kenya and it makes a substantial contribution to the country's economic development. It has the potential to generate foreign exchange earnings through exports and diversify the country's economy. This sector has grown over time both in terms of its contribution to the country's gross domestic product and employment. The growth in manufacturing sector was mainly attributed to rise in output of the agro-processing industries. These included sugar, milk, grain milling, fish, tea, oils and fats processing sub-sectors. Therefore, to build a self-sustaining industrial sector, it is necessary to establish strategic linkages within the domestic economy. Some efforts have to be made to promote linkages among supply chains so as to enhance spread effects of industrial growth and to facilitate transfer of technology, materials, skills and growth of small and medium scale sub-contractors. The linkages among supply chains in Kenya are weak. This has resulted in consistently low manufacturing value added in the sector (KAM 1989).

However, growth in the manufacturing sector has been impeded by depressed domestic demand, increased oil prices and transport costs. Rising operating costs mainly as a result of high power costs coupled with deteriorating road and rail networks further dampened growth in the sector.

According to KAM directory (2011), food and beverages sector is the largest sector that constitutes 21.8 per cent of total KAM membership. This adds to 146 members, out of which, about 100 members are situated in Nairobi province. The sub-sectors include: bakers & millers, cocoa, chocolate and sugar confectionery, dairy products, juices, waters

and carbonated soft drinks, alcohol beverages and spirits, tobacco and finally, vegetable oils.

Kenya has a large agro-processing industry, reflecting the importance of the agricultural sector in the Kenyan economy. A wide spectrum of agro-industries exists today, ranging from processing staple food and fruits, to beverage and tobacco production for both the domestic and foreign markets. Agro processing is the largest manufacturing sub sector accounting for 13 per cent of the total manufacturing output (2002). Food processing is thus one of the key activities in Kenya's agro-processing industry. There are 17 industrial fish processing companies in Kenya mainly for export. The 17 companies have operating capacity of 437 MT per day of which only 213.4 MT per day is utilized. Total in built milk and dairy processing capacity is estimated at 2.5 million litres per day. Milk production 203 million litres in 2003 there are 11 major grain processors in the country. Main products are maize, wheat fortified foods, rice millet and sorghum.

1.2 Research Problem

The central aim of information integration on supply chain management is to ensure that organizations can reap significant returns to investment, some which include decreased order cycle times, increased agility to respond to customer demand, and increased firm profitability (Gavirneni 2002; Hult *et al.* 2004; Kulp *et al.* 2004; Lee 2004; Li 2002; Liu *et al.* 2005; Soliman and Janz 2004). Stalk and Hout (1990) specifically warn of the dangers of slow information lead-times, summing up the problems with information delays when they state "The underlying problem here is that once information ages, it loses value ... old data cause amplifications, delay and overhead ... The only way out of this disjointed supply system between companies is to compress information time so that the information circulating through the system is fresh and meaningful." Customers consistently demand that products are delivered faster, on time, and with no damage. This can only be achieved with proper coordination of efforts by linking systems and processes to create synergy.

From the studies done on supply chain management by past researchers, we have identified gaps for further research. Awino (1997) on performance measurement of supply chain linkages of competencies, strategy and capabilities within organizations as abundant, clearly show opportunities for further research. It focused mostly on how attributes affect performance in large

Manufacturing firms in Kenya and supply chain best practices as well. Malik M A Khattan (2006) on innovating for supply chain integration with construction. It focused mainly on innovative thinking, in procurement processes for supply chain integration offers all involved parties some key benefits interms of flexibility and adaptability, commercial growth and improved delivered service. Henk Folkerts (1998) on challenges in international food supply chains; vertical coordination in Europian Agribusiness and food industries. Stresses that more attention should be paid to international food supply chains and that chain reversal asks for new methods, tools and expertise on chain analysis and chain management.

No attempt has been made to study information integration on supply chain management among food processing firms in Nairobi, Kenya. In this study therefore, I have sort to fill the gap in this knowledge. I have establish the benefits and factors influencing the effects of information integration on supply chain management in food processing firms in Nairobi. There is likely a gap existing between the rhetoric surrounding information integration on supply chain management and actual practice especially among the food processing firms in Nairobi.

Therefore, this study answers the following questions, what is the benefits information integration on supply chain management? What are the factors that influence the effect of information integration on supply chain management?

1. 3 Research Objectives

The main objectives of this paper were to examine information integration on supply chain management among food processing firms in Nairobi. However, the specific objectives were to:

i. Determine the benefits of information integration on supply chain management among food processing firm in Nairobi, Kenya;
ii. Establish the factors that influence the effect of information integration on supply chain management among food processing firm in Nairobi, Kenya.

1.4 Value of the Study

The findings of this study are expected to benefit a number of players in the food processing industries in Nairobi and academicians and researcher.

a) Food processing firms in Kenya

The findings of this paper will assist the managers along the supply chain to make sound and informed strategic management decisions and enable them to focus on their customers more efficiently. With such exposition, managers will understand how firms can perform better and add value to the shareholders.

The study will act as a guide to food processing firms in Nairobi in their steps towards developing more competitive advantage in the market and pursuing market leadership in the industry. This will lead to higher firm profitability.

b) Researcher and Academicians

It will be a reference material for future researchers and academicians. The study will also highlight other important areas that need relational studies. The study will give direction for future research rather than a report of work already implemented in the process of being implemented.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter introduces the review of theoretical literature relating to information integration on supply chain management. We will discuss two subjects at length, the first is of information integration and the second is supply chain management.

According to Lee et al. (2007) information integration refers to the sharing of information and knowledge among the members in the supply chain, including sales forecasts, production plans, inventory status and promotion plans. According to Handfield & Nichols (1999) information technology "encompasses the information that businesses create and use as well as a wide spectrum of increasingly convergent and linked technologies that process the information". In this part of the study, it is important to focus on the information related to the flows of materials, products and services including the reverse flows contained in a logistics information system (LIS).

According to Handfield & Nichols (1999), business needs drive managers to become more competitive and they are under increased pressures to integrate the supply chain. Integration often requires coordination of disparate functions among supply chain partners in geographically dispersed locations. Information integration also involves sharing of pertinent knowledge and information among members of a supply chain. It may involve sharing of design and manufacturing data among suppliers, focal manufacturer, and customers. It may also include sharing forecast and delivery scheduling data between the logistics functions of the customers, the focal company, the suppliers, the carriers etc. Suppliers and customers may be invited to participate in focal company product design teams to capture pertinent upstream and downstream issues in the product/process designs to reduce costly design and/or process changes later. Information integration makes inventory and production visible throughout the supply chain creating a more congenial climate for collaborative planning and forecasting.

Supply chain members, as a result, face less uncertainty, can reduce inventory buffers by postponing costly value-adding operations and provide better customer service with more flexible response to customer demand.

A reliable communication infrastructure paves the way for timely and efficient information exchange among partners. For example, using electronic data interchange (EDI) technology, manufacturers can provide up-to-the-minute information about their production needs by giving vendors access to the production planning and control system and vendors can arrange deliveries without the need of any paper transactions. Similarly, timely payments can be arranged using EDI. Reduction of payment delays lowers the cost of doing business significantly, makes supply chains more efficient, and gives the users competitive advantage. The integration of the many IT-enabled electronic commerce tools – bar coding, electronic messaging, electronic data interchange, global network management, and the Internet – is allowing supply chain partners to attain significant productivity gains. The fruits of information integration such as reduced cycle time from order to delivery, increased visibility of transactions, better tracing and tracking, reduced transaction costs, and enhanced customer service offer greater competitive advantage for all participants in the supply chain.

Yet, despite all the classical virtues of information technology (IT), many firms continue to face problems in achieving seamless supply chain management. In a recent survey among European firms, a large majority (80%) believed that IT can be the greatest single barrier to supply chain integration due to lack of appropriate IT systems, poor information visibility, and multiple platforms. In the same survey, these respondents also believed that information technology (IT) played a major role in integrating a supply chain network for achieving optimal performance.

Supply chain management (SCM) is an integrated management tool for information and materials/services flow among different facilities and stakeholders. After the advent of the supply chain concept, the related studies have been explored in various areas such as

information processing (Lee et al., 1997; Srinivasan et al., 1994), inventory planning (Ganeshan et al., 2001; Nahmias and Smith, 1994; Svoronos and Zipkin, 1988), logistics and transportation (Cohen and
Lee, 1988; Geoffrion and Powers, 1995; Vidal and Goetschalckx, 2001), ordering strategies (Cachon, 1999), operations planning (Li and O'Brien, 2001; Sabri and Beamon, 2000), supplier diversity (Shah and Ram, 2006), supply chain partnership (Carter et al., 2000; Maloni and Benton, 1997; Meade and Sarkis, 1998; Xu et al., 2001), trust in supply chain operations (Kwon and Suh, 2004a, b), and possible benefits from supplier relationship (Dyer and Nobeoka, 2000; Liker and Choi, 2004).

To have an effective supply chain management framework; organizations must have a clear understanding of the supply - demand nexus and its implications for strategy and implementation. There is an interdependent relationship between supply and demand; organizations need to understand customer demand so that they can manage it, create future demand and, of course, meet the level of desired customer satisfaction. Demand defines the supply chain target, while supply side capabilities support, shape and sustain demand

2.2 Technology and Information Integration

According to Stanley E. F.; Donald L. S.; Gregory M. M & Matthew W. M (2005), Companies are investing heavily in a variety of software. Most of the investment is targeted at one of the following applications: enterprise resource planning (ERP) systems, warehouse management systems (WMS), transportation management systems, advanced planning and scheduling (APS) systems, satellite tracking systems, computer-assisted ordering systems, database management and mining, electronic data interchange (EDI), intranets and extranets, point of sales tracking systems, and Web-based catalogues. These new information applications have impacted every aspect of the order fulfillment process.

From tracking inventory status to ordering, to picking and packing, to shipping to receiving to storing, information systems are used to eliminate uncertainty, reduce

inventory, and increase responsiveness to customer requests. Some of the important roles identified in the new information technologies are automated order placement, electronic funds transfer payment, facility location, stock keeping unit management, shipment consolidation, point of sales data capture, shipment tracking, customer profiling, share best practices, supplier performance monitoring, computer aided design, advanced shipment notices, facility design, inventory control, transportation routing, warehouse management, automatic replenishment, product flow-through analysis, on-line bidding or auctions, purchasing compliance to policy, creation of global, consortiums or exchanges, share strategic information (eg. technology plans).

The more advanced and more optimistic information technology companies have established policies designed to phase out non-electronic orders (from customers and to suppliers). Most of these companies have been heavily invested in EDI for several years and are transitioning as quickly as possible to Web-based systems. It is suggested that existing investments combined with limited bandwidth and security concerns will limit the Web's attractiveness. There are three best practices of information technology.

First is the development of Web catalogues for all standard purchases that occur within a company. The purchasing department's role is to select the best suppliers, negotiate beneficial relationships, and then work with the systems people to help design the Web catalogue. Once the relationships and the catalogue are in place, purchasing gets out of the way and focuses its time on strategic purchasing issues. Individual end users access the catalogue and make purchases with a simple point and click. Web catalogues have improved service, reduced cost, empowered end users, and increased compliance with respect to the use of preferred suppliers.

Second is the development of Web-based systems that enables suppliers to obtain the latest sales data and up-to-date rolling forecasts. One of the participants has created a "Web-pull" system, which has essentially placed the data found in a material requirements planning (MRP) system on the Web for suppliers to use as needed.

Suppliers can see real-time inventory levels as well as the timing of expected demand. They can use this information to plan their own production schedules. Another company shares three years of sales history with its suppliers together with an 18-month rolling forecast of demand. Again, this information helps suppliers better utilize their own production capacities while providing higher levels of service to the buying company.

The third is the establishment of proactive supplier selection policies regarding technology adoption. It was emphasized that even to be considered as a source, a supplier had to be connected electronically. To achieve preferred status, a supplier had to implement EDI at least one tier backward. As a result of this policy, EDI linkages cascade backwards two tiers for almost 100 percent of the strategic purchases made by the company. This type of policy helps close the gaps that often develop between the first and second-tier suppliers and facilitates greater chain-wide connectivity.

2.3 People and Information Integration

According to Stanley E. F.; Donald L. S.; Gregory M. M & Matthew W. M (2005), in many organizations, on the people-management side, astute managers recognize that the best technology in the world does not build solid and synergistic relationships where information is not shared frequently and openly. For example, at one retailer, the point of sale (POS) system captures all relevant sales data on a real time basis. However, the retailer does not share any of this data with its suppliers. More bewildering is the fact that this same retailer shares complete shipping data with its third-party logistics providers to help them more efficiently plan their vehicle utilization.

Other companies are more than happy to share forecasts with suppliers but hold tenaciously onto actual production plans and strategic information. The willingness to share information is based largely on trust and expected mutual benefit. Achieving trust is something best done face-to-face. Indeed, several managers emphasized the need to increase one-on-one time even though they were in the midst of significant technology investments. Common approaches to relationship building are multifaceted. First, senior-

level executives are charged with spending a significant amount of their time, often in excess of 20 percent, meeting with counterparts at key customers and suppliers. Customer and supplier visits made by cross-functional account management and supplier management teams respectively support the high-level contact. These visits do more than help achieve harmonious relationships; they provide key insights into real needs and real opportunities to work together in innovative ways.

Teaming is another common approach to enhancing information sharing. Cross functional teams are widely used for internal coordination while advisory councils are increasingly used to assure more cohesive and meaningful information exchange up and down the supply chain. Along the same lines, more leading companies are adopting dedicated account management teams to provide a consistent and comfortable interface with their best customers. Looking upstream, supplier conferences are bringing companies together on a more frequent basis to improve relationships, share expectations, and disseminate best practices.

2.4 Supply Chain Integration (SCI)

In their seminal work, (Lawrence and Lorsch 1986) defined integration as, "the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demands of the environment". While this definition refers to integration internal to a firm or organization, our emphasis here goes beyond the firm and encompasses external entities that are players in a supply chain. Bowersox, Closs and Stank (1999) have classified integration in a supply chain context in six different types. These are customer integration, internal integration, material and service supplier integration, technology and planning integration, measurement integration and relationship integration.

Stevens (1989) identified four stages of supply chain integration, where stage I represented the fragmented operations within the individual company. Stage II focused on limited integration between adjacent functions, e.g. purchasing and materials control.

Stage III required the internal integration of the end-to-end planning in the individual company and stage IV represented the true supply chain integration including upstream to suppliers and downstream to customers. Lee (2000) outlines three dimensions of supply chain integration: information integration, coordination and resource sharing, and organizational relationship linkage. Information integration refers to the sharing of information and knowledge among the members in the supply chain, including sales forecasts, production plans, inventory status and promotion plans. Coordination and resource sharing refers to the realignment of decisions and responsibility in the supply chain.

Organizational relationship linkages include communication channels between the members in the supply chain, performance measurement and sharing of common visions and objectives. As already mentioned earlier, we view supply chain integration broadly in terms of information and organizational integration. Accordingly, we will examine the role of information technology and organizational linkages for rallying the key members of a supply chain network towards common goals for the supply chain. Supply chain integration (SCI) can also be broadly defined as the extent to which supply chain members work cooperatively together to achieve mutually beneficial outcomes (O'Leary-Kelly and Flores, 2002). SCI continues to be a key theme amongst those seeking to understand how to harness the potential of the supply chain to create sustainable value. The notion of leveraging linkages within the supply chain is not new and can be traced to Porter's value chain model that identified the importance of exploiting both intra and inter firm linkages (Porter, 1985).

In recent years however, interest has been heightened as firms seek to establish a competitive advantage in an increasingly competitive, dynamic global marketplace, (Bagchi, P. K and Larsen T.S 2002). Academics too are increasingly drawing upon a rich theoretical basis with roots in decades of literature in economics, organizational theory, and lean systems or reengineering (Jayaram et al., 2004) to better understand what motivates integration and how to implement it successfully.

Until recently, the research has focused on either direct upstream or downstream integration, exploring either the integration of immediate suppliers or customers into decision making processes. Frohlich and Westbrook (2001) extended the discussion by simultaneously examining upstream and downstream integration in the context of forward physical flows and backward information flows. While theirs and subsequent studies have demonstrated the importance of taking a broader view of integration, they do not address the issue of the breadth of the supply chain that should be involved in integration efforts.

Recognition of the need to integrate broadly across the supply chain is not new (e.g. Prahalad and Hamel, 1994; Hammer, 2001). Indeed, several definitions of supply chain management refer explicitly to the entire supply chain from acquisition of basic raw materials to the consumption of finished products. For example, Lambert (2004) defines supply chain management as the "cross functional integration within the firm and across the network of firms that comprise the supply chain". Mentzer (2001) made the distinction between direct supply chains that include a focal firm and a supplier and customer, extended supply chains that include second tier suppliers and customers, and ultimate supply chains that encompass the entire supply chain. Despite definitions such as these, the literature has been slow to empirically examine the impact of integration across a broader swath of the supply chain. Indeed, using Mentzer's (2001) characterization, it is apparent that the literature has either focused on direct supply chains or failed to clearly articulate otherwise.

2.4.1 Extent and Performance of Supply Chain Integration (SCI)

In a recent survey of the performance implications of supply chain integration, Van de Vaart and van Donk (2008) revealed two key issues. First, much of the literature focuses on relationship development and/or firm orientation towards holistic, long-term decision making processes rather than integration per se. Indeed, this is borne out by their

classification of prior research based on patterns of inter firm interaction, attitudes of firms towards partners, and use of practices that enable collaboration.

Second, while there is ample evidence of the beneficial impact of integration on performance, it is hard to generalize from the literature due to ambiguity in how integration is defined, operationalized, and measured. Given the largely supportive evidence of a positive relationship between integration and performance, the current focus is explicitly on the relationship between extent of integration among supply chain members and its performance benefits. Extent of integration is operationalized in terms of "more versus less" integration as characterized by the various authors of pertinent research. Frohlich and Westbrook (2001) coined the expression "arcs of integration" to characterize the extent to which firms integrated with upstream and downstream supply chain partners. They observed that firms with the greatest arcs, those with the most extensive integration with both suppliers and customers, demonstrated the greatest improvements in several measures of financial, productivity, and non productivity based performance. Building on this work, Rosenzweig et al. (2003) explored the relationship between integration intensity, competitive capability, and performance. They observed that integration intensity is positively related to quality, delivery, process flexibility, and cost capability.

Moreover, they found positive relationships between integration intensity and new product revenues, return on assets, and customer satisfaction. In applying the "arcs of integration" concept to a comparison of US and East Asian firms, Zailani and Rajagopal (2005) not only corroborated the results of Frohlich and Westbrook (2001), they showed that they held in an East Asian context. Narasimhan and Kim (2002) examined the impact of internal, supplier, and customer integration on product diversification and international market diversification. They observed that integration with suppliers and customers positively moderates the relationship between international markets diversification and performance. Specifically, they concluded that integration could extend the point of diminishing returns of product and market diversification over time. They also showed

that the moderating effect of international market diversification on the relationship between product diversification and performance becomes insignificant as the level of internal, customer, and supplier integration increases.

Droge et al. (2004) explored internal and external integration in the context of design processes and their impact on product development time, product cycle time, and responsiveness. They observed that both internal and external integration exhibit positive relationships with all three measures of time based performance. Bagchi et al. (2005) operationalized integration in terms of the frequency of participation with key suppliers and customers and the breadth of functional groups engaged. Not only did they identify differences in degree of integration with suppliers versus customers, but they also identified variations in where within the organization integration was taking place. Moreover, they found evidence of significant positive relationships between integration with suppliers with regard to supply chain design, inventory control, sales administration, research and development, and procurement, as well as with customers with regard to production, and various measures of performance.

Kim (2006a) examined the impact of the level of integration on the interaction between corporate competitive capability and supply chain operational capability, and how these affect performance. Corporate competitive capability was operationalized in terms of cost leadership, customer service, innovative marketing technology, and differentiation, while supply chain operational capability was operationalized in terms of technical, structural, and logistical capability. Support was found for the hypothesis that as the level of integration increases, significant interactive effects diminish. They speculated that internal and external sharing of resources and technological knowledge reduces the need for firms to internalize supply chain operational capability. Kim (2006b) observed that among large firms, the level of integration has a positive influence on corporate competitive capability and firm performance, but that among small firms, this is true only with respect to performance.

Lee et al. (2007) examined the relationship between strong internal, customer, and supplier linkages, and supply chain cost containment, performance reliability, and overall performance. Cost containment was measured in terms of logistics related costs while performance reliability was measured in terms of inventory performance. They observed that all three linkages were positively related to overall performance and performance reliability, and that strong internal and supplier linkages were positively related to cost containment.

Using Fisher's (1997) categorization of functional versus innovative supply chains, Ramdas and Spekman (2000) observed that innovative supply chains are more closely integrated than functional supply chains with respect to planning and control, quality management, and service and after sales support. They also noted that suppliers are more proactive in high performing innovative supply chains than those in functional supply chains. Moreover, high performing firms in innovative supply chains use more integrating mechanisms.

2.5 Integration in a Supply Chain (SC) Network

According to Bagchi, P. K and Larsen T.S (August 2002), warn of practical limitations of the reality of supply chains and lament that the process of making complex supply chain networks work is not yet well understood. A supply chain consists of a network of facilities and actors that procures raw materials and component parts, transforms these into intermediate goods and sub-assemblies, builds the final products, and makes these available to the global marketplace for consumption by the final customer. The emphasis on both physical supply (inbound) and physical distribution (outbound) sides is not merely on the immediate suppliers and customers, but often on supplier's suppliers and customers' customers. The interfaces upstream and downstream in the supply chain are frequently enabled these days by a logistics information system (LIS) providing access to each other's business and manufacturing systems.

Suppliers gain access to manufacturers' production plans and can reduce their reliance on uncertain forecasts. Manufacturers obtain early warning about possible disruptions of supply due to unforeseen events faced by the suppliers and can reschedule their plans and avoid costly disruptions. These and other similar uses of the LIS ensure a smooth flow of information pertaining to order, product design and development, market intelligence, production scheduling, payments, and any other information flow for managing coordination among the various actors in the supply chain.

Thus, according to Bagchi, P. K and Larsen T.S (August 2002), supply chain management consists of the entire set of processes, procedures, the supporting institutions, and business practices that link buyers and sellers in a marketplace. A supply chain involves four distinct flows, requirement information from buyer to seller which triggers all later activities; the movement of goods from sellers to buyers; transfer of ownership rights from seller to buyer and payment from buyer to seller. To be effective, a supply chain has to link the members of the network and the functions to ensure uninterrupted flow by matching supply and demand flows in a network and securing accurate response at each buyer-seller transaction in the chain. Coordinating these flows in a network requires integration of supply chain partners to ensure unhindered flows at each of the many buyer-supplier interfaces in a supply chain network.

Experts believe supply chain integration involves efficient management of information and closer organizational coordination among supply chain partners. Lee outlines three dimensions of supply chain integration: information, coordination and organizational linkage. Information integration refers to the sharing of information and knowledge among the members in the supply chain, including sales forecasts, production plans, inventory status and promotion plans. Coordination refers to the realignment of decisions and responsibility in the supply chain. Organizational linkages include communication channels between the members in the supply chain, performance measurement, and sharing of common visions and objectives.

The multi-echelon supply chain, we described above, often gives rise to "speculative" buying at each buyer-supplier interface downstream. At each interface, the extent of fluctuation due to speculative buying gets amplified leading to what is known as “bullwhip” effect. As a result, the supply chain as a whole often carries more inventories than actual requirement and yet there can be pockets where there is not enough. Customer dissatisfaction becomes common and obsolescence often results. Logisticians frequently have to resort to rework and transshipment increasing costs thereby. Many experts have shown that information sharing and close communication and partnership within the supply chain can help reduce the severity of “bullwhip”18 effects

According to Bagchi, P. K and Larsen T.S (2002), organizational integration encourages partners to become more entrenched members of the network and instills a sense of belonging to the supply chain. It becomes easier to generate trust among partners in an integrated supply chain. Trust promotes collaboration and decision delegation, reduces irrational behavior and “second guessing” among supply chain members thereby reducing the need for safety stocks. The objective of organizational integration is not merely to resolve conflicts should they arise, but rather to recognize and avoid potential conflicts and/or divergence of interest in advance and device governance structure to forestall or avoid it. True organizational integration thus paves the way for individual members of the chain to behave more like a unified entity sharing ideas, skills and culture alike. Supply chain integration may fail to blossom without organizational integration among supply chain partners.

Supply chain management requires various actors at all levels of hierarchy in multiple organizations to work together for achieving a common goal. Managing coordination among the supply chain partners therefore assumes significant importance. Organization integration can become a catalyst by facilitating information sharing within and among firms.

2.6 Benefits of Information Integration on Supply Chain Management

Information integration permits management to examine the operations of the organization in totality and not in a fragmented, functionally isolated manner. The participants in a supply chain can be linked by information technology for such logistics activities as inventory management, order fulfillment, production planning, and delivery planning and coordination.

2.6.1 The Benefits of Supply Chain Integration

Organizations need to manage the integration of business, technology and processes across extended enterprises to be successful. It is no different with supply chain management. Inter-enterprise cooperation and collaboration with suppliers, customers, and business partners is facilitated with supply chain management. This system brings tremendous benefits and competitive advantages to the organizations and major supply chain participants like the suppliers, manufacturers, distributors and customers. Any supply chain cannot be integrated overnight. The levels of integration evolve and grow deeper overtime.

Integrated supply chain enables an organization to reap significant returns to investment, some which include decreased order cycle times, increased agility to respond to customer demand, and increased firm profitability (Gavirneni 2002; Hult et al. 2004; Kulp et al. 2004; Lee 2004; Li 2002; Liu et al. 2005; Soliman and Janz 2004). It also improves customer satisfaction and loyalty as the end customers experience improved on-time delivery. There is also a surge in the loyalty among partners, diminished inventory and an increase in flexibility to deal with disruptions.

These benefits are described below:

a) Partnership formation

The primary benefit of integrating a supply chain is the formation of partnerships. Sourcing and customer relationships are transformed into partnerships thereby increasing the trust levels. There is a steady performance and predictable sourcing due to this added trust, paving the way for even former rivals to become partners.

b) Facilitates prediction

With the sharing of information, the supply chain achieves better integration. Companies along the supply chain begin to swap planning data in addition to real-time tracking. Keeping in mind the goal of increasing efficiency, companies can plan and execute inventory management, shipping, and production schedules with the deeper and more valuable information. For instance, a construction company can share information with a supply chain partner that produces doors to ensure there are adequate resources for a new housing development.

c) Decrease in inventory requirement

The most important benefits of supply chain system integration are increased on-time delivery and lower inventory requirements. A recent study of supply chain management indicated that companies that moved to an integrated supply chain reported doubled inventory turns, had 50 percent improvements in on-time delivery and experienced a 50 percent increase in sales supported by 35 percent lower inventory. This in turn improved customer service which in turn increased customer loyalty due to better on-time delivery.

d) Flexibility

An integrated supply chain offers flexibility and a great amount of resilience in facing chaotic circumstances. A company can quickly acclimatize to the varying circumstances without delayed production by having true partners along the supply chain. As an integrated supply chain achieves resilience by increasing flexibility, companies can cross train employees along the supply chain to respond quickly to a shutdown at one point along the chain. The main driver behind any collaboration and integration is the desire to extend the control and co-ordination of operations across the entire supply process, replacing both the market and vertical integration as the means of managing the supply chain solutions.

2.6.2 Benefits of Information Technology on Supply Chain Management

In a longitudinal firm-level investigation, Brynjolfsson and Hitt (2006) show that Information Technology has clear impact on firm output. More recently, Devaraj and Kohli (2003) showed how the observed use of Information Technology was positively

and statistically significantly related to revenue and quality improvements with a specified time lag.

2.7 Challenges of Information Integration on Supply Chain Management

There are many failures and breakdowns in information integration on supply chain management. A research by CAPS (2009) identified 14 key challenges that organizations experience: there is no established vision of how financial and non-financial results will improve with supply chain integration, a people and an organizational culture that supports the supply chain vision has not been developed properly, customer-centric metrics is not well developed, multiple supply chains that can meet the needs of different customer and market segments is none existent, there is no established correct positioning of work on a global basis, supply chain consideration is not incorporated into product and service design decisions, sourcing is not maintained as a first level priority, organizations do not stay focused and consistent in a relationship with customers and suppliers, an effective sales and operations process has not been created, a valid and reliable databases, data and information have not been developed, the capabilities and analytic tools required to make effective decisions in an increasingly complex and risky environment is not developed, there is no trust within and across organizations in the supply chain, ways needs to be found to share risk and rewards equitably among supply chain partners.

2.7.1 Challenges of Information Technology on Supply Chain Management

In the findings for the case study done to examine the challenges faced by European companies in integrating their supply chain networks, Bagchi And Larsen (2003) indicated that many suppliers do not have the resources needed to invest in EDI and Web systems. They are often faced with the challenge of selecting among multiple standards used by different customers. Rather than make the tough choice, they forgo the investment altogether. Interestingly, several companies that receive customer orders through EDI end up retyping the information into their own computer systems. This reality highlights the challenge of system incompatibility. The lack of compatibility not

only deters many supply chain Integrative initiatives but confounds companies that have been involved in the recent spate of mergers and acquisitions. Bringing diverse information systems together can be difficult from both technological and political standpoints. For example, a company can decide to phase out the use of an acquired company's superior costing system in favour of its own in-house weaker system.

Despite the huge investments in advanced information systems, a tremendous amount of communication still takes place the old fashioned way; that is, via fax and telephone. In most companies, it has been noted that most managers are constantly on the phone with colleagues, customers, or suppliers. For many companies, over half of all communication occurs using these older technologies. At other companies, an interesting technology divergence has occurred, they receive 100 percent of their orders electronically (Web or EDI) and transmit 80 percent or more of their orders to suppliers using fax or phone. The emphasis on traditional communication back to suppliers is often a result of the supplier's lack of technology. Many suppliers simply have not had the resources needed to invest in EDI and Web systems. Further, they are often faced with the challenge of selecting among multiple standards used by different customers. Rather than make the tough choice, they forgo the investment altogether.

2.7.2 The Three Caveats of Information Integration

According to Stanley E. F.; Donald L. S.; Gregory M. M & Matthew W. M (2005), there are three caveats in the modern information sharing. They are explained below:

a) Enterprise Resource Planning (ERP)

Although ERP systems have become extremely popular in the past several years, most companies have experienced some difficulty in installing these systems. Time and money budgets are often exceeded by 50 to 100 percent. In most organizations, managers have commented on the endless challenges they have endured during the implementation process. Other managers question the value of the ERP systems while others highly recommend it because of the numerous benefits their companies have attained because of

the system. Perhaps the most positive feedback came from the companies that had left their existing systems in place, running them in parallel with a newly installed ERP system until all of the bugs had been worked out.

Most organizations have experienced difficult experiences during implementation because there is no realistic option. There are, however, some organizations who feel that the best-of-breed philosophy is superior to the integrated ERP approach. The challenge experienced with implementation of this system is in getting all of the disparate, functional systems to talk to each other. Thus, the best-of-breed approach is not without problems. Most hope that Web-based systems will emerge in the not too distant future to relegate current, complicated systems to the annals of history. Ultimately, a valid concern voiced is that these expensive, hard-to-implement systems are not the silver-bullet or panacea to the companies' information dilemma. Too many companies seem to be caught in either a shiny-hardware syndrome or a follow-the-competition mentality. Either philosophy hampers the successful implementation of a capable information system.

b) Global Net Exchanges

Global net exchanges, such as the ones instituted by Ford, General Motors, and DaimlerChrysler as well as Carrefours and Sears, were often perceived as the wave of the future; however, have not measured up to expectation. Several companies are active participants in these exchanges. Two of the greatest concerns are that the mechanics (technical and philosophical) are much more complicated that they initially appear, and the shared leverage will eliminate cross-profit subsidization, threatening the lead company's overall competitive advantage. These concerns are true and they also hinder the global net exchange success (Fahey 2004; Luening 2001; Meta Group 2000). This issue, once rarely considered in the trade press, is now gaining more attention.

The bottom line is that large companies often are able to utilize their market positions to extract lower prices from their suppliers. In order to maintain some semblance of a profit margin, the suppliers invariably charge other customers slightly higher prices. When all

of the key finished goods assemblers and their best suppliers are pooling their purchases to achieve maximum buying leverage, there is no one left to charge the higher prices. The supplier either has to live on an incredibly thin margin or go out of business. At the same time, all of the members of the exchange end up paying the same basic price for components, eliminating any competitive advantage that comes from superior purchasing practice. One fewer weapon is left available for use in tomorrow's competitive battle. These realities increase the political rhetoric and jockeying for position that is taking place as these net exchanges are being developed. Companies with adequate market power and efficient technological and purchasing practices are likely to continue to opt out of the net exchanges.

c) The World Wide Web

Third, the advent of the World Wide Web (www) has created opportunities to alter the dynamics of channel power. Power has consistently shifted downstream toward the end consumer over the past 20 years. However, with the Web, finished goods assemblers and packaged goods producers can take their products directly to the end users of their products. This ability creates the opportunity to develop alternative, parallel channels. Of course, this option comes with plenty of risk. Few companies are willing to alienate current channel partners to experiment with an unproven technology. Another risk encountered by some companies involves alienating internal sales people who are likely to lose commissions if products are sold directly to customers via the Web.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter sought to explain the population of interest which is all the food processing firms in Nairobi province, the sample selection method; the type of data used the sources of data and data analysis. Primarily, the study aimed at establishing the benefits and factors affecting information integration on supply chain management in food processing firms in Nairobi, Kenya.

3.2 Research design

The study adopted the exploratory survey design to study the information integration on SCM among the food processing firms in Nairobi. This enabled me to achieve a better understanding of the research problem.

3.3 Population

The target population was all private food processing entities in Nairobi, who are members of KAM. The main reason for this choice was that these firms were likely to exhibit an elaborate SCM philosophy and make use of best practices in SCM. The respondents in the study were randomly picked from Nairobi Province, which form the bulk of manufacturing sector in Kenya and this is where most of the companies with an established supply chain are found, this is according to Awino (2009). To constitute the population is the 100 food processing firms in Nairobi, KAM's directory (2011).

The population of interest was divided into 3 strata, depending on the size (in terms of financial performance) of the firm using stratified random sampling. Firms were then randomly selected from each stratum that consisted of the study. This method gave equal chance to allow all food processing firms in Nairobi to comprise the study.

3.4 Sampling

Stratified sampling method was used to select firms that comprised the sample; the method gave equal chances to all food processing firms in Nairobi to constitute the sample. Using the stratified sampling method, 30 firms were picked to constitute the sample. This represented 30 % of the sampling population.

3.5 Data collection

The primary data collection instrument that was used to collect data was the questionnaire (Copy attached in the appendices). The questionnaire addresses issues related to information integration along the supply chain. For the firms that were selected, the questionnaires were given to a team of managers involved in SCM. The drop and pick method was adopted for this study. This method is appropriate for the study because it enabled the respondents to dedicate enough time convenient to themselves to fill the questionnaire. The researcher then picked the completed questionnaire at the agreed time.

The questionnaire was structured in a way that the respondents filled it with or without the assistance of the interviewer. The respondents were expected to respond to all questions. For most of the sections, those surveyed was invited to score their responses using ordinal level of measurement like a Likert-style rating scale, with a score of 1 to 5. The structure of questions allowed for verification across questions in the analysis stage.

3.6 Data analysis

The completed questionnaires were edited for completeness, consistency and coherence. The data collected included both qualitative and quantitative data. The data collected was further tabulated and classified into subcategories based on the aspects explored. Quantitative analysis was used to derive the information collected from the questionnaires. Descriptive statistics was used to analyze the data by way of tables, frequencies, percentages, means, variance, standard deviation and correlation analysis. A Spearman's Rank of correlation analysis was carried out on the variables used in question

14 of the questionnaire. A report was drawn finally with the conclusions and recommendations based on the findings.

CHAPTER FOUR
DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents analysis and findings of the study as set out in the research methodology. The results were presented on information integration on supply chain management a case study of food processing firms in Kenya. The data was gathered exclusively through questionnaires. The questionnaires were designed in line with the specific objectives of the study. The questionnaire was used to collect quantitative data. To enhance the quality of data obtained, Likert type questions were included whereby respondents indicated the extent to which the variables were practiced in a five point Likert scale. The study targeted a total of 30 respondents out of which 26 responded and returned their questionnaires contributing to 86.7% response rate. This response rate was excellent and representative and conforms to Mugenda and Mugenda (1999) stipulation that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. This commendable response rate was made a reality after the researcher made personal calls and visits to remind the respondent to fill-in and return the questionnaires.

4.2 Demographic Information

Table 1: The size of the organization

Company Size	Frequency	Percent
Total	26	100.0
Small Size Company (After Tax Annual Profit of Ksh.500 Million and below)	11	42.3
Medium Size Company (After Tax Annual Profit of Between Ksh.500 Million to Ksh.1 Billion)	8	30.8
Large Size Company (After Tax Annual Profit of Ksh.1 Billion and above)	7	26.9

Source: Author, (2011)

The study sought to establish the size of the organization. From the findings, the study established that the majority (42.3%) of the organizations were small size companies (after tax annual profit of ksh.500 million and below), 30.8% were medium sized company (after tax annual profit of between ksh.500 million to ksh.1 billion) while 26.9% of the firms were large size company (after tax annual profit of ksh.1 billion and above).

Table 2: Department of work in the organization

Department	Frequency	Percent
Supply Chain	9	34.6
Sales and Marketing	8	30.8
Finance	5	19.2
Production	3	11.5
Planning	1	3.8
Total	26	100.0

Source: Author, (2011)

The linkages to supply chain involve almost all functions in an organization. The respondents were asked to state the department of work in the organization. This will enable us analyse how each function contributes to and is affected by information integration on supply chain management. The study found that the majority of the respondents (34.6%) were in the supply chain department, 30.8% were in sales and marketing, 19.2% were in finance, 11.5% were in production while 3.8% of the respondents were in the planning department.

4.3 Internal and External Linkage with firms Supply Chain

Supply chain involves both the upwards and downwards linkages. According to Bowersox, Closs and Stank (1999), integration in a supply chain context is classified into six different types. These are customer integration, internal integration, material and

service supplier integration, technology and planning integration, measurement integration and relationship integration.

The respondents were given an open interview guide to address the forms of linkages, information system linkages with the supply chains and linkages between the suppliers, firm and customers.

4.3.1 Support for Internal and External Linkages

In supply chain management, there are both internal and external linkages that are supported by different functional areas within an organization. Lee (2000), coordination and resource sharing is the realignment of decisions and responsibility in the supply chain. The respondents were asked to indicate the role that their functional areas play to support the internal and external linkages along the supply chain. From the content analysis, it was established that their functional areas helps in early payment for goods, they are the link between company and external customers, they connect the customers to the firm products, the department is responsible for ensuring that the supply chain produces matches the market demand by forecasting, enhance payments to suppliers, procure goods for the firm, oversee the management of the SC process, ensure smooth flow of raw materials and financial products, material management, to ensure there is no stock out, production provides quality products, control and monitor supply chain activities with the objective of creating net value to our organization, deals with accounts payables and ensuring the practice of line balancing through kaizen principles.

4.3.2 Information Systems and Supply Chain Linkages

Information systems support supply chain linkages. The study wanted to establish whether adequate information systems linkages exist within the supply chain. According to Handfield & Nichols (1999) information technology "encompasses the information that businesses create and use as well as a wide spectrum of increasingly convergent and linked technologies that process the information". It is important to find out about the information related to the flows of materials, products and services including the reverse flows contained in a logistics information system (LIS). A reliable communication

infrastructure paves the way for timely and efficient information exchange among partners. According to the study, majority of the respondents reported that there are adequate information systems linkages within their supply chain like the Kanban that clearly states the reorder level and the estimated procurement period. Every department has its input to the functionality of the supply chain, the system is such that one can be able to see what is happening in the organization from production to point of sale and they get the flow ahead because they get the information concerning stocks. This is because of the existence of a good information system that ensures that information flows from the company to distributors and to the general business.

4.3.3 Information Systems and Linkages to Supplier and Customers

According to Stanley E. F.; Donald L. S.; Gregory M. M & Matthew W. M (2005), The second best practice of information technology is the development of Web-based systems that enables suppliers to obtain the latest sales data and up-to-date rolling forecasts. Suppliers can see real-time inventory levels as well as the timing of expected demand. They can use this information to plan their own production schedules. Again, this information helps suppliers better utilize their own production capacities while providing higher levels of service to the buying company. According to Handfield & Nichols (1999), business needs drive managers to become more competitive and they are under increased pressures to integrate the supply chain. Information integration involves, sharing of design and manufacturing data among suppliers, focal manufacturer, and customers. Supply chain members, as a result, face less uncertainty, can reduce inventory buffers by postponing costly value-adding operations and provide better customer service with more flexible response to customer demand. A reliable communication infrastructure paves the way for timely and efficient information exchange among partners. The respondents were asked to state whether the information systems are linked to their suppliers and customers. The respondents said that they are linked via emails, fax and telephone services, and website for communication. Some of the information system are tailored to pick orders from customers, send the information to the warehouse and have deliveries done and information system is linked to major distribution to manage

inventory. They also added that processing of orders and purchasing (minimum stock levels) is online to suppliers and customers and sending and receiving of information from customers is on time with the help of emails.

The respondents were asked to state whether the current Information system satisfy supply chain communications requirements in their organization. According to Stanley E. F.; Donald L. S.; Gregory M. M & Matthew W. M (2005), Companies are investing heavily in a variety of software. These new information applications have impacted every aspect of the order fulfillment process. Information systems are used to eliminate uncertainty, reduce inventory, and increase responsiveness to customer requests. The respondents said that communication through e-mail to the clients is sufficient, there is smooth communication flow between the customers and the firm thus leading to satisfaction of both, there is sharing of ordering system between supplies and the company, there are adequate ICT systems in the company that helps in maintaining the re-order level thus timely sourcing and delivery, easy sharing of information across the board on different supply chain issues e.g. pending orders and materials, the information helps the company to control its finance and to plan ahead, helps in timely processing of orders and procurement of raw materials and provide the accounts status of suppliers in regard to returned supplies. However, some said that their information system is not integrated as different departments have different softwares and one does not get timely and accurate information.

The study also required the respondents to indicate whether information and knowledge are shared along the supply chain. According to Lee (2000), Information integration refers to the sharing of information and knowledge among the members in the supply chain, including sales forecasts, production plans, inventory status and promotion plans. According to the responses given, majority of the respondents were in accord that information and knowledge are shared along the supply chain citing that customers share preferred trading ways and competition activities and when there is a new products launch or change in the product prices, sizes, the information is shared to both parties.

They also added that efficient communication and strategy i.e. one email which is shared along the SC from procurement to dispatch including sales, the department have its system mail communicated within the supply users and its user friendly and any new development across the supply chain is shared by employees mostly done through email and training sessions as well as meeting across the different sub-department in supply chain which enable smooth supply of raw materials and sale of goods. They further said that information is shared by the use of kaizen signaling systems where we maintain a better stock card showing all the details. However, some said that the information system is not integrated in their firms and some of the knowledge is not documented so sharing is a problem.

Lawrence and Lorsch (1986), defined integration as, "the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demands of the environment". According to Lee (2000), coordination and resource sharing refers to the realignment of decisions and responsibility in the supply chain. The study sought to establish whether there is increased inter-functional coordination over the past 3 years. From the study the respondents were unanimous that there is increased inter-functional coordination over the past 3 years in that various departments are more linked to each other than it was before. Some of this is necessitated by ISO requirements with updated computers and telephone. They added that the organization have greatly improved in knowledge due to coordination of employees to work hard.

The respondents were asked to indicate whether a level of trust had been established with important customer. According to Stanley E. F.; Donald L. S.; Gregory M. M & Matthew W. M (2005), in many organizations, on the people-management side, astute managers recognize that the best technology in the world does not build solid and synergistic relationships where information is not shared frequently and openly. Other companies are more than happy to share forecasts with suppliers but hold tenaciously onto actual production plans and strategic information. The willingness to share information is based largely on trust and expected mutual benefit. The respondents intimated that a level of

trust has been established with important customers as payment for goods can be done before or after the supply, the company promise what they deliver and in a timely manner. This can be explained on the credit facilities offered to the important customers, through sharing information on products and addressing the challenges they face and large customers are linked through IT to manage inventory. They also said that customers are allowed to audit supply chain systems, they have developed a preferred supplier status with the customers and customers buy raw materials on credit due to the good trust they have built with them. They also said that there is need to establish trust so as to get better services from suppliers.

4.4 Information System with Supply Chain Management

The IS integration in the supply chain management can focus on various forms of IT that can be used with SCM, nature of integration in the various aspects of the supply chain management and benefits in the organization.

4.4.1 Forms of IS used in supply chain Management

According to Stanley E. F.; Donald L. S.; Gregory M. M & Matthew W. M (2005), there are many forms of information systems and technologies that can be used to support an organization's functions. Companies are investing heavily in a variety of softwares. Most of the investment is targeted at one of the following applications: enterprise resource planning (ERP) systems, warehouse management systems (WMS), transportation management systems, advanced planning and scheduling (APS) systems, computer-assisted ordering systems, database management and mining, electronic data interchange (EDI), intranets and extranets, point of sales tracking systems and many others. These new information applications have impacted every aspect of the order fulfillment process. This study sort to establish the level of investments that the companies have in the various form of IS and IT along the SC. The respondents were asked to indicate the extent to which their firms used various forms of Information Technology in the management of their supply chain using a five point likert scale of 1-5 (1- not evident; 2-

fairly evident; 3- evident; 4- clearly evident and 5- out-standing) and the results are as shown in table 4.3.

Table 4.3: Forms of Information Technology used in the management of supply chains

Forms of IT	Mean	Std. Deviation
Computer-Assisted Ordering Systems	3.3846	1.29852
Point Of Sales Tracking Systems	3.3077	1.34964
Warehouse Management Systems (WMS)	3.0000	1.20000
Transportation Management Systems	3.0000	1.20000
Database Management and Mining	2.9615	1.42775
Enterprise Resource Planning (ERP) Systems	2.8462	1.48842
Electronic Data Interchange (EDI)	2.6538	1.49512
Advanced Planning and Scheduling (APS) systems	2.3846	1.26734

Source: Author, (2011)

From the study findings, majority of the respondents indicated that it was evident that in the management of its supply chain, their firms used Computer-Assisted Ordering Systems as shown by a mean score of 3.3846, Point Of Sales Tracking Systems as shown by a mean score of 3.3077, Warehouse Management Systems (WMS) and Transportation Management Systems as shown by a mean score of 3.0000 in each case, Database Management and Mining as shown by a mean score of 2.9615, Enterprise Resource Planning (ERP) Systems as shown by a mean score of 2.8462 and Electronic Data Interchange (EDI) as shown by a mean score of 2.6538. It was also fairly evident that the firm used Advanced Planning and Scheduling (APS) systems as shown by a mean score of 2.3846.

4.4.2 Areas of IS Integration in Firm Operations

The respondents were asked to indicate the extent that their firms have integrated information technology in the various aspects of the supply chain management. According to Stanley E. F.; Donald L. S.; Gregory M. M & Matthew W. M (2005),

Companies are investing heavily in a variety of software. These new information applications have impacted every aspect of the order fulfillment process. Information systems are used to eliminate uncertainty, reduce inventory, and increase responsiveness to customer requests. Some of the important roles identified in the new information technologies are automated order placement, electronic funds transfer payment, facility location, stock keeping unit management, shipment consolidation, point of sales data capture, shipment tracking, customer profiling, share best practices, supplier performance monitoring, computer aided design, advanced shipment notices, facility design, inventory control, transportation routing, warehouse management, automatic replenishment, product flow-through analysis, on-line bidding or auctions, purchasing compliance to policy, creation of global, consortiums or exchanges, share strategic information (eg. technology plans). Using a Five Point Likert scale of 1-5 (1-Very good extent (V.G.E), 2-good extent (G.E), 3-Moderate (M), 4-Small Extent (S.E), 5.Very Small Extent (V.S.E) and the results are as shown in table 4.4.

Table 4.4: Integration of information technology in supply chain management

Aspects of the supply chain management	Mean	Std. Deviation
Order processing	4.4231	.64331
Dispatch	4.3846	.85215
Distribution	4.2308	.76460
Purchasing	4.1923	1.16685
Transport management	4.1538	.67482
Production	3.9615	1.18257
Inventory control	3.7308	1.37281

Source: Author, (2011)

From the study findings, majority of the respondents indicated that to a great extent, the firm has integrated information technology in order processing as shown by a mean score of 4.4231, dispatch as shown by a mean score of 4.3846, distribution as shown by a mean score of 4.2308, purchasing as shown by a mean score of 4.1923, transport management

as shown by a mean score of 4.1538, production as shown by a mean score of 3.9615 and inventory control as shown by a mean score of 3.7308.

4.4.3 Impact of information integration

According to Gavirneni 2002; Hult et al. 2004; Kulp et al. 2004; Lee 2004; Li 2002; Liu et al. 2005; Soliman and Janz (2004), the central aim of information integration on supply chain management is to ensure that organizations can reap significant returns to investment, some which include decreased order cycle times, increased agility to respond to customer demand and increased firm profitability and many others. This study sort to establish the benefits of information integration on SCM. The respondents were asked to indicate how information integration on supply chain management (IISCM) has impacted on their organization using a five point likert scale of 1-5 (1-not evident, 2-fairly evident, 3-evident, 4-clearly evident, 5.outstanding) and the results are as shown in table 4.5.

Table 4.5: Impact of information integration on supply chain management

Benefits	Mean	Std. Deviation
Reduced time in servicing customer orders	3.5769	.75753
Increased financial performance of the organization	3.4615	.98917
Increased customer service levels	3.3846	.89786
Increased timely deliveries	3.3077	1.01071
Reduced supply chain costs	3.2692	.82741
Increased flexibility towards the customer demands	3.1923	1.09615
Increased inventory control	2.9615	1.21592

Source: Author, (2011)

On how information integration on supply chain management (IISCM) has impacted on the organization, it was clearly evident that information integration on supply chain management (IISCM) has reduced the time it takes to service customer orders as shown by a mean score of 3.5769. It was also evident that information integration on supply chain management (IISCM) has increased financial performance of the organization as shown by a mean score of 3.4615, increased customer service levels as shown by a mean

score of 3.3846, increased timely deliveries as shown by a mean score of 3.3077, reduced supply chain costs as shown by a mean score of 3.2692, increased flexibility towards the customer demands as shown by a mean score of 3.1923 and increased inventory control as shown by a mean score of 2.9615.

4.5 Factors that influence information integration on supply chain management

There are various factors that affect the integration of information along the supply chains of the firm, its customers and suppliers. The study therefore sought to establish the factors that influence linkage of information System on supply chain management by looking at how the suppliers and customers adopt various parameters of performance measurement and whether the objectives have been achieved in the structure of the supply chain strategy. The study also sought to establish the measures that can be undertaken to improve information integration on supply chain management.

4.5.1 Adoption of performance parameters by the firm, suppliers and customers

According to Bagchi, P. K and Larsen T.S (August 2002), warn of practical limitations of the reality of supply chains and lament that the process of making complex supply chain networks work is not yet well understood. A supply chain consists of a network of facilities and actors. In SCM, there are interfaces, upstream and downstream. The emphasis on both physical supply (inbound) and physical distribution (outbound) sides is not merely on the immediate suppliers and customers, but often on supplier's suppliers and customers' customers. The global orientation and increased performance-based competition, combined with rapidly changing technology and economic conditions have led to studies on how SCM have considered the measurement of competencies, strategy, capabilities and the effect of each on performance. We sort to establish the level of efficiency and increase in performance by asking the respondents to indicate the extent that their suppliers and customers adopt various parameters of performance measurement in the process of supplying goods & services along the supply chain using a five point likert scale of 1-5 (1-Very good extent (V.G.E), 2- good extent (G.E), 3-Moderate (M), 4-Small Extent (S.E), 5.Very Small Extent (V.S.E) and the results are as shown in table 4.6.

Table 4.6: Adoption of performance parameters by suppliers and customers in supplying goods & services

Parameters of performance measurements	Mean	Std. Deviation
Efficient communication(external & internal)	4.3462	1.41258
Incorporation of technology in their processes	3.8077	1.20064
Adapt to changing technologies in order fulfillment	3.6923	1.34964
Increased investment in information systems	3.4615	1.47596

Source: Author, (2011)

The study sought to establish the extent that the suppliers and customers adopt various parameters of performance measurement in the process of supplying goods & services along the supply chain. From the study findings, majority of the respondents indicated that the parameters of performance measurement in the process of supplying goods & services along the supply chain adopted by the suppliers and customers to a great extent include efficient communication (external & internal) as shown by a mean score of 4.3462, incorporation of technology in their processes as shown by a mean score of 3.8077 and adapt to changing technologies in order fulfillment as shown by a mean score of 3.6923 while to a moderate extent, there is increased investment in information systems as shown by a mean score of 3.4615.

4.5.2 Achievement of objectives in the structure of the supply chain strategy

Awino (2009), to guarantee efficiency of IS integration on the SCM, proper coordination of efforts by linking systems and processes to create synergy must be achieved. Each of these necessitates better coordination with suppliers and distributors, and constitutes the linkage between SC structure, SCM core competencies, strategy and SCM core capabilities. Information needs to be shared frequently and openly. The respondents were asked to indicate whether various objectives have been achieved in the structure of their supply chain strategy using a three point Likert scale of 1-5 (1- high, 2- medium, 3- Low) and the results are as shown in table 4.7.

Table 4.7: Objectives achieved in the structure of the supply chain strategy

Performance measurements on SC linkages	Mean	Std. Deviation
Intensity of the internal relationships along the supply chain	3.1923	.80096
Speed of information processing along the supply chain	3.0000	.89443
Intensity of the external linkages (suppliers & customers)	2.9615	.91568

Source: Author, (2011)

The study also wanted to establish whether various objectives have been achieved in the structure of the supply chain strategy. From the study findings, majority of the respondents indicated that the objectives that have been highly achieved in the structure of the supply chain strategy include intensity of the internal relationships along the supply chain, speed of information processing along the supply chain and intensity of the external linkages (suppliers & customers) as shown by a mean score of 3.1923, 3.0000 and 2.9615 respectively.

The respondents indicated that the measures that can be undertaken to improve information integration on supply chain management in the organization include provision of proper and timely information, there should be linkage of information system with suppliers, employing the latest technologies in information management, hiring experts in IT, working together within the industry to come up with real time communication, adopt a flexible user friendly system, strictly adherence to the ISO standards, check benchmarks to service, training of customers as well as users on importance and friendly data interface for customers.

The respondents further suggested that to improve information integration on supply chain management, the management should make sure that all the respective heads of departments have full and clear information on time to enhance easy decision making, using the latest model of software and hardware available in the market, training of staff,

adopt real time solutions in ICT, increase external linkages with customers, update customers on supply requirement and there should be open and frequent feedback between supply chain and other functions within the business.

4.6 Discussion

Bowersox, Closs and Stank (1999) have classified integration in a supply chain context in six different types. These are customer integration, internal integration, material and service supplier integration, technology and planning integration, measurement integration and relationship integration. The study found that in support of the internal and external linkages along the supply chain, the respondents functions help in early payment for goods, they are the link between company and external customers, they connect the customers to the firm products, the department is responsible for ensuring that the supply chain produces matches the market demand by forecasting, enhance payments to suppliers, procure goods for the firm, oversee the management of the SC process, ensure smooth flow of raw materials and financial products, material management, to ensure there is no stock out. Production provides quality products, control and monitor supply chain activities with the objective of creating net value to our organization, deals with accounts payables and ensuring the practice of line balancing through kaizen principles.

On whether the current Information system satisfy supply chain communications requirements in the organization, the study found that communication through e-mail to the clients is sufficient, there is smooth communication flow between the customers and the firm thus leading to satisfaction of both, there is sharing of ordering system between supplies and the company, there are adequate ICT systems in the company that helps in maintaining the re-order level thus timely sourcing and delivery, easy sharing of information across the board on different supply chain issues e.g. pending orders and materials, the information helps the company to control its finance and to plan ahead, helps in timely processing of orders and procurement of raw materials and provide the accounts status of suppliers in regard to returned supplies. This is consistent with Handfield & Nichols (1999) that a reliable communication infrastructure paves the way

for timely and efficient information exchange among partners. For example, using electronic data interchange (EDI) technology, manufacturers can provide up-to-the-minute information about their production needs by giving vendors access to the production planning and control system and vendors can arrange deliveries without the need of any paper transactions.

The study also established that there are adequate information systems linkages within the supply chain given that the Kaizen clearly states the reorder level and estimates the procurement period, every department has its input to the functionality of the supply chain, the system is such that one can be able to see what is happening in the organization from production to point of sale, they get the flow ahead because they get the information concerning stocks This is because of the existence of a good information system that ensures that information flows from the company to the distributors and to the general business.

On whether the information systems are linked to their suppliers and customers, the study revealed that they are linked via emails, fax and telephone services, website for communication. Some of the information system are tailored to pick orders from customers, send the information to the warehouse and have deliveries done and information system is linked to major distribution to manage inventory. It was also clear that processing of orders and purchasing (minimum stock levels) is online to suppliers and customers and sending and receiving of information from customers is on time with the help of emails. In line with this, Lee et al. (2007) examined the relationship between strong internal, customer, and supplier linkages, and supply chain cost containment, performance reliability, and overall performance. They observed that all three linkages were positively related to overall performance and performance reliability, and that strong internal and supplier linkages were positively related to cost containment.

The study further established that there is increased inter-functional coordination over the past 3 years in that various departments are more linked to each other than it was before necessitated by ISO requirements with updated computers and telephone. The

organizations have greatly improved in knowledge due to coordination of employees to work hard.

The study also revealed that a level of trust has been established with important customers as payment for goods can be done before or after the supply, the company promise what they deliver and in a timely manner. This can be explained on the credit facilities offered to the important customers, through sharing information on products and addressing the challenges they face and large customers are linked through IT to manage inventory. Customers are allowed to audit supply chain systems, they have developed a preferred supplier status with the customers and customers gave raw materials on credit due to the good trust they have built on them. This concurs with Stanley E. F.; Donald L. S.; Gregory M. M & Matthew W. M (2005), that the willingness to share information is based largely on trust and expected mutual benefit. Achieving trust is something best done face-to-face. Indeed, several managers emphasized the need to increase one-on-one time even though they were in the midst of significant technology investments.

According to Stanley E. F.; Donald L. S.; Gregory M. M & Matthew W. M (2005), Companies are investing heavily in a variety of software. Most of the investment is targeted at one of the following applications: enterprise resource planning (ERP) systems, warehouse management systems (WMS), transportation management systems, advanced planning and scheduling (APS) systems, satellite tracking systems, computer-assisted ordering systems, database management and mining, electronic data interchange (EDI), intranets and extranets, point of sales tracking systems, and Web-based catalogues. These new information applications have impacted every aspect of the order fulfillment process. Consistent with the literature, it was evident that in the management of its supply chain, the food processing firm used Computer-Assisted Ordering Systems, Point Of Sales Tracking Systems, Warehouse Management Systems (WMS), Transportation Management Systems, Database Management and Mining, Enterprise Resource Planning (ERP) Systems and Electronic Data Interchange (EDI).

The study deduced that to a great extent, the firms have integrated information technology in order processing, dispatch, distribution, purchasing, transport management,

production and inventory control. This is in agreement with Liker and Choi (2004) that from tracking inventory status to ordering, to picking and packing, to shipping to receiving to storing, information systems are used to eliminate uncertainty, reduce inventory, and increase responsiveness to customer requests.

On how information integration on supply chain management (IISCM) has impacted on the organization, it was clearly evident that information integration on supply chain management (IISCM) has reduced time in servicing customer orders. It was also evident that information integration on supply chain management (IISCM) has increased financial performance of the organization, increased customer service levels, increased timely deliveries, reduced supply chain costs, increased flexibility towards the customer demands and increased inventory control. This is in line with Rosenzweig et al. (2003) who explored the relationship between integration intensity, competitive capability, and performance. They observed that integration intensity is positively related to quality, delivery, process flexibility, and cost capability. Kim (2006b) also observed that among large firms, the level of integration has a positive influence on corporate competitive capability and firm performance, but that among small firms, this is true only with respect to performance.

The study further found that the parameters of performance measurement in the process of supplying goods & services along the supply chain adopted by the suppliers and customers to a great extent include efficient communication (external & internal), incorporation of technology in their processes and adapting to changing technologies in order fulfillment. The study also established that the objectives that have been highly achieved in the structure of the supply chain strategy include intensity of the internal relationships along the supply chain, speed of information processing along the supply chain and intensity of the external linkages (suppliers & customers).

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presented the summary of key data findings, conclusion drawn from the findings highlighted and recommendations made there-to. The conclusion and recommendations that were drawn are in quest of addressing the research question or achieving at the research objective which is the information integration on supply chain management, a case of food processing firms in Nairobi, Kenya.

5.2 Summary of Findings

The study found that in the support the internal and external linkages along the supply chain, the respondents functions helps in early payment for goods, they are the link between company and external customers, they connect the customers to the firm products, the department is responsible for ensuring that the supply chain produces matches the market demand by forecasting, enhance payments to suppliers, procure goods for the firm, oversee the management of the SC process, ensure smooth flow of raw materials and financial products, material management, to ensure there is no stock out, production provides quality products, control and monitor supply chain activities with objective of creating net value to our organization, deals with accounts payables and ensuring the practice of line balancing through kaizen principles.

On whether the current Information system satisfy supply chain communications requirements in the organization, the study found that communication through e-mail to the clients is sufficient, there is smooth communication flow between the customers and the firm thus leading to satisfaction of both, there is sharing of ordering system between supplies and the company, there are adequate ICT systems in the company that helps in maintaining the re-order level thus timely sourcing and delivery, easy sharing of information across the board on different supply chain issues e.g. pending orders and materials, the information helps the company to control its finance and to plan ahead,

helps in timely processing of orders and procurement of raw materials and provide the accounts status of suppliers in regard to returned supplies.

The researcher also found that information and knowledge is shared along the supply chain. It was clear that customers share preferred trading ways and competition activities and when there is new products launch or change in the product prices, sizes, the information is shared to both parties. Efficient communication and strategy i.e. one email which is shared along the SC from procurement to dispatch including sales. The department has its own system email communicated within the supply chain users and its user friendly and any new development across the supply chain is shared by employees mostly done through email and training sessions as well as meeting across the different sub-department in supply chain which enable smooth supply of raw materials and sale of goods. It was deduced that information is shared by the use of kaizen signaling systems where the firms maintain a better stock card showing all the details.

The study also established that there are adequate information systems linkages within the supply chain given that the Kaizen clearly states the reorder level and estimates the procurement period, every department has its input to the functionality of the supply chain, the system is such that one can be able to see what is happening in the organization from production to point of sale, they get the flow ahead because they get the information concerning stocks This is because of the existence of a good information system that ensures that information flows from the company to the distributors and to the general business.

On whether the information systems are linked to their suppliers and customers, the study revealed that they are linked via emails, fax and telephone services, website for communication. Some of the information system are tailored to pick orders from customers, send the information to the warehouse and have deliveries done and information system is linked to major distribution to manage inventory. It was also clear that processing of orders and purchasing (minimum stock levels) is online to suppliers and customers and sending and receiving of information from customers is on time with the help of emails.

The study further established that there is increased inter-functional coordination over the past 3 years in that various departments are more linked to each other than it was before necessitated by ISO requirements with updated computers and telephone. The organizations have greatly improved in knowledge due to coordination of employees to work hard.

The study also revealed that a level of trust has been established with important customers as payment for goods can be done before or after the supply, the company promise what they deliver and in a timely manner. This can be explained on the credit facilities offered to the important customers, through sharing information on products and addressing the challenges they face and large customers are linked through IT to manage inventory. Customers are allowed to audit supply chain systems, they have developed a preferred supplier status with the customers and customers gave raw materials on credit due to the good trust they have built on them.

It was evident that in the management of its supply chain, the food processing firm used Computer-Assisted Ordering Systems, Point Of Sales Tracking Systems, Warehouse Management Systems (WMS), Transportation Management Systems, Database Management and Mining, Enterprise Resource Planning (ERP) Systems and Electronic Data Interchange (EDI).

The study deduced that to a great extent, the food processing firms have integrated information technology in order processing, dispatch, distribution, purchasing, transport management, production and inventory control. On how information integration on supply chain management (IISCM) has impacted on the organization, it was clearly evident that information integration on supply chain management (IISCM) has reduced time in servicing customer orders. It was also evident that information integration on supply chain management (IISCM) has increased financial performance of the organization, increased customer service levels, increased timely deliveries, reduced supply chain costs, increased flexibility towards the customer demands and increased inventory control.

The study further found that the parameters of performance measurement in the process of supplying goods & services along the supply chain adopted by the suppliers and customers to a great extent include efficient communication (external & internal), incorporation of technology in their processes and adapting to changing technologies in order fulfillment. The study also established that the objectives that have been highly achieved in the structure of the supply chain strategy include intensity of the internal relationships along the supply chain, speed of information processing along the supply chain and intensity of the external linkages (suppliers & customers).

5.2 Conclusion

From the study findings, the researcher concludes that the current Information systems in the food processing firms in Nairobi satisfy supply chain communications requirements in the organization as there is smooth communication flow between the customers and the firm thus leading to satisfaction of both.

The study also revealed that a level of trust has been established with important customers and that there is increased inter-functional coordination over the past 3 years. The food processing firms have integrated information technology in order processing, dispatch, distribution, purchasing, transport management, production and inventory control. This has reduced time in servicing customer orders, increased financial performance of the organization, increased customer service levels, increased timely deliveries, reduced supply chain costs, increased flexibility towards the customer demands and increased inventory control.

The study also concludes that the parameters of performance measurement in the process of supplying goods & services along the supply chain adopted by the suppliers and customers include efficient communication (external & internal), incorporation of technology in their processes and adapt to changing technologies in order fulfillment.

5.3 Recommendations

From the discussions and conclusion in this chapter, the study recommends that to improve information integration on supply chain management, the management should

make sure that all the respective heads of departments have full and clear information on time to enhance easy decision making, using the latest model of software and hardware available in the market, training of staff, adopt real time solutions in ICT, increase external linkages with customers, update customers on supply requirement and there should be open and frequent feedback between supply chain and other functions within the business.

5.4 Recommendations for Further Research

The study has examined the effect of information integration on supply chain management in food processing firms in Nairobi. The researcher therefore recommends that further research should be done on the information integration on supply chain management in other food processing firms in other areas so as to allow for generalization. Further study should also be done on the effect of information integration on supply chain management of other industries since the processing and consumption of each product employs a different strategic approach.

REFERENCES

Awino, Z. B. (2002). Purchasing and Supply Chain Strategy: Benefits, Barriers and Bridges, *An Independent Conceptual Study Paper in Strategic Management*, School of Business, University of Nairobi September 2002.

Awino, Z. B., & Gituro W. (2009). An Empirical Investigation of Supply Chain Management Best Practices in Large Private Manufacturing Firms in Kenya. *Paper Presented in The 5th International Operations Research of Eastern Africa Conference*, White Sands Hotel, Dar es Salaam, Tanzania, 17th July, 2009.

Bagchi, P. K. (1992). International Logistics Information Systems, *International Journal of Physical Distribution & Logistics Management*, Vol. 22, No. 9, pp. 11-19.

Bagchi, P. K., & Larsen, T. S. (2002, August). Challenges of Integration in Supply Chain Networks: An European Case Study, *ACES Working Paper 2002.1* American Consortium on European Union Studies EU Center**,** Monroe Hall 403, Washington, DC 20052, USA

Barratt, M. (2004). Unveiling Enablers and Inhibitors of Collaborative Planning, *International Journal of Logistics Management*, (15:1), pp. 73-91.

Bazerman, M. H. (2005). Conducting Influential Research: The Need for Prescriptive Implications, *Academy of Management Review*, (30:1), pp. 25-31.

Bender, P. S. (2000). Debunking Five Supply Chain Myths, *Supply Chain Management Review*, (4:1), pp. 52-58.

Bowersox, D. J., Closs, D. J., & Stank, T. P. (1999). *21st Century Logistics: Making Supply Chain Integration a Reality,* Oak Brook, IL: Council of Logistics Management.

Bowersox, D.J., & Stank, T. P. (1999). *21st Century Logistics: Making Supply Chain Integration a Reality*. Council of Logistics Management, Oak Brook, IL.

Bowersox, D.J., Closs, D. J., and Stank, T.P. (1999). *21st Century Logistics: Making Supply Chain Integration a Reality*. Council of Logistics Management, Oak Brook, IL.

Brau, J. C., Fawcett, S. E., Magnan, G.M., & McCarter M.W. (2005). Information Sharing in Supply Chain Management: A Two-Dimensional Perspective, *Working paper,* University of Illinois Urbana-Champaign.

Brynjolfsson, E., & Hitt, L. (2006). Paradox Lost? Firm-Level Evidence on the Returns to Information Systems Spending. *Management Science*, 42 (4), pp. 541-558

Cox, A. (1999). Power, Value and SCM, *Supply Chain Management: An International Journal*. 4(4) 167-175.

Cross, G. J. (2000). How e-business is transforming supply chain management. *The Journal of Business Strategy*, 21(2), pp. 36-39

David, P. A. (1990). The Dynamo and the Computer: An historical Perspective on the Modern Productivity Paradox. *The American Economic Review*, 80(2), pp. 355-361

Dejonckheere, J., Disney, S.M., Lambrecht, M.R., & Towill, D.R. (2004). The Impact of Information Enrichment on the Bullwhip Effect in Supply Chains: A Control

Engineering Perspective, *European Journal of Operational Research*, (153:3), pp. 727-750.

Devaraj. S., & Kohli, R. (2003). Performance Impacts of Information Technology: Is Actual Usage the Missing Link. *Management Science*, 49(3), pp. 273-289

Eisenhardt, K.M. (1989). Building Theories from Case Study Research, *Academy of Management Review*, (14:4), pp. 532-550.

Eisenhardt, K.M. (1989). Building Theories from Case Study Research, *Academy of Management Review*, (14:4), pp. 532-550.

Fahey, J. (2004). A B-to-B that Couldn't, *Forbes*, (173:30), p. 46.

Fahey, J. A B-to-B that Couldn't, *Forbes*, (173:30), 2004, p. 46.

Ferraro, F., Pfeffer, J., & Sutton, R. I. (2005). Economics Language and Assumptions: How Theories Can Become Self-Fulfilling, *Academy of Management Review*, (30:1), pp. 8-24.

Fink, G., & Holden, N. (2005). The Global Transfer of Management Knowledge, *Academy of Management Executive*, (19:2), pp. 5-8.

Folkerts, H., & Koehorst, (1998). Challengees in International Food Supply Chains: Vertical co-ordinational in the European agribusiness and Food Industries, *British Food Journal*, Vol 100 Iss: 8, pp 385-388.

Foster, T. (1998). You Can't Manage what you Don't Measure. *Distribution Journal* 37 (5) 63-68.

Gillingham, M. (2000). *Purchasing and supply chain* ,Pearson Education Publishers, 6th edition, Thomsons Publishers, London UK.

Handfield, R. B., & Nichols, E. L. Jr. (1999). *Introduction to Supply Chain Management,* New Jersey: Prentice-Hall.

Harvard Business Review (2003). Supply Chain Challenges: Building Relationships, *Harvard Business Review, (81:7), pp. 64-74.*

Harvard Business Review (2003). Supply Chain Challenges: Building Relationships, *Harvard Business Review,* (81:7), pp. 64-74.

Holmström, J. (1999). Business process innovation in the supply chain - a case study of implementing vendor managed inventory, *European Journal of Purchasing & Supply Management,* Vol. 4 (1998), pp. 127-131.

R. B. Handfield and E. L. Nichols, Jr., *Introduction to Supply Chain Management* , New Jersey: Prentice-Hall.

Kenya Association of Manufacturers (2011) Edition Directory.

Lambert, D. M., Cooper, M. C., & Pagh J. D. (1998). Supply Chain Management: Implementation Issues and Research Opportunities, *The International Journal of Logistics Management,* Vol. 9, No. 2, pp. 1-20;

Lambert, D. M., Cooper, M., C,. & Pagh, J. D. (1997). Supply Chain Management: More Than a New Name for Logistics, *The International Journal of Logistics Management,* Vol. 8, No. 1, p. 10.

Lawrence, P. R., & Lorsch, J. W. (1986). *Organization and Environment: Managing Differentiation and Integration* Boston, MA: Harvard Business School Press.

Lee, H. L. (2000, September/October). Creating Value through Supply Chain Integration, *Supply Chain Management Review,* pp. 30—36.

Lee, H. L., & Whang, S. (2001). E-Business and Supply Chain Integration. Stanford *Global Supply Chain Management Forum*, White paper SGSCMF-W2-2001, 20 pp.

Levary, R. R. (2000). Better Supply Chains Through Information Technology. *Industrial Management*, 42(3), pp. 24-30

Loveman, G. (2001). Cash drain, no gain. *Computerworld*, 25(47) p. 69-70, 72

Luening, E. (2005). Public Net Exchanges May be Losing Their Luster, News.Com,

Lysons, K., (2003). *Purchasing Management*, 4th edition, Pearson Professional Limited Brussels Germany.

Malik, M. A., McDermott, Peter & Khalfan. (2006). Innovating for Supply Chain Integration within construction. *Construction Innovation*, Volume 3, pp 143-157(15)

Mentzer, et al J. T. (2001). Defining Supply Chain Management, *Journal of Business Logistics*, Vol. 22, No. 2 pp. 1-25.

Meta Group. (2005). Commentary: Undefined Goals Detrimental to Net Exchanges, *News.Com*.

Paik, S. K., & Bagchi, P. K. (2002). Process Reengineering of Port Operations: A Case Study, *The International Journal of Logistics Management*, Vol. 11, No. 2;

Stalk, G., & Hout, T. (1990). *Competing against Time*, Free Press, New York, NY.

Stanley E. F., Donald L. S., Gregory M. M., & Matthew W. M. (2005). Benchmarking Information Integration in Supply Chain Management: A Multi-Channel Approach. *Research Paper.*

Stanley, E. G., & Gregory, M. M. (2001). Achieving World Class Supply Chain Alignment: Benefits, Barriers and Bridges, *A Compiled Research Report*.

Stevens, G. C. (1989). Integrating the supply chain, *International Journal of Physical Distribution and Materials Management*, Vol. 19, No. 8, pp. 3--8.

APPENDICES

APPENDIX I: INTRODUCTION LETTER

University of Nairobi,
School of Business,
P.O. Box 30197-00100,
Nairobi.
5th September, 2011.

Dear respondent,

I am a postgraduate student at the University of Nairobi, School of Business. I am conducting a research on "Information integration on Supply Chain Management among Food Processing Firms in Nairobi, Kenya". This is in partial fulfillment of the requirements for the Master of Business Administration Degree.

Kindly fill the attached questionnaire to the best of knowledge. The information will be used purely for academic purposes and will be treated with strict confidence. A copy of the final report will be availed to you on request.

Your assistance will be highly appreciated. Thank you.

Yours faithfully,

Opiyo A. S.
MBA Student

Magutu O.P
Research supervisor

APPENDIX II: RESEARCH QUESTIONNAIRE

I am a postgraduate student at the University of Nairobi, School of Business. I am conducting a research on "Information integration on Supply Chain Management; a case study of the Food Processing Firms in Nairobi, Kenya". This study is being carried out as part fulfillment of the requirements for the award of a Master of Business Administration at the University of Nairobi.

Section B. General Company details

1. Indicate your organization (optional)

   …….....…….....…….....

2. Please tick the size applicable to your organization.

Large Size Company (After Tax Annual Profit of Ksh.1 Billion and above) ☐

Medium Size Company (After Tax Annual Profit of Between Ksh.500 Million to Ksh.1 Billion) ☐

Small Size Company (After Tax Annual Profit of Ksh.500 Million and below) ☐

Other (specify) …….....…….....…….

…….....…….....…….....……

.....

3. Please tick the department you work in the organization.

   Finance ☐

   Planning ☐

   Sales and Marketing ☐

   Production ☐

   Supply Chain ☐

   Other (specify) …….....……

   …….....…….....…….....…….....

Section B. Benefits of Information Integration on Supply Chain Management

4. What role does your function play to support the internal and external linkages along the supply chain?

   If Yes,

   Explain…….....…….....…….....

   …….....…….....…….....…….....

5. Does the current Information system satisfy supply chain communications requirements in your organization?

   If Yes,

   Explain…….....…….....…….....

   …….....…….....…….....…….....

6. Is information and knowledge shared along the supply chain?

   If Yes,

   Explain…….....…….....…….....

   …….....…….....…….....…….....

7. Do adequate information systems linkages exist within your supply chain?

   If Yes,

   Explain…….....…….....…….....

   …….....…….....…….....…….....

8. Are the information systems linked to your suppliers and customers?

   If Yes,

   Explain…….....…….....…….....

   …….....…….....…….....…….....

9. Are there increased inter-functional coordination over the past 3 years?

   If Yes,

   Explain…….....…….....…….....

   …….....…….....…….....…….....

10. Has a level of trust been established with important customers?

    If Yes,

Explain…….....…….....…….....

…….....…….....…….....…….....

11. To what extent has your food processing firm used the following forms of Information Technology in the management of its supply chain?

    Please tick as appropriate 1 to 5 (1-not evident, 2-fairly evident, 3-evident, 4-clearly evident, 5.outstanding). If the mode of valuation does not apply to your function, indicate N/A (not applicable)

MODE OF VALUATION	NOT EVIDENT	FAIRLY EVIDENT	EVIDENT	CLEARLY EVIDENT	OUT-STANDING
Enterprise Resource Planning (ERP) Systems					
Warehouse Management Systems (WMS)					
Transportation Management Systems					
Advanced Planning and Scheduling (APS) systems					
Computer-Assisted Ordering Systems					
Database Management and Mining					
Electronic Data Interchange (EDI)					
Point Of Sales Tracking Systems					

Section C: Effects on Information Integration on Supply Chain Management

12. To what extent has your food processing firm integrated information technology in the following aspects of the supply chain management? Please tick as appropriate 1 to 5 (1-Very good extent (V.G.E), 2- good extent (G.E), 3-Moderate (M), 4-Small

Extent (S.E), 5.Very Small Extent (V.S.E). If the mode of valuation does not apply to your function, indicate N/A (not applicable)

MODE OF VALUATION	V.G.E	G.E	M	S.E	V.S.E
Purchasing					
Production					
Inventory control					
Order processing					
Dispatch					
Transport management					
Distribution					

13. Could you kindly indicate how information integration on supply chain management (IISCM) has impacted on your organization? Please tick as appropriate 1 to 5 (1-not evident, 2-fairly evident, 3-evident, 4-clearly evident, 5.outstanding). if the mode of valuation does not apply to your function, indicate N/A (not applicable)

MODE OF VALUATION	NOT EVIDENT	FAIRLY EVIDENT	EVIDENT	CLEARLY EVIDENT	OUT-STANDING
Increased inventory control					
Increased financial performance of the organization					
Reduced supply chain costs					
Increased customer service levels					
Increased flexibility towards the customer demands					
Increased timely deliveries					
Reduced time in servicing customer orders					

14. To what extent do you think you, your suppliers and customers adopt the following in the process of supplying goods & services along the supply chain? In answering these questions, you are given scale 1-5 (Please tick).

Parameters of performance measurements	**5**	**4**	**3**	**2**	**1**	**Not Applicable(N/A)**
Efficient communication(external & internal)						
Increased investment in information systems						
Incorporation of technology in their processes						
Adapt to changing technologies in order fulfillment						

15. Have the following objectives been achieved in the structure of your supply chain strategy? If yes, please indicate High, Medium, Low or Not Applicable (Please tick).

OBJECTIVES	HIGH	MEDIUM	LOW	Not Applicable (N/A)
Intensity of the internal relationships along the supply chain				
Intensity of the external linkages (suppliers & customers)				
Speed of information processing along the supply chain				

16. In your opinion, what measures can be undertaken to improve information integration on supply chain management in your organization?
    a) ……
    b) ……
17. What recommendations would you make that will improve information integration on supply chain management?

    ……
    ……
    ……

    Thank you.