



**IMPACT OF SUPPLY CHAIN INTEGRATION  
STRATEGIES ON PERFORMANCE OF PORK  
PROCESSING INDUSTRY IN RWANDA (CASE  
OF GERMAN BUTCHERY IN KIGALI)**

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## **DECLARATION**

This proposal is my original work and has not been presented for award of degree in any other University

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## ABSTRACT

Supply chain integration (SCI) is a useful approach to improve various measures of firm performance. The aim of this study is to evaluate the impact of supply chain integration strategies on performance of pork processing industry in Rwanda. The study employed a quantitative research design in order to address to the research objective. The target population was the 52 employees of German butchery in Kigali. Due to the small size of the population, there was no need of sampling. Therefore all the 52 employees were obtained through census method and were recruited to the study. Questionnaires were used to collect information regarding internal integration, supplier integration, customer integration and performance of the firms. Questionnaires were distributed through drop and pick method to avoid inconveniencing the respondents during working hours. Data collected was edited and analysed using SPSS. The results indicated that there was a positive and significant correlation between internal integration, supplier integration, customer integration and performance of the firm. The study was about the impact of customer integration, supplier integration and internal integration on pork industry. The study recommended that the industry managers should ensure that the extents of integration of the three variables are enhanced. The study further recommended that a study that will assess the challenges affecting supply chain integration in the pork industry should be conducted in the future. Future study that will assess the barriers of implementation of supply chain integration strategies in pork industry was also recommended.

## ACRONYMS

**CI-** Customer integration

**MINAGRI-** Ministry of agriculture and animals resources –Rwanda

**RAB-** Rwanda Agricultural Board

**SCM-** Supply chain management

**SI-** Supply integration

**SCI-** Supply chain integration

## DEFINITION OF TERMS

**A cross-functional team** is a group of people with different functional expertise working toward a common goal. It may include people from finance, marketing, operation and HR departments

**Cross-functional team:** group that is made up of people from different functional areas within a company e.g. marketing, engineering, sales, and human resources

**Enterprise Application Integration:** A set of technologies that allow unrestricted sharing of data and business processes throughout the net worked applications within the business

**Firm performance:** Is the concept of how successful an organization is in achieving the outcomes the organization intends to produce (Field, 2004).

**Market share:** how well a firm is doing against its competitors

**Supplier partnership:** a commitment over an extended time to work together to the mutual benefit of parties, sharing relevant information and the risks and rewards of the relationship

**Supply chain integration:** extent to which all activities within an organization, and the activities of its suppliers, customers, and other supply chain members, are integrated together (Narasimhan, et al.1998)

**Supply Chain:** Network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of ultimate consumer.

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## CHAPTER ONE: INTRODUCTION

### 1.1 Background of Study

Supply-chain integration has become a prominent issue during the last decade. In recent years, there has been a great deal of empirical evidence to show that successful supply-chain integration can improve a firm's performance and competitive advantage (Wiengarten et al. 2010). Supply chain management (SCM) seeks to enhance competitive performance by closely integrating the internal cross-functions within a company and effectively linking them with the external operations of suppliers, customers, and other channel members to be successful (Kim, 2006). This means that a firm that is pursuing SCM practices needs to pay attention to supply chain integration (SCI) and its implementation (Hussein & Nassar, 2010).

Although pork is not consumed by certain populations or in certain regions, it is one of the preferred meats in the world. For instance, China is the largest world producer about 51.4% and total consumption of 52.0% while European Union produces 20.1% with total consumption of 18.4%. United States is the third largest producer in the world with 9.3% and total consumption of 7.7%. World total production has reached 110 million tons (USDA, Foreign Agricultural services, 2014). Pork consumption accounts for 40% of daily meat protein intake in United States (USDA, Foreign Agricultural services, 2014).

In Kenya, Pork accounts for about 9% of the red meat consumed, in Uganda Pork Consumption accounts for about 12% of red meat consumed. (FAOSTAT Data, 2012). In Rwanda, Pork consumption is fourth and accounts for 10% of red meat consumed (RAB, Animal Resource extension, 2012). Pork Consumption in East African region is way below developed markets.

Rwanda's economy is highly dependent on agriculture which includes highly growing livestock sector. Pork processing firms in Rwanda are on small scale and therefore, creating a competitive advantage will be the main objective in pork industry performance within the region. Whereas pig population have increased, from an annual of 586,621 in 2008, to 989,316 heads in 2012 (NISR, 2012). Pork produced in Rwanda is about 8,000 tons per year which accounts for about 10% of the total meat consumed (RAB, Animal Resource extension, (NISR, 2012)). 4% of pork produced yearly is exported to DRC and there remains large market opportunity for export to DRC market (MINAGR, 2014). The main challenges that have majorly constraints within the pig industry include lack of modern abattoir for pigs, a limited number of pork processors and pig breeders, and weak pig farmer's organization in cooperatives. Pork is the fastest growing sector in animal meat with an increase of 40% between 2011 and 2012 (RAB/ Animal resources, 2012). Thus the focus on pork industry in Rwanda is key in order to create sustainable industry that will be competitive in the region. Pigs multiply in a faster rate than any other domesticated animals. The cost of keeping pigs is lower since pigs can eat anything as long as it is fresh. Whereas, the investment cost vary depending on the income levels and the production process. Pigs can give birth 2 times a year and can give between 6-12 piglets per breeding. This is very profitable looking at the number of piglets that can be reared per year. Pigs are normally sold per kilo gram and thus the amount put in is eventually the output that can be attained.

The agricultural sector remains the economic backbone of the country. It employs about 87% of the working population and contributes about 32% of GDP and generates about 80% of the total export revenues (Ministry of Finance). The Government of Rwanda has recently revised the agricultural policy and strategies, in order to better achieve the objectives, as formulated in the Vision2020 outlined in the EDPRS. The ultimate objective of the agricultural policy is to contribute to the national economic growth, to achieve improved food security and the

nutritional status of the population and increase the incomes of the rural households (Ministry of Agriculture and Animal resources, 2012).

Developing countries enjoy comparative advantage in the abundance of raw materials and inexpensive labour, it is important to note that all these factors are easily imitated and therefore impossible to sustain in a competitive environment, especially as technological advances. Reliance on natural resources alone cannot create competitiveness. Orienting production, marketing and distribution towards the consumer remains the only means by which firms can become competitive.

One of the most critical issues that are expected to increase performance in pork processing industry in Rwanda is orienting production and marketing to the consumer, both internally and externally. Consumers demand a diverse range of high quality safe products. Product diversification through food processing, improved quality and safety supported by market studies is one of the ways through to create and expand market opportunities.

## **1.2 Statement of problem**

Despite the fact that pork is a cheap source of proteins, pork processing industry is yet to be fully exploited in Rwanda and there remain many opportunities for pork processing in Rwanda. According to RAB, Animal Resources Extension (2012), currently 10% of pork is consumed in Rwanda while in developed markets (USA) consumption rate is 40% (USDA, Foreign Agricultural services, April 2014). Strategies related to pork processing from source to the consumer need to be developed in order to increase firm performance in pork processing industry. Supply chain integration is one of the key elements in improving firm performance. It is important for the stake holders to understand the impact of supply chain integration on firm performance in order to understand level of integration that will create firm competitiveness.

## **1.3 Objectives of the study**

### **1.3.1 General objective**

The aim of the research was to determine the impact of supply chain integration on performance of pork industry in Rwanda.

### **1.3.2 Specific objectives**

The study sought to address the following specific objectives:

1. To establish the effect of customer integration on performance of Rwanda pork industry.
2. To determine the effect of supplier integration on performance of Rwanda pork industry.
3. To establish the effect of internal integration on performance of Rwandan pork industry.

## **1.4 Research questions**

Below are the questions that guided during the research process;

1. What is the effect of customer integration on performance of Rwandan pork industry?



2. What is the effect of supplier integration on performance of Rwandan pork industry?
3. What is the effect of internal integration on performance of Rwandan pork industry?

### **1.5 Justification of the study**

This study was considered important as it will help the government to enact appropriate legislation in order to enhance proper supply chain management of pork in the country; this will increase the production of processed pork to narrow the gap of local processed pork and imported processed pork. Investors will need the information in order to determine the viability of investing in Pig industry by forecasting the future demand and thus profitability in the long run. This study will also help students and other scholars to gain knowledge in the terms of information that will be attained during this study. To JKUAT, the study is an enhancement to the academic body of knowledge; while to other scholars, it will be a source of reference material on the subject, useful for further study. The other group of beneficiaries from the study will be the business people in the pork processing industry. They will use the findings to know how to enhance their work and deal with the common challenges better.

### **1.6 Scope of study**

The geographical scope of this study covers the southern and Kigali provinces. Southern province has 55.8% of pig population in Rwanda (MINAGRI, Directorate of Animal husbandry, 2003). In the ministry of Commerce SME product cluster booklet, Nyamagabe and Gisagara districts are listed as the main producers of Pork. The study was carried in Kigali since the area is expected to be the highest consumption of pork.

The time scope of the study is six months, whereby all procedures were followed all the way from drafting the research proposal to the reporting. It is in the timeline to this proposal. Demographically, the research involved the small and medium enterprises as they are the ones mostly found in the geographical study area.

### **1.7 Limitations of the study**

The study is expected to be limited by language barrier. This limitation will be countered by having the research instrument translated into the appropriate language. Secondly, the researcher expects inaccessibility of primary data due to lack of proper communication and unwillingness of the respondents to cooperate based on fear and lack of understanding. This will be dealt with by creating rapport with the respondents and assuring them utmost confidentiality in handling their responses. Besides, the instrument will be blinded as to avoid identification particulars.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This chapter review theories and empirical studies that border on supply chain integration and performance. The purpose of the chapter is to have an in-depth assessment of related studies with a view of trying to establish potential research gaps. The review of the empirical literature enables the researcher to formulate a conceptual framework in line with the study objectives.

### **2.2 Theories of supply chain management**

The study will be based on four theories of supply chain management namely; the principal-agent theory, transaction cost analysis theory, the network theory and the resource-based view theory.

#### **2.2.1 The principal-agent theory (PAT)**

Based on the separation of ownership and control of economic activities between the agent and the principal, various agency problems may arise, such as asymmetric information between the principal and the agent, conflicting objectives, differences in risk aversion, outcome uncertainty, behavior based on self-interest, and bounded rationality. The contract between the principal and the agent governs the relationship between the two parties, and the aim of the theory is to design a contract that can mitigate potential agency problems. The “most efficient contract” includes the right mix of behavioral and outcome-based incentives to motivate the agent to act in the interests of the principal (Logan, 2000).

The alignment of incentives is an important issue in SCM. Misalignment often stems from hidden actions or hidden information. However, by creating contracts with supply chain partners that balance rewards and penalties, misalignment can be mitigated (Narayanan and Raman, 2004)

#### **2.2.2 Transaction cost analysis (TCA)**

TCA offers a normative economic approach to determine the firm’s boundaries and can be used to present efficiency as a motive for entering inter-organizational arrangements (Williamson, 1996). A company may reduce its total transaction costs by cooperating with external partners. In the context of SCM, this question is addressed as: which activities should be performed within the boundary of each firm, and which activities should be outsourced? SCM relationships are represented by the hybrid mode of governance between markets and hierarchies. Asset specificity is the most influential attribute of the transaction (Rindfleisch and Heide, 1997). Behavioral assumptions of bounded rationality and the risk of being subject to opportunistic behavior from a partner also influence the transaction costs. Bounded rationality may result from insufficient information, limits in management perception or limited capacity for information processing. Mechanisms for mitigating the risk of opportunism include safeguards and credible commitments such as long-term contracts, penalty clauses if a partner fails to fulfill the contract, equity sharing, and joint investments. According to Williamson (1996), trust between the parties is based on “calculated risk” and not on personal trust between individuals.

TCA has often been used in make-or-buy decisions in supply chains. Examples are outsourcing of logistics activities (Halldorsson, 2002), buyer supplier relationships and restructuring of supply chains (Croom, 2001). In essence, TCA is a useful instrument to decide whether a transaction should be performed in the marketplace or in-house.

### **2.2.3 Network perspective theory**

The performance of a firm depends not only on how efficiently it cooperates with its direct partners, but also on how well these partners cooperate with their own business partners. NT can be used to provide a basis for the conceptual analysis of reciprocity in cooperative relationships (Croom, 2001). Here, the firm's continuous interaction with other players becomes an important factor in the development of new resources (Haakansson and Ford, 2002). Relationships combine the resources of two organizations to achieve more advantages than through individual efforts. Such a combination can be viewed as a quasi-organization (Halldorsson, 2002). The value of a resource is based on its combination with other resources, which is why inter-organizational ties may become more important than possessing resources per se. Thus, the resource structure determines the structure of the supply chain and becomes its motivating force. The network theory (NT) contributes profoundly to an understanding of the dynamics of inter-organizational relations by emphasizing the importance of "personal chemistry" between the parties, the build-up of trust through positive long-term cooperative relations and the mutual adaptation of routines and systems through exchange processes. Through direct communication, the relationships convey a sense of uniqueness, ultimately resulting in supply chains as customization to meet individual customer requirements. The parties gradually build up mutual trust through the social exchange processes. A network does not seek an optimal equilibrium, but is in a constant state of movement and change. Links between firms in a network develop through two separate, but closely linked, types of interaction: exchange processes (information, goods and services, and social processes) and adaptation processes (personal, technical, legal, logistics, and administrative elements) (Johanson and Mattsson, 1987).

NT is descriptive in nature and has primarily been applied in SCM to map activities, actors, and resources in a supply chain. The focus has been on developing long-term, trust based relationships between the supply chain members. Examples of issues include buyer-supplier relationships (Gadde and Haakansson, 2001), third party logistics (Halldorsson, 2002), and management roles in supply networks (Harland and Knight, 2001).

### **2.2.4 The resource based view (RBV)**

Only a few articles have applied the resource-based view (RBV) to the field in focus in order to obtain the sources of competitive advantage through SCM (Carr and Pearson, 2002) or to analyze the structure of chains and industrial clusters (Miller and Ross, 2003).

The RBV deals with competitive advantages related to the firm's possession of heterogeneous resources (financial, physical, human, technological, organizational, and reputational) and capabilities (combination of two or more resources) (Miller and Ross, 2003). These resources and capabilities constitute the core competence of the particular firm and serve ultimately as its source of competitive advantage. The static stream of research focuses on attributes that contribute to the heterogeneity of resources and capabilities. Four barriers may prevent competitors from imitating a firm's resources and capabilities: durability, transparency, transferability and replicability (Miller and Ross, 2003).

These attributes may also apply to inter-organizational arrangements (Jap, 2001). The more dynamic aspects of the RBV consider a firm's core competence to be its ability to react quickly to situational changes and build further competencies (Miller and Ross, 2003) or dynamic capabilities (Eisenhardt and Martin, 2000). Hence, a firm's competitiveness is associated with the configuration of resources and capabilities as the markets evolve. However, inter-organizational relationships may also facilitate and advance the learning processes of individual

firms. As such, relationships are not only output-oriented but also learning oriented. Efficiency may not only be explained in terms of productivity or operational measures, but also in terms of the opportunity to access another firm's core competencies through cooperative arrangements as an alternative to building such competencies in-house (Haakansson et al., 1999).

The RBV is an implicit assumption in many supply chain decisions. Often, outsourcing decisions are based on the idea of focusing on core competencies and outsourcing complementary competencies to external partners. TPL and outsourcing of standard components and processes to subcontractors are examples. However, outsourcing of design, NPD, or software development is often a way to gain access to other supply members' core competencies through inter-organizational collaboration.

The PAT stresses issues of inter-firm contracting and ultimately the notion of supply chain transparency. The TCA considers hybrids such as integrated supply chains as the result of a market failure, whereas the NT and the RBV see the supply chains as a means to access resources and competencies outside the focal firm (Skjoett-Larsen, 1999).

## **Empirical Review**

### **2.2 Supply Chain Management (SCM)**

The concept of "supply chain management (SCM)" has gone through huge developments globally. SCM seeks to enhance competitive performance by closely integrating the internal cross-functions within a company and effectively linking them with the external operations of suppliers, customers, and other channel members to be successful (Otchere, Annan & Anin, 2013). The objective of supply chain management is to maximize the overall value generated rather than profit generation (Otchere et al, 2013). Although the importance of supply chain relations is widely acknowledged, seamless coordination is rarely achieved in practice coupled with several challenges (Hussain and Nassar, 2010; Otchere et al, 2013).

### **2.3 Supply Chain Integration (SCI)**

Supply chain integration is defined as "the extent to which all activities within an organization, and the activities of its suppliers, customers, and other supply chain members, are integrated together" (Narasimhan, et al.1998). SCM has three independent variables in its original scale they are: internal, suppliers and customer integrations. Some also considers integration in two levels: internal integration and external integration (Tutuncu and Kucukusta, 2008). Finally, Stevens (1989) classifies supply chain integration into three levels, from functional integration to internal integration and to external integration. However, this study focuses only on internal and external integration, because functional integration is a pre-requisite for all firms to implement and achieve Internal Integration (Otchere et al, 2013). The dominant belief is that supply chain integration (SCI) is a useful approach to improve various measures of firm performance (Van der Vaart and Van Donk, 2008). The basis of integration can therefore be characterized by cooperation, collaboration, information sharing, trust, partnerships, shared technology, and a fundamental shift away from managing individual functional processes, to managing integrated chains of processes (Pagell, 2004).

#### **2.3.1 Internal Integration**

Internal integration involves cross functional teams that may bring together a carefully selected array of specialists who share information and make product, process, and manufacturing decisions, jointly and simultaneously (Koufteros, Vonderembse & Jayaram, 2005). Internal

integration is defined as a process of inter-functional interaction, collaboration, coordination, communication and cooperation that bring functional areas together into a cohesive organization (Flynn et al, 2010). Furthermore, Supply chain partners who exchange information regularly are able to work as a single entity, and can understand the needs of the end customer better and hence can respond to market change quicker (Stein, 1998). A prerequisite for successful SCM is internal integration (Lambert, Cooper & Pagh, 1998). Also, companies with a low internal integration strategy will achieve low level of external integration and companies implementing the full internal integration strategy will have the highest levels of external integration (Gimenez and Ventura, 2005). Generally, it is believed that firms achieve a relatively high degree of internal integration before they attempt to develop a higher degree of external integration (Otchere et al. 2013). Internal integration can be accomplished through automation and standardization of each internal logistics function, the introduction of new technology, and continuous performance control under formalized and centralized organizational structure (Bowersox, 1989).

### **2.3.2 External Integration**

As the competitive environment is becoming increasingly challenging, firms are undertaking efforts to compete along multiple fronts. However, many firms find it difficult to compete in the market by relying on their internal resources and competencies alone. They have turned to collaborate with their customers and suppliers to obtain information and complementary resources, which they can deploy to build competitive advantage. External supply chain integration reveals two major areas of emphasis. They are: Customer integration (CI) and Supply integration (SI). Supplier integration also called “backward” integration (Frohlich and Westbrook, 2001) refers to the process of interaction and collaboration between an organization and its suppliers to ensure an effective flow of supplies (Zhao et al, 2011). Customer integration, also called “forward” integration (Frohlich & Westbrook, 2001) refers to the process of interaction and collaboration between an organization and its” customers to ensure an effective flow of products and/or services to customers (Zhao et al. 2002). Customer integration involves sharing demand information, help the manufacturer to understanding better the customer needs and to forecast better customer demand, as well as collaborative involvement of customers with respect to product design, provision of better quality products at lower cost and more flexibility in responding to customer demand (Flynn et al. 2010).

## **2.4 Supply chain integration and performance**

### **2.4.1 Logistic integration and performance**

Increasing competition not only guides organizations to improve their internal operations (process control and inventory management) but also focuses on the integration of suppliers and customers in the entire processes of chain. Thus, suppliers' involvement in delivering value to customers causes competitive capabilities such as quality, delivery, flexibility and cost (Prajogo & Olhager, 2012) Logistics was defined as "process of scheduling" run and control the flow, storage of raw materials, inventory in manufacturing, final product and its related information at the minimum cost. According to this definition, the entire process of logistics, combine a large number of activities with suitable integration in order to implement the right to meet customer needs to reach smooth flow of operations through the chain and the most portion of profit for organization and customer. (Valizade&Malaki rad, 2011) According to Stock et al (2000), Logistics integration refers to specific logistics practices and operational activities that coordinate the flow of materials from suppliers to customers throughout the value stream. In other words, higher levels of integration are characterized by increased logistics-



related communication, greater coordination of the firm's logistics activities with those of its suppliers and customers, and more blurred organizational distinctions between the logistics activities of the firm and those of its suppliers and customers. (Prajogo & Olhager, 2012) The goal of logistics management is planning and coordinating all activities which are necessary to achieve desired levels of quality and customer service with the lowest possible cost. Logistics is thus a link between marketing and operational activities. Logistics working area within the organization start from supply and management of raw materials to delivery final product to market and customers. (Valizade&Malaki rad, 2011) Logistics integration decreases various problems such as bullwhip effect and gives the organizations and partners the opportunity to benefit from vertical integration (quality, reliability, planning and control and lower cost). Improved logistics integration between supply chain partners yields a number of operational benefits, including reduction in costs, lead time, and risks as well as improvement in sales, distribution, customer services, and service levels and customer satisfaction.”( Stock et al, 1998)

#### **2.4.2 Information integration.**

In supply chain, the importance of coordinating activities is important. This point is also noticeable for information management in the chain, information management systems and the data transaction. Coordinated and appropriate information between partners will lead to growing impacts on the speed, accuracy, quality and other aspects. Effective information management will lead to greater coordination in the chain. Information integration is the extent that operational, tactical and strategic information are transferred between business partners and the central company. Elahi et al, (2009) downward flow of material in supply chain should be supported through information flows from bottom to top. Kalakota and Robinson (1997) suggested that significant progress in supply chain management can be achieved through the integration of business processes and information flow between business partners. Lai et al (2008) defined information integration as using information and communication technology in order to coordinate decisions and activities between an organization and its partner. Jayaram and Tan (2010) concluded that information integration has positive relationship with performance of an organization. Information integration in this study is reviewed through two dimensions of information technology (technical) and information sharing (social dimension). Importantly, to emphasis on information technology without the willingness to share critical information will not significantly associate organizations together. So they may fail in integrating their logistics. In other words, that organizations notice both side of information integration can then use the maximum benefits of integrated logistics. Using information technology has the potential of developing supply chain partners in order to work together for efficient delivery of products to consumers. Information technology allows the supply chain partners act as a single entity. (Marzang, 2010) information technology is a mixture of telecommunications achievements, methods and strategies for problem solving and leadership skills using computer knowledge and include issues related to advanced science and computer technology, computer design, information systems implementation and their applications. Dorudchi & Nikmehr, (2007) knows information technology as compilation of traditional computer science and information technology for storage, processing and exchange of any data (including text, sound and image, etc.) Information (and communication) technology plays a central role in supply chain management in the following aspects. First, IT allows firms to increase the volume and complexity of information which needs to be communicated with their trading partners. Second, IT allows firms to provide real-time supply chain information, including inventory level, delivery status, and production planning and scheduling which enables firms to manage and control its supply chain activities. Third, IT also facilitates the alignment of forecasting and scheduling of operations between firms and suppliers, allowing

better inter-firms coordination. Prajogo & Olhager (2012) explained that integrated information technology, is a key factor for supply chain integration. These technologies include electronic data exchange between organizations and within organizations through material requirement planning systems. Elahi et al (2009) stated that information technology plays a vital role in the success or failure of the supply chain. When suppliers are scattered across the world, integration of activities within and outside the company becomes important. This requires an integrated information system, which leads to information-sharing. Devaraj et al (2007) have concluded that information technology affects information integration and production in supply chain and Supplier integration has a positive impact on organizational performance. Kelle and Akbulut (2005) concluded using information technology in supply chain management leads to integration and coordination of material flow, financial flow and information flow between suppliers, manufacturers, wholesalers, retailers and final customers. Prajogo & Olhager (2012) concluded that IT has a positive impact on logistics integration. While the technological aspect of information integration is important, it is the frequency, the quantity and the quality of information that is shared that really matters. Information sharing means "supply chain companies" willingness to give accurate, timely, related and common information to each other in order to create harmony at all levels of the supply chain." Information sharing in organizations causes better decisions, capacity allocation, production and materials planning through increased transparency, demand, supply and inventory. Koçoglu et al., (2011) in their study show that information sharing acts as a key component in achieving an integrated supply chain. They display that SCI increase coordination, reduce uncertainty, expedite material flow, accelerate order fulfillment, reduced inventory costs, increase customer satisfaction by reliable and fast delivering, improve performance and increase operational effectiveness. Green and Shaw (2000) expressed that an important strategy for managing integrated supply chain is information sharing between trading partners. One of the main benefits of information sharing is inventory reduction. Koçoglu et al (2011) suggested Information sharing significantly reduce supply chain costs, improve communication with partners, increase the flow of materials, fast delivery, order fulfillment, and ultimately improve customer satisfaction, improve coordination and facilitate access to the competitive position

### **2.4.3 Supplier integration**

In the supplier-facing component of integration, a number of studies have found a positive association between supplier integration and operational performance (e.g., Petersen et al. 2005; Devaraj et al. 2007). Nevertheless, others have reported no direct association between supplier integration and operational performance (e.g., Stank et al. 2001; Flynn et al. 2010) or supplier integration and business performance (e.g., Flynn et al. 2010), and yet others find a negative association (e.g., Stank et al. 2001; Swink et al. 2007) between supplier integration and operational performance. Although failing to uncover direct effects, Flynn et al. (2010), for instance, find that the interaction between the external dimensions of integration is associated with operational performance. As for business performance, similar to customer integration, the few existing studies focusing on this aspect have not found a direct positive association between supplier integration and business performance (Flynn et al. 2010) or between integration intensity and business performance (Rosenzweig et al. 2003).

### **2.4.4 Customer integration**

For the customer-facing component of integration, the literature indicates that this dimension is directly (Flynn et al. 2010; Wong et al. 2011) and indirectly (Devaraj et al. 2007) associated with improved operational performance. However, other studies contradict the customer-facing to operational performance association (e.g., Swink et al. 2007). As for business performance,

studies have not found a direct positive association between customer integration and business performance (e.g., Flynn et al. 2010; Koufteros et al. 2010) and the link seems to remain under investigated and unclear.

## **2.5 The effect of SCI on firm performance**

Although financial performance has been widely used as a key output measure of firm performance (Boyer, 1999), numerous studies have pinpointed the limitations in relying solely on financial performance measures in supply chain studies (Eccles and Pyburn, 1998). For example, numerical performance measures used as simple qualitative evaluations may not adequately describe firm performance. Therefore, in this study, we adopt both operational and financial performance to measure the benefits of SCI. Internal integration can help functions to leverage each other's resources and capabilities to jointly design products, ensure product quality and reduce duplicated tasks (Schoenherr and Swink, 2012). For example, Tan (2001) found that internal integration could create a close link between manufacturing and distribution processes to deliver products and services in a timely and effective manner. Efficient external process integration allows manufacturers to speed up product delivery processes, improve production planning and reduce inventory obsolescence using accurate information about customer demands and preferences (Swink et al., 2007). Further, process integration with suppliers helps manufacturers reduce mistakes and enhance product quality through information sharing and joint planning, which are directly related to the manufacturers' operational performance (Petersen et al., 2005). Product integration with suppliers and customers can enhance manufacturers' new product development capabilities, promoting product quality, flexibility and innovation in addition to product competitive advantage (Koufteros et al., 2007).

Many studies have investigated the relationship between SCI and financial performance, and it is generally accepted that the former enhances the latter. For example, Frohlich and Westbrook (2001) concluded that manufacturers with the widest degrees of supplier and customer integration achieve the best performance improvements in terms of market share and profitability. Droge et al. (2004) found that both internal and external integration were related to financial performance through time-based performance. Zailani and Rajagopal (2005) noted that manufacturers with the greatest degrees of external customer and supplier integration achieved the highest overall performance improvement. The literature suggests that internal and external process and product integration can directly contribute to manufacturers' financial performance. Furthermore, it indicates that operational performance plays an important role in the relationship between SCI and financial performance. The literature also provides evidence that operational performance positively influences financial performance (Inman et al., 2011)

## **2.6 Critical Review**

A study that was conducted by Abdullah et al., (2011) sought to analyze the impact of supply chain integration on business performance. This study selected a sample of 21 research papers published between 1995 and 2011. Although this study provided an empirical proof that supply chain integration led to better business performance, the use of secondary data rather than primary data exposed the study to bias associated to publication. Further to this, the information was not obtained directly from the respondents as such the reliability of the data is compromised. There were only 21 research papers that were sampled, more research papers and journal articles could be researched or reviewed. Therefore, the findings of this paper cannot be widely generalized



A Meta-Analytic Evaluation was conducted by Alan et al., (2014) to determine the Relationship between Strategic Supply Chain Integration and Performance. The study found that there was a relationship between Supply Chain Integration and Performance. However like the study by Abdullah et al., (2011), this study relied on secondary data which involved analyzing the 34 published journals. This method has the disadvantage of failing to obtain enough or sufficient data that can allow generalization of the findings. The method is also cumbersome especially when the researcher has to search for studies that evaluate supply chain integration–performance relationship.

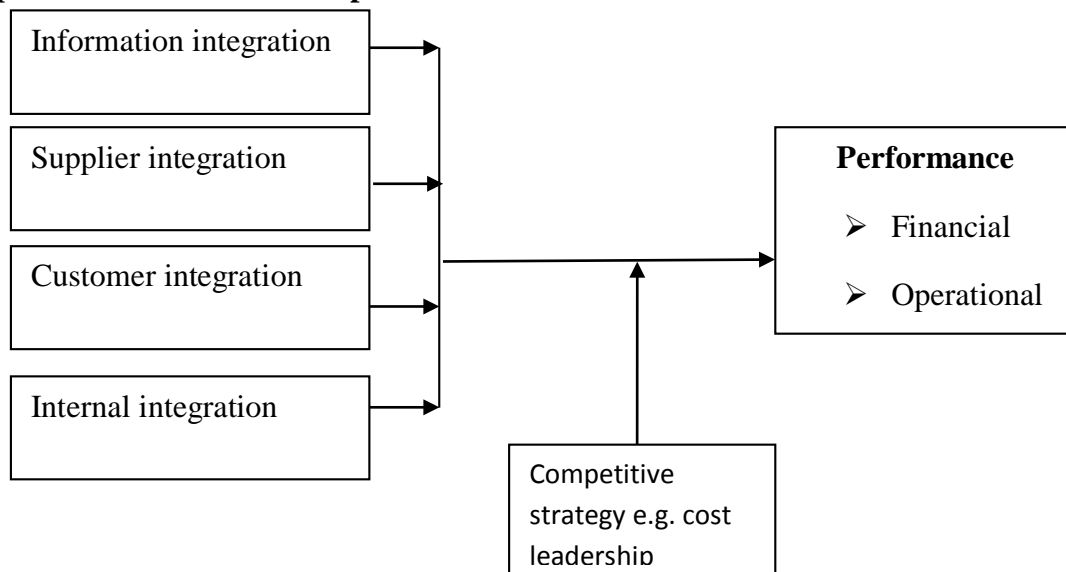
## 2.7 Research gap

Although a number of studies have been conducted to determine the impact and relationship between supply chain integration and performance, secondary data has been the choice of many researchers where they analyze the already published journals. This method faces challenges of failing to obtained sufficient data that could allow generalization of the findings. The current study will rely on primary data which will allow the research to get the current situation and impact of the supply chain integration on pork processing firms.

## 2.7 Conceptual framework

Supply chain integration (SCI) helps firms to reconfigure their resources and capabilities internally and externally to consolidate their supply chain as a whole in an effort to improve long-term performance (Horvath, 2001) SCI has both operational and financial performance benefits.

### Independent Variable -SCI Dependent Variable



### Moderating variable

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.0 Introduction**

The chapter presents the research methods that were employed in this study. Such include information gathering and data presentation. The research design, sampling procedure, data collection methods, validity and reliability and data analysis procedures are also highlighted.

### **3.1 Research design**

The study was a quantitative descriptive case study utilizing primary data collection. Orodho (2003), describe a descriptive case study as a method of collecting information by administering a questionnaire to a sample of individuals. Descriptive research determines and reports the way things are and helps researcher to describe a phenomenon in terms of attitude, values and characteristics (Mugenda and Mugenda, 2003). The selected samples for this study was administered with questionnaires to facilitate data collection

### **3.2 Target Population**

Mugenda and Mugenda (2003) define a population as a complete set of individuals, with common characteristics. It is the total collection of elements about which the study wishes to make some inferences (Cooper& Schindler, 2008). A total of 52 employees of German butchery formed the target population of this study

### **3.3 Sample Size**

Sample size refers to the number of units or people that are chosen from which the researcher wish to gather information or data (Evans et al., 2000). The study population for this study was small in size (52); therefore the entire population was treated as the 'sample' in order to achieve accuracy and reliability of data.

### **3.4 Sampling Technique**

Census method of sampling was used because the population is small and the data can be collected from the entire population. According to Pratt et al., (1995) Census method is a type of purposive sampling technique that involves examining the entire population that have a particular set of characteristics involves collecting data from the entire population. The method has an advantage over sample in that the data obtained is more reliable and accurate. Total population sampling has a wide coverage of the population of interest reducing risk of missing potential insights from members that are not included (Pratt et al., 1995)

### **3.5 Data Collection Instrument**

Primary data provided by the respondents was the focus of this study. Nachmias and Nachmias (2008) argues that questionnaires are more efficient in that, they require less time to prepare; they are less expensive and permits collection of data from a wide population. In this regard, this study used structured questionnaires to correct data related to supply chain integration strategies and performance.

### **3.6 Data Collection Procedure**

Primary data was collected using close- ended questionnaires. The researcher administers the questionnaires himself during working hours to ensure that all respondents are available. The

respondents were left with the questionnaires to avoid inconveniencing the employees during working hours.

### **3.7 Reliability and Validity for the research instrument**

#### **3.7.1 Reliability**

Golafshani (2003) defines reliability as the extent to which results of a study are consistent over time and there is an accurate representation of the total population under study. According to Toke et al., (2012), the aim of reliability analysis is to find the extent to which a measurement procedure produced the same result if the process is repeated over and over again under the same conditions. In this study Cronbach alpha coefficient generated by the use of SPSS was used to ascertain reliability of the questionnaire. The value generated was compared with the threshold of 0.7 to confirm reliability. Cronbach alpha value above 0.7 indicates reliability of the measurement procedure as recorded by Toke et al., (2012).

#### **3.7.2 Validity**

According to Mugenda and Mugenda (1999), validity of research tool has three components. The first is construct validity which deals with the consistency of the questions with the responses intended by the researcher. This validity was assured by structuring the questionnaire according to the specific objectives. The second form of validity is content validity, i.e. the ability of an instrument to gather the data required for the analytical techniques suggested (Peil 1996). This was assured by using close ended questions which avoided irrelevant answers. To ensure internal validity of the questionnaire, the researcher gave the draft questionnaire to the supervisors for review and recommendations made were included in the final questionnaire.

### **3.7 Ethical considerations**

The researcher proceeded with data collection after obtaining authorizations from Jomo Kenyatta University and the pork processing firm from which data collected. The researcher's ensured that participants completely understand the purpose and methods to be used in the study. The participants were made to understand that they have the right to withdraw from the study at any time. A consent form was availed to the participants to sign whether to participate in the study or not. Assurance that all the information provided by the respondents' was treated with utmost confidentiality was also be ensured.

## CHAPTER 4: RESEARCH FINDINGS AND DISCUSSION

### 4.1 Introduction

This chapter presents analysis of the data on the study conducted to determine the impact of supply chain integration on performance of pork industry in Rwanda. The study target population comprised of all the 52 members of the pork processing firm. Census method was used to obtain the study respondents. Close ended questionnaires were administered to a sample of 52 respondents out of which 48 were correctly filled and returned. The response rate of this study was 92.3% which was considered excellent. According to Baruch, (1999) a response rate of 70% and above is excellent and can be used to draw conclusions for a study.

### 4.2 Demographic characteristics of the participants

The study sought to determine the gender and position held by the respondents. Table 4.1 indicates that 67% of the respondents were male while 33% were female. This indicates that both male and female participate in the projects. Majority of the respondents 75% held a non-managerial position while 25% held a managerial position

**Table 4.1 Demographic characteristics of the participants**

	Frequency	Percent (%)
<b>Gender</b>		
Male	32	67
Female	16	33
Total	48	100
<b>Position Held</b>		
Managerial	12	25
Non-managerial	36	75
Total	48	100

### 4.3 Distribution of responses requiring “lesser” or “greater extent” as the response

Majority of the respondents 67% felt that information exchange with major supplier through information networks was done to a greater extent, while 33% said it was done to a lesser extent. Most of the respondents 60% stated that suppliers shared their production capacity with the pork industry to a greater extent while 40% of them indicated that such sharing was being done to a lesser extent. Likewise a larger percentage of the respondents 63% indicated that supplier shared their production schedule to a greater extent while 37% indicated to lesser extent. The industry shared their production plan with the supplier to a greater extent as indicated by 79% of the study participants. 21% of them however felt that the extent of sharing was to a lesser extent. Majority 77% stated that level of strategic partnership with the industry supplier was done to a lesser extent while 23% felt that the strategic partnership was done to a greater extent. The level of linkage with industry’s customer through information networks was considered by 52% to be at a greater extent while 48% felt that it was done to a lesser extent. Computerization for ease of customer ordering was being done at greater extent as indicated by 79% of the respondents. Minority of the respondents 21% however felt the extent was lesser. Communication with major customers was done at greater extent as indicated by 62 % of the respondents. A fair percentage however indicated that communication was being done to a lesser extent.

Quick ordering systems were being established with major customers to a greater extent as indicated by 65% of the respondents. Available inventory is shared with major customers at a greater extent as pointed out by 54% of the respondents. 46% felt that the extent of the sharing of the available inventory was done to a lesser extent. Market information from the major customer was shared to a greater extent as indicated by 58% of the respondents. Most of the respondents 58% indicated that the extent to which the industry ensured that data integration among internal functions was great while 42% felt it was lesser.

**Table 4.3 Distribution of responses requiring “lesser” or “greater extent” as the response**

Statement	Less extent (%)	Great extent (%)
The level of information exchange with your major supplier through information networks	33	67
The level at which your supplier share their production capacity with you	40	60
The level at which your supplier share their production schedule with your industry	37	63
Sharing your production plan with your supplier	21	79
The level of strategic partnership with your supplier	77	23
The level of linkage with your customer through information networks	48	52
The level of computerization for ease of customer ordering	21	79
The level of communication with major customers	38	62
The establishment of quick ordering systems with your major customers	35	65
The level of sharing of available inventory with the major customers	46	54
The level of sharing of market information from the major customer	42	58
Ensuring data integration among internal functions	42	58
Enterprise application integration among internal functions	15	85
The level of utilization of periodic interdepartmental meetings among internal functions	17	83
The use of cross functional teams in process improvement	31	69
Integrative inventory management	67	33

The extent to which the industry ensured enterprise application integration among internal functions was greater according to 85% of the respondents. Periodic interdepartmental meetings among internal functions was being level of utilized to a greater extent as indicated by 83% of the respondents. 69% of the respondents felt that the use of cross functional teams in process improvement was being done to a greater extent. Likewise 67% of the respondents indicated that the industry ensured and integrative inventory management to a greater extent.

#### **4.4 Responses requiring the respondent to agree or disagree**

Majority of the respondents 46% of the respondents agreed that the pork firm could quickly modify products to meet major customer’s requirement, 25% strongly agreed while 29% disagreed with the statement. Regarding introducing new product in the market, 50 % of the

respondents strongly agreed that the pork industry could quickly introduce new product in the market. 23% just agreed while 27 % of the respondents disagreed with the statement. While 44 % of the respondents just agreed with the statement that the pork industry could quickly respond to changes in market demand, 29% strongly agreed and 27% disagreed. A fair percentage 33% strongly agreed with a statement that the pork firm has an outstanding on-time delivery record to its customer, 31% just agreed while 36% disagreed. Most of the respondents 40% strongly agreed with the statement that the firm provided a high level of customer service to its major customer, 42% just agree while 18% disagreed with the statement

**Table 4.3 Distribution of responses requiring the respondent to agree or disagree**

Statements	Strongly Agree	Agree	Disagree
Our firm can quickly modify products to meet our major customer's requirement	25	46	29
Our firm can quickly introduce new product in the market	50	23	27
Our firm can quickly respond to changes in market demand	29	44	27
Our firm has an outstanding on-time delivery record tour customer	33	31	36
Our firm provides a high level of customer service to our major customer	40	42	18

#### 4.5 Correlation analysis

The correlation table revealed that there was a positive significant relationship between customer integration, supplier integration, internal integration and firm performance (.808\*\* , p<0.001) (.784\*\* p<0.001), (.822\*\* , p<0.001). This implies that the three independent variables have the potential to influence the performance of pork firm in Rwanda.

**Table 4.5 Correlation Analysis between the independent and dependent variables**

		Firm performance	Customer integration	Supplier integration	Internal integration
Firm performance	Pearson Correlation	1	.808**	.784**	.822**
	Sig. (2-tailed)		.000	.000	.000
	N	48	48	48	48
Customer integration	Pearson Correlation	.808**	1	.331*	.433**
	Sig. (2-tailed)	.000		.021	.002
	N	48	48	48	48
Supplier integration	Pearson Correlation	.784**	.331*	1	.355*
	Sig. (2-tailed)	.000	.021		.013
	N	48	48	48	48
Internal integration	Pearson Correlation	.822**	.433**	.355*	1
	Sig. (2-tailed)	.000	.002	.013	
	N	48	48	48	48

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

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

#### **4.5.1 Customer integration and performance of pork processing industry**

The results indicated that customer integration and performance of pork industry are positively related (.808\*\*,  $p < .01$ ). This means that improving the extent to which the industry ensures customer integration has a great potential to improve the industry's performance. Elements of customer integration dealt with in this study such as computerization for ease of customer ordering and establishment of quick ordering system should be ensured for improved performance.

#### **4.5.2 Supplier integration and performance of pork processing industry**

The results indicated that supplier integration and performance of pork industry are positively and significantly related (.784\*\*,  $p < .01$ ). This is an indication that enhancing supplier integration within the pork industry will lead to increased performance. Likewise ignoring supplier integration can affect the productivity of the industry

#### **4.5.3 Internal integration and performance of pork processing industry**

Table 4.5 indicate that internal integration and performance of pork industry are positively and significantly related (.822\*\*,  $p < .01$ ). This means that enhancing internal integration within the pork industry has the potential to increase performance of the pork industry.



## CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Introduction

The study focused on the impact of supply chain integration strategies on the performance of pork industry in Rwanda. The study was carried out to find out whether performance of pork industry can be attributed to customer integration, supplier integration and internal integration. This chapter is divided into three sections, summary of the findings, conclusions and recommendations including areas for further study.

### 5.2 Summary of the findings

To achieve the objectives, the study collected primary data from a total of 52 individuals out of whom 48 questionnaires were filed and returned. Census method of obtaining the study participants was used because the target population was too small. Data collected was cleaned coded and analyzed using SPSS to generate meaningful information. The study revealed that that 67% of the respondents were male while 33% were female indicating that both male and female participated in the pork industry. Majority of the respondents 75% held a non-managerial position while 25% held a managerial position.

The results indicated that customer integration and performance of pork industry were positively related (.808\*\*,  $p < .01$ ). The level of linkage with industry's customer through information networks was considered to be at a greater extent by 52% of the respondents. Computerization of services for ease of customer ordering was being done at greater extent as indicated by 79% of the respondents. Communication with major customers was done at greater extent as indicated by 62% of the respondents. Quick ordering systems were being established with major customers to a greater extent as indicated by 65% of the respondents. Available inventory was being shared with major customers at a greater extent as pointed out by 54% of the respondents. Market information from the major customer was shared to a greater extent as indicated by 58% of the respondents. Most of the respondents 58% indicated that the extent to which the industry ensured that data integration among internal functions was great.

The results indicated that supplier integration and performance of pork industry are positively and significantly related (.784\*\*,  $p < .01$ ). Information exchange with major supplier through information networks was done to a greater extent as indicated by 67% of the respondents. Most of the respondents 60% stated that suppliers shared their production capacity with the pork industry to a greater extent while 40% of them indicated that such sharing was being done to a lesser extent. A large percentage of the respondents 63% indicated that supplier shared their production schedule to a greater extent. The industry shared their production plan with the supplier to a greater extent as indicated by 79% of the study participants. Majority 77% stated that level of strategic partnership with the industry supplier was done to a lesser extent.

Internal integration and performance of pork industry were positively and significantly related (.822\*\*,  $p < .01$ ). The extent to which the industry ensured enterprise application integration among internal functions was greater according to 85% of the respondents. Periodic interdepartmental meetings among internal functions were being utilized to a greater extent as indicated by 83% of the respondents. 69% of the respondents felt that the use of cross functional teams in process improvement was being done to a greater extent. Likewise 67% of the respondents indicated that the industry ensured and integrative inventory management to a greater extent.



### **5.3 Conclusion**

It was established from the study that there was a significant positive relationship between customer integration and performance of pork industry. Improving the extent to which the industry ensures customer integration has a great potential to improve the industry's performance. The level of linkage with industry's customer through information networks was to a greater extent. Computerization of services for ease of customer ordering and communication with major customers was being done at greater extent. The industry had quick ordering systems which were being established with major customers to a greater extent. Available inventory within the industry was being shared with major customers to a greater extent. To a greater extent the industry ensured that data integration among internal functions was great.

Supplier integration and performance of pork industry are positively and significantly related. Information exchange with major supplier through information networks is done to a greater extent in the industry. Suppliers shared their production capacity with the pork industry to a greater extent. Supplier production schedule was being shared to a greater extent. The industry shared their production plan with the supplier to a greater extent. Strategic partnership with the industry supplier was done to a lesser extent.

Internal integration and performance of pork industry were positively and significantly related. The extent to which the industry ensured enterprise application integration among internal functions was greater. Periodic interdepartmental meetings among internal functions were being utilized to a greater extent. Cross functional teams were being used within the industry to a greater extent. The industry ensured integrative inventory management to a greater extent.

### **5.4 Recommendation**

The study was about the impact of customer integration, supplier integration and internal integration on pork industry. Since there was a positive and significant relationship between customer integration, supplier integration, internal integration and performance of pork industry, there industry managers should ensure that the extent of integration of the three variables are enhanced. The study recommended the following areas of further study;

- i. A study that will assess the challenges affecting supply chain integration in the pork industry. This study will expose the challenges that need to be addressed for improved performance.
- ii. Future researches should also conduct a study that will assess the barriers of implementation of supply chain integration strategies in pork industry. This study will be important in that it will help the industry managers to identify areas within the industry that require to be polished in order to increase the performance
- iii. A study that will focus on the regression analysis to explain how much of the pork industry performance can be explained by the independent variables

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## Appendix 1: Research Questionnaire

Dear respondent,

This questionnaire is meant to collect data for research study on **IMPACT OF SUPPLY CHAIN INTEGRATION STRATEGIES ON PERFORMANCE OF PORK PROCESSING INDUSTRY IN RWANDA**

You have been identified as one of the respondents for this study and you are kindly requested to fill the questionnaire. Information given will be held with confidentiality and will be used purely for research purposes.

*Instruction: Please tick inside the boxes as appropriate*

### **SECTION A: DEMOGRAPHIC CHARACTERISTICS**

1. Gender

a) Male

b) Female

2. Position held

a) Managerial

b) Non-managerial

3. Customer integration has an effect on performance of Rwanda pork industry.

Yes

No

4. Supplier integration influences performance of Rwanda pork industry.

Yes

No

5. Internal integration influences performance of Rwandan pork industry

Yes

No

**SECTION B: IMPACT OF SUPPLY CHAIN INTEGRATION STRATEGIES ON PERFORMANCE OF PORK PROCESSING INDUSTRY IN RWANDA**

**PART I: Information integration**

The following statements relate to impact of supply chain integration strategies on performance of pork processing industry in Rwanda. Follow the instructions given for your responses

<i>Please indicate the extent to which integration of the following strategies in your business(1-lesser, 5- greater)</i>					
2	<b>Supplier integration</b>				
a	The level of information exchange with your major supplier through information networks				
b	The level at which your supplier share their production capacity with you				
c	The level at which your supplier share their production schedule with you				
d	Sharing your production plan with your supplier				
e	The level of strategic partnership with your supplier				
3	<b>Customer integration</b>				
a	The level of linkage with your customer through information networks				
b	The level of computerization for ease of customer ordering				
c	The level of communication with major customers				
d	The establishment of quick ordering systems with your major customers				
e	The level of sharing of available inventory with the major customers				
	The level of sharing of market information from the major customer				
4	<b>Internal integration</b>				
a	ensuring data integration among internal functions				
b	Enterprise application integration among internal functions				
c	The level of utilization of periodic interdepartmental meetings among internal functions				
d	The use of cross functional teams in process improvement				
f	Integrative inventory management				
<b>Operational performance: Please indicate the extent to which you agree or disagree with the following statement concerning your firm performance in respect to your competitors (1 strongly disagree, 2-Disagree, 3-Agree, 4-Strongly Agree)</b>					
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
a	Our firm can quickly modify products to meet our major customer's requirement				

b	Our firm can quickly introduce new product in the market				
c	Our firm can quickly respond to changes in market demand				
d	Our firm has an outstanding on-time delivery record to our customer				
e	Our firm provides a high level of customer service to our major customer				

**Thank you for your time**