EFFECT OF SUPPLY CHAIN COLLABORATION ON THE STRENGTH OF BUSINESS-TO-BUSINESS RELATIONSHIP AMONGST INFORMATION AND COMMUNICATION TECHNOLOGY OF SMALL AND MEDIUM ENTERPRISES IN KENYA

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Effect of Supply Chain Collaboration on the Strength of Business-to-Business Relationship amongst Information and Communication Technology of Small and Medium Enterprises in Kenya

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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This thesis has been submitted for examination with our approval as University supervisors.

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DEDICATION

This work is dedicated to my family and friends who constantly reminded me of the value of education and the need to complete my studies on time.

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ABBREVIATIONS AND ACRONYMS

PAT	Principal-Agency Theory
B2B	Business-to-Business
B2C	Business-to-Customer
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
GDP	Gross Domestic Product
ICT	Information and Communication Technology
IOS	Inter-Organizational Systems
SME	Small and Medium Enterprises
SPSS	Statistical Package for Social Sciences
PPRA	Public Procurement Regulatory Authority
UNCTAD	United Nations Conference on Trade and Development

DEFINITION OF TERMS

Business-to-Business Business-to-Business is an electronic commerce between businesses such as between a supplier and a manufacturer or buyer and supplier (Hadjikhani & LaPlaca, 2013).

Cost Collaboration Involves joint control of activities to eliminate waste, improve cost drivers and plan operations (Vanovermeire & Sörensen, 2014).

Information and Communication Technology (ICT) Information and communications technology (ICT) refers to all the technology used to handle telecommunications, broadcast media, intelligent building management systems, audiovisual processing and transmission systems, and network based control and monitoring functions. (Alrubaiee, Alshaibi & Al-bayati , 2012).

Innovation Collaboration Refers to the intra and inter-organizational competence within a supply chain to cooperate, to identify, develop, and implement original, solution-oriented actions that address new or previously unsolved problems (Chesbrough, 2003).

Internet This is a global system of interconnected computer networks that use the standard internet protocol suite to serve billion of users' worldwide (Kim & Lee, 2010).

Planning Collaboration Covers joint business planning, sales forecasting and all operations required to replenish raw materials and finished goods (Palmatier & Crum, 2010).

Relationship This is the extent to which the partners are bound in a B2B relationship, and reflects the ability of the relationship to resist both internal and external challenges (Shi, Chan, Shi & Wang, 2006). In this study B2B relationship was treated as an e-commerce model.

Risk Management Collaboration Is the joint identification, assessment and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor and control the probability of occurrence and the impact (Zsidisin & Wagner, 2010).

Small and Medium Enterprises (SMEs) In Kenya, classification of small and medium enterprises is primarily by the number of employees engaged by the firm. Those firms that engage less than ten (10) employees are referred to as micro-enterprises, while those that employ ten (10) to fifty (50) workers are classified as Small-scale Enterprises and Medium-scale Enterprises are those that employ less than two hundred and fifty (250) employees (Mullei & Bokea, 1999). This study adopted this definition.

Strength The amount of influence that one variable has on another variable and how closely the variables are related (Ramanathan, 2014).

Supply Chain Collaboration The degree to which an organization strategically collaborates with its supply chain partners and manages intra and inter-organization processes to achieve effective and efficient flows of products, services, information, money and decisions, with the objective of providing maximum value to its customers (Zhao, Huo, Selen & Yeung, 2011). This study adopted this definition.

Supply Chain Supply chain is the network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product, from the delivery of source materials from the supplier to the manufacturer, through to its eventual delivery to the end user (Simatupang & Sridharan, 2008).

ABSTRACT

The purpose of this study was to investigate the effect of supply chain collaboration on strength of business-to-business relationship among information and communication technology small and medium enterprises in Kenya. Research has shown that in an environment of cutthroat mass customization and shortened product lifecycles, organizations may benefit from adopting supply chain collaboration and business-to-business e-commerce models in their pursuit of sustainable competitive advantage. Information and communication technological advances have contributed to creation of new innovative products, which in turn leads to the formation of collaborative advantage. Most firms seek to remain competitive in today's marketplace, often by looking externally for assistance in meeting customer expectations through supply chain collaboration. However, small and medium enterprises still face severe challenges in adopting supply chain collaboration resulting in poor business-to-business relationship. Despite numerous publications and techniques on how firms can coordinate supply chain collaboration, many small and medium enterprises are still lagging behind in tapping the benefits of supply chain collaboration and business-to-business relationship. This is likely to lead to death of small and medium enterprises, in turn lowering of the country's gross domestic product. This decline in gross domestic product stirs worry of economic recession. This study tested the null hypotheses that innovation, planning, cost and risk management collaborations have no significant effect on strength of business-to-business relationship. Positivism paradigm approach and descriptive research survey design was adopted in this study. The target population for this study was 134 small and medium enterprise of information and communication technology firms in Kenya, and the respondents were drawn from owners, information technology and other managers of the small and medium enterprises. A sample of 100 small and medium enterprises was selected using Yamane (1967) formula. The study was guided by principal-agency theory. A self-administered structured questionnaire was used to collect primary data. Qualitative data was obtained from published sources such as library, internet and research done by other scholars. The questionnaire was tested for reliability and validity prior to being used. Quantitative technique was used to analyze the collected data with the aid of Statistical Package for Social Sciences software version 21.0 and Ms-Excel. Analyses were conducted using confirmatory measurement model. Also, multiple regression analysis was carried out by comparing ordinary least squares regression model. The study found that innovation, planning, cost and risk management collaborations were individually significant predictors of business-to-business relationship with risk management collaboration being the most significant predictor of the four. Generally, the study demonstrated positive relationship between supply chain collaboration and business-to-business relationship. This study recommends that management of small and medium enterprises as well as other organizations should consider developing risk management collaboration policy as it had the greatest impact. Finally, effective adoption of supply chain collaboration is capable of creating checks and balances to reduce opportunistic behavior between agent and principal as happens in the principal-agent theory. Future studies should be done using longitudinal study so as to provide a deeper perspective of the effect of supply chain collaboration on business-to-business relationship in Kenya.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Supply chain collaboration main objective is to focus on improving the efficiency of inter-organizational supply relationships, entirely from source to consumer with particular emphasis on the interfaces of the different operations in the supply chain (Montoya-Torres & Ortiz-Vargas, 2014; Chen, Daugherty & Roth, 2009). Information and communication technology (ICT) infrastructure has long been hyped as the driver of supply chain collaboration mechanisms within supply chains world over (Prajogo & Olhager, 2012).

The literature provides different definitions of the concept of supply chain collaboration. Zhao, Huo, Selen and Yeung, (2011) defined supply chain collaboration as the degree to which an organization strategically collaborates with its supply chain partners and manages intra and inter-organization processes to achieve effective and efficient flows of services, products, information, money and conclusions, with the objective of providing maximum value to its customers. Flynn, Huo and Zhao (2010) defined collaboration as the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manage intra and inter-organization processes. While Chen,Daugherty and Roth (2009) contend that supply chain collaboration is the management of various sets of activities that aims at seamlessly linking relevant business processes within and across firms so as to eliminate duplicate processes for the purpose of building a better-functioning supply chain.

The goal is to achieve effective and efficient flow of products, services, information, money and decisions, to provide maximum value to customer at low cost and high speed (Nair, Jayaram & Das, 2015; Kumara & Rahman, 2015). It is assumed that collaborating partners in the supply chain are all focusing on the same goals of relaying goods and services to customers at the lowest cost possible (Hudnurkar, Jakhar & Rathod, 2014). This unity in purpose enables the supply chain partners to streamline their processes to eliminate duplication, improve communications and adjust their operations to achieve efficiency (Cai, Jun & Yang, 2010).

Supply chain collaboration is a form of managing inter-firm relationships aiming at creating relational rents and sustainable competitive advantage, jointly generated in an exchange relationship that cannot be generated by either firm in isolation but through the joint individual contributions of the specific partners (Scholten & Schilder, 2015; Dyer, 2000).

The essential supply chain collaboration dimensions for SMEs consist of joint decision making, information sharing, incentive sharing, goal congruence and joint knowledge creation (Simatupang & Sridharan, 2005; Cao & Zhang, 2013). Supply chain collaboration takes place when partners share information freely; jointly solve common problems in demand planning, cost, risk management and sharing of profits (Hui, He-Cheng & Min-Fei, 2015; Fantazy, 2010). The success of supply chain collaboration depends on trust and commitment, effective communications by specifying responsibilities and conflict resolution techniques (Sridharan & Simatupang, 2013; Fawcett & Magnan, 2008).

The practice of supply chain collaboration in supply chain management has established itself as a successful and sustainable business operation (Prajogo & Olhager, 2012). Business-to-business relationships have virtually eliminated geographical and cultural barriers in international supply chain and reduced the time to market for goods and services (Yaakub & Mustafa, 2015; Ghobakhloo, Arias-Aranda & Benitez-Amado, 2011). This has resulted in high revenues due to the elimination of middlemen and high sales (Hadjikhani & LaPlaca, 2013; Eng, 2004). In the last few years, Kenya has experienced a gradual development of Internet usage and subsequent growth of ICT SMEs. Emerging economies in Asia and Africa have not been left behind in this Internet revolution, with most SMEs beginning to see the benefits of B2B e-commerce in economic development.

However, these countries including Kenya are still lacking the prerequisite information technology infrastructure, legal and political framework for the development of B2B e-markets compared to the developed economies in the west (Wieteska, 2016; UNCTAD, 2004; Ghobakhloo, Arias-Aranda & Benitez-Amado, 2011). According to Bagchi and Chun (2005) the wide spread use of web based technologies and increased competition in global economy has given rise to supply chain collaborations across many sectors.

Information Technology has contributed to the development of supply chain collaboration in Kenya and rest of the world. The concept of collaboration has made a significant growth in Kenya from being theoretical to a competitive advantage enhancer in supply chain. Consequently, supply chain collaboration has become popular among business community from SMEs to big companies in Kenya.

The ultimate goal in supply chain collaboration is to create value for customers as well as the firms in the supply chain network (Ding, Guo & Liu, 2011; Scholten & Schilder, 2015). Many scholars have suggested that there is need for supply chain members to have closer relationships in order to leverage their capabilities (Zhao, Huo, Selen & Yeung, 2011; Cai, Jun & Yang, 2010; Kumar, Dakshinamoorthy & Krishnan, 2007). Closer relationships will promote pooling of resources by supply chain partners which will lead to better supply chain visibility and sustainable competitive advantage (Sundram, Ibrahim & Govindaraju, 2011; Ramanathan & Gunasekaran, 2012). Successful supply chain collaboration requires a change from managing individual functions to integrating activities into key supply chain processes (Ghobakhloo, Arias-Aranda & Benitez-Amado, 2011; Chopra & Mendl, 2010).

Shared information between supply chain partners is only possible if supply chain partners can integrate their business processes and show commitment and trust towards other partners (Ramanathan & Gunasekaran, 2014; Kumara & Rahman, 2015). Supply chain collaboration involves collaborative work between suppliers and buyers in common systems, joint product development, shared information and risks (Hudnurkar, Jakhar & Rathod, 2014; Wieteska, 2015). Integrated supply chain requires continuous information flow in real time for efficiency (Ouyang, 2007). Supply chain collaboration can sometimes be an extremely difficult task, because it requires right training and preparedness, ready and competent business partners and a change in one or more organizational cultures (Kumara & Rahman, 2015).

On the other hand, the benefits of collaboration through information sharing cannot be ignored i.e. reduced time to market, better utilization of resources, reduced supply chain costs, higher quality levels and greater flexibility to respond to market changes (Nair, Jayaram & Das, 2015; Chopra & Mendl, 2010). Consistent with Simatupang and Sridharan (2008) and Saeed, Malhotra and Grover (2011) findings, collaborative

relationships between organizations can take place in a variety of forms such as single organizations in partnership, business contracts or networked relationship involving multiple parties. The key to effective supply chain collaboration is the ability to create long term, tactical relationships with supply chain partners (Lau, Tang & Yam, 2010; Abdallah, Anh & Matsui, 2016). In terms of improving the performance of the supply chain as a whole, collaboration is clearly better than competition (Ramanathan, 2014).

Supply chain collaborative relationships can deliver a wide range of benefits which enhance competitiveness and performance of supply chain partners (Hudnurkar, Jakhar & Rathod, 2014; Hoffmann, Schiele, Song & Krabbendam, 2011). Some of these benefits are; innovative products, cost management, improved efficiency and risk management as well as delivering incremental business value to customers (Macdonald & Thomas, 2013; Giannakis & Papadopoulos, 2016). Effective supply chain collaboration can create an environment that promotes trust between organizations based on a shared understanding and communication that promotes B2B relationship (Lavastre, Gunasekaran & Spalanzani, 2014; Stundza, 2009). However, there are costs associated with supply chain collaboration that need to be considered, that is, Internet connectivity, technology cost, risks, process change and overhead costs (Soosay & Hyland, 2015; Oliva & Watson, 2011).

Even though supply chain collaboration and the benefits are associated with large public and private enterprises, it may also extend to small and medium enterprises. SMEs can also benefit from collaboration by sharing resources, skills and working together to respond to changes in the market (Ramanathan, 2014; Zhao, Huo, Selen & Yeung, 2011). SMEs have become important in the global economy due to their contribution in economic development.

Nearly 80% of the total establishments across the world are SMEs. These SMEs contribute to economic growth by playing a significant role in employment creation (UNCTAD, 2004; Bokea & Mullei, 1999). There is very little empirical data to gauge the effect of supply chain collaboration on strength of B2B relationship. At the same time, much of the operations management literature on electronic business focuses on supply-side and Internet-enabled commerce especially in logistics (Al-bayati, 2011; Welker,Van der Vaart & Van Donk , 2008), whereas this study sought

to examine the effects of both upstream and downstream supply chain relationships with business customers (Lau, Tang & Yam, 2010).

1.1.1 Supply Chain Collaboration

Supply chain collaboration is defined as the formation of close, long-term relationships where supply chain partners work together and share information, resources and risk to achieve shared goals (Cao & Zhang, 2013). Supply chain collaboration has also been defined as the degree to which an organization strategically collaborates with its supply chain partners and manages intra and inter-firm processes to achieve effective and efficient flows of products, services, information and decisions (Hui, He-Cheng & Min-Fei, 2015).

Fawcett, Magnan and McCarter (2008) define supply chain collaboration as the ability to work across organizational boundaries to build and manage unique value-added processes. Collaboration is seen as a source of differential firm performance (Swink & Schoenherr, 2015). The sole purpose of supply chain collaboration is to focus on improving the efficiency of inter-organizational supply relationships as a whole from source to consumer with particular emphasis on the interfaces of the different operations in the supply chain (Ralston, 2014; Scholten & Schilder, 2015; Marchildon & Hadaya, 2011).

The reasoning behind supply chain collaboration is that partners are all sharing the same goal of delivering goods and services to customers within the shortest time and best price possible (Hui, He-Cheng & Min-Fei, 2015). Supply chain collaboration encourages all partners in the supply chain to take part in joint planning, information sharing, joint forecasting, and joint replenishment of orders and pooling of resources (Ramanathan & Gunasekaran, 2014). Besides, the application of supply chain collaboration is able to reduce the operating costs, enhance decisions implementation and reinforce the provision of time and place utility to the client (Kim & Lee 2010; Adams, Richey, Autry, Morgan & Gabler, 2014).

Conventionally, the movement of information and materials within supply chain are straight or linear and inadequate in terms of visibility and relationship (Cao & Zhang, 2013). However, every supply chain partner has limited information concerning the other partners.

Hence, the key focus of supply chain collaboration is to control resources and collaborative behavior across partnering firms in supply chain successfully (Hudnurkar, Jakhar & Rathod, 2014; Ramanathan, 2012).

Currently, more and more firms have started to coordinate their distribution and production activities and collaborate with supply chain partners instead of managing their own internal resources individually (Hui, He-Cheng & Min-Fei, 2015). Drivers of successful supply chain collaboration include trust and commitment, effective communications by specifying responsibilities and conflict resolution techniques (Prajogo & Olhager, 2012; Hui, He-Cheng & Min-Fei, 2015). Ahmed and Ullah (2012) found drivers of successful supply chain collaboration to be shared targets, open communication and a commitment to sharing information, joint problem solving and rapid response to failures to meet expectation were the main drivers for successful collaboration in supply chain.

Successful supply chain collaboration requires a significant amount of trust to exist between partners to enhance collaboration in such a transparent and accountable way (Sridharan & Simatupang, 2013). The equal sharing of benefits within supply chain leads to a win-win arrangement that ensures longevity of the collaboration (Lado, Paulraj & Chen, 2011; Lambert, 2006). Consequently, the eventual goal of supply chain collaboration is to supply customers with the products and services they desire at the right price, right time and right quality (Huang, Lin, Ieromonachou, Zhou & Luo, 2015). Supply chain collaborative relationships can be created using relatively simple but effective practices (Chicksand, Glyn, Helen, Zoe & Robert, 2012; Adams, Richey Jr., Autry, Morgan, & Gabler, 2014). Consider the case of East Africa Breweries, which has developed long-term collaborative relationships both with its local barley suppliers and with major bars in Nairobi City.

This collaborative relationship involve basic information-sharing and coordination practices, which have led to more efficient distribution and more satisfied customers downstream. As firms recognize the value inherent in supply chain collaboration, the desire to collaborate and integrate processes with supply chain partners increases (Ahmed & Ullah, 2012). Since complementary competencies of medium asset specificity are still significant for the organization's position in the market, bounded

rationality and fear of opportunism drives buyers and suppliers to work closely (Simatupang & Sridharan, 2005; Narasimhan, Swink & Viswanathan, 2010).

It is widely accepted that pooling of resources in supply chain results in better outcomes than those achieved out of collaboration (Chen, Sohal & Prajogo, 2013). Network theory proposes that the value of the resources can be expanded by its combination with other resources, then building an effective inter-organizational relationship within the supply chain (Cao & Zhang, 2013; Mentzer & Gundlach, 2010). Network theory is used as the basis of the reciprocal effect in inter-organizational relationships explaining why firms ought to collaborate (Chen, 2010). Hence, the interactions between different organizations and other players in the layers of the supply chain become very critical in the success of supply chain collaboration (Prajogo & Olhager, 2012; Scholten & Schilder, 2015). The ever increasing competition in the global market has pushed organizations into focusing on strategic partnerships (Hudnurkar, Jakhar & Rathod, 2014).

Success of one partner will depend on the success of its upstream suppliers and downstream customers, since the determination of the inter-organizational collaboration is heavily dependent on personal chemistry amongst the supply chain partners (Beske & Seuring, 2014; Gold, Seuring & Beske, 2010). Personal chemistry includes factors such as trust and frequent communication.

1.1.2 Types of Supply Chain Relationships

Relationship is the exchange of information for the benefit of the supply chain partners (Sridharan & Simatupang, 2013). Talavera (2013) described relationship as created to increase the financial and operational competence of each supply chain partners through reductions in costs, inventories and increased sharing of information throughout the supply chain. Close relationship in supply chain management has been referred to in various empirical studies as inter-organizational, cooperation, co-ordination, collaboration and integration (Harrison & Van Hoek, 2005; Mamad & Chahdi, 2013).

There are various types of supply chain relationships; competitive supply chain relationship describes those rivalries between supply chain organizations and units within the same supply chain for resources and capabilities (Saeed, Malhotra &

Grover, 2011; Mlaker Kač, Gorenak & Potočan, 2015). It could also describe firms competing indirectly with those who develop product substitutes that may not be similar to one another physically, but in their use (Laseter & Gillis, 2012). Cooperative relationships are the opposite of competition as relational states, since they describe different levels of interdependence amongst supply chain partners (Harrison & Van Hoek, 2005).

Such levels of interdependence could be referred to as formal and informal states of coordination; partnerships, collaboration and cooperation within supply chain (Schilke & Cook, 2015; Zeng, Xie & Tam, 2010) as they converge interests and strive to derive mutual benefits. Coordinated supply chain relationships are the simplest form of cooperation between supply chain partners. It is often presented as a transactional, arms-length relationship, typically contractual and formal by nature and usually exemplified in fourth party logistics relationships (Hudnurkar, Jakhar & Rathod, 2014).

Rosenzweig (2009) posit that supply chain partnerships are those that share formal, specific, strategic or operational objectives within the supply chain. Partnerships can occur between either competitive or non-competitive relationships, at either vertical or horizontal levels within the supply chain (Munksgaard, Stentoft & Paulraj, 2014). Partnerships are those supply chain relationships that are specific to either two-way formal supply chain relationships (Haeussler, Patzelt & Zahra, 2012; Christopher, 2011) or triadic three way formal relationships and share a high degree of integration through mutual and specific agreements.

1.1.3 Business-to-Business Relationship

Business-to-business (B2B) is an electronic commerce type between businesses such as a supplier and a manufacturer or buyer and supplier (Hadjikhani & LaPlaca, 2013). It is the exchange of goods, information and services between businesses as opposed to that of businesses and consumers (Lomas, 2016). B2B supply chain relationship involves a group of business partners and suppliers using the internet to exchange business information and jointly forecast demand for their products (Ghobakhloo, Arias-Aranda & Benitez-Amado, 2011; Ali, Boylan & Syntetos, 2012). It also involves developing production schedules and controlling inventory

flow (Brennan, Canning & McDowell, 2010; Bigné, Aldás & Andreu, 2008). Business-to-business e-commerce has always been associated with United States of America, Norway, Denmark, Sweden, Japan, Britain and China (UNCTAD, 2004; Asare, Brashear-Alejandro & Kang, 2016; Sreejith & Vinaya, 2017).

However, despite the low value of its transactions in sub Saharan Africa, B2B e-commerce has received significant attention in Kenya due to the availability of high speed fibre optic connectivity, consumer trust and cost friendly benefits that come with B2B e-commerce platforms. E-commerce promises to increase efficiency and effectiveness of supply chain activities by replacing traditional manual processes with automated electronic processes and expanding the number of available trading partners (Waller & Fawcett, 2012; Chong, Shafaghi, Woollaston & Lui, 2010). Business-to-business enables market participants to market, build and extend their business relationships for the purposes of improving individual business proposition and overall supply chain performance (Lomas, 2016; Christopher, 2011).

Effective use of B2B e-commerce has the potential of improving the management of materials for both the buyer and the supplier by reducing inventory, delivering-lot sizes, purchase orders and invoicing (Benavides & de Eskinazis, 2012). Business-to-business e-commerce requires appropriate internet connectivity. Appropriate internet technology enables companies to create new markets that facilitate electronic interactions among multiple buyers and sellers through B2B platform (Asare, Brashear-Alejandro & Kang, 2016; Vachon, Halley & Beaulieu, 2008).

Statistics from UNCTAD (2004) show that, global Business-to-Business transactions accounts for over 80% of all e-commerce in the world. This is in line with the research carried out by International Data Corporation (2002) where the findings estimated that international B2B e-commerce especially among wholesalers and distributors will amount to US$12.4 trillion at the end of 2012. This growth in B2B e-commerce is set to continue and is expected to account for over 5% of all supply chain inter-organization transactions in the year 2017 (UNCTAD, 2004). There are many virtual shopping stores in Kenya offering goods and services for sale on the B2B e-commerce marketplace.

These online shopping platforms not only offer goods and services but also delivery to the customers preferred location. All the transactions are carried out over the Internet through personal computers and phones with payments completed via visa card, PayPal, M-pesa or any other globally accepted online payment method (McIvor & Humphreys, 2004; Hudnurkar, Jakhar & Rathod, 2014). However, very little quantitative research has been done investigating effect of supply chain collaboration on strength of business-to-business relationship in Kenya and other developing nations. Chan, Chong and Zhou (2012) found out in their study using the power of Internet technologies that the extended supply chain configurations evolving in today's digital economy can reshape the historical chains into new networks or business-webs. While a study by Frohlich (2002) on the effect of web-based integration on operational performance measured web-based integration as e-integration with suppliers and customers.

Frohlich, further states that supply chain collaboration can enhance capability of the partners to deal with uncertainty within the business environment. Several empirical studies have examined the role of B2B e-commerce and Internet in supply chain collaboration (Wieteska, 2016; Oliveira, McCormack, Ladeira, Trkm & Bergh, 2011; Wang & Archer, 2007; Bigné, Aldás & Andreu, 2008). However, this study went further to establish effect of supply chain collaboration on strength of B2B relationship among ICT SMEs in Kenya with emphasis on Nairobi City County.

1.1.4 ICT Small and Medium Enterprises in Kenya

Small and medium enterprises (SMEs) have been defined differently by various scholars mostly based on the size of the firm. While others have attempted to use the capital assets, some have used skill of labour and turnover levels (Lavastre, Gunasekaran & Spalanzani, 2012). Still others define SMEs in terms of their legal status and method of production. According to European Commission (2013), SMEs are defined as enterprises having fewer than 10 employees and a turnover not exceeding €2 million are categorized as "micro", those with fewer than 50 employees and a turnover not exceeding €10 million as "small", and those with fewer than 250 and a turnover not exceeding €50 million as "medium".

In Kenya, SMEs are classified as micro-enterprise having no more than 10 employees; a small enterprise with 11-50 employees; and a medium/large enterprise with more than 50 employees, as indicated by (Mullei & Bokea, 1999). This definition was adopted by this study. The SME ICT sector in Kenya can be traced back to the late 1990s although it has only developed over the past seven years. One of the catalysts was the launching of four submarine fiber optic cables in Mombasa between 2009 and 2012 (Rubadiri, 2012), that brought high-speed internet to the country. ICT has been a core development pillar in the government's growth plan and in 2013; Kenya released the National Broadband Strategy to help transform Kenya into a knowledge-based society driven by a high capacity, nationwide broadband network (ICT Authority of Kenya, 2016).

While Africa's internet contribution to GDP is low at 1.1%, Kenya scores well above its GDP weight and lead the continent at 2.9%, ahead of Canada, China, Brazil and Russia, and just behind Africa's top ranked nation Senegal at 3.3% (ICT Authority of Kenya, 2016). Small and medium enterprises (SME) play an important role in Kenya's economy. SMEs provide a potential avenue for employment creation, particularly among youthful population of Kenya and other countries. This sector accounts for over 80 per cent of the country's employment and has a combined approximate annual turnover of nearly Ksh100 billion (BD, 2012; Mureithi, 2013).

Yaakub & Mustafa (2015) defined SME as a company that is less structured, having small management group and inadequately organized, as well as informal of risk management. While Ong'olo and Odhiambo (2013) posit that SMEs form a critical sub-sector that employs about 85% of the Kenyan workforce. Ong'olo and Odhiambo further states that, in Kenya most SMEs engage in informal business structures with no formal strategic planning and recognized management framework. These firms are commonly referred to as *jua kali* and touted as the engine of national economic growth in Kenya (Mullei & Bokea, 1999; Ong'olo & Odhiambo, 2013). However, nowadays some SMEs have formal management structures.

The Government of Kenya is currently promoting SME sector through reservation of 30% of government's procurement budget to marginalized groups which has seen many SMEs firms formed by youths, women and persons with disability. The Government has also recognized SME sector as the force that will help the country

achieve middle class economy (BD, 2012). This sector has also been touted as a potential driver of Vision 2030 goals of providing quality life to citizens through equitable distribution of wealth, improved health care and making the country industrialized (BD, 2012).

SMEs play a crucial role in inspiring economic growth; generating income through employment and in the process alleviates abject poverty (Huang, Lin, Ieromonachou, Zhou & Luo, 2015; Ong'olo & Odhiambo, 2013). SME sector in Kenya is a mixture of dynamic enterprises involved in an array of activities that are concentrated in urban areas but are also evident in rural Kenya (BD, 2012; Ong'olo & Odhiambo, 2013). The 1999 baseline survey indicated that there were 1.3 million SMEs employing 2.5 million Kenyans and generating as much as 20% of the country's gross domestic product (Central Bureau of Statistics, 1999; Mureithi, 2013).

Small and medium enterprises economic contribution is more than double that of the large manufacturing sector which stands at 8% of GDP (Mureithi, 2013; Mullei & Bokea, 1999). Jafar , Roland and Paul (2015) in their study on how SMEs can benefit from supply chain partnerships, adopted the European Commission's definition of SMEs: 'enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million Euros, and/or an annual balance sheet total not exceeding 43 million Euros. The emphasis was placed on the medium sized companies for their role in applying information technology tools and development in terms of service delivery and employment. A large number of SMEs have seen an increase in expenditure on information technology due to the advent of outsourcing of noncore functions by multinationals. This has increased SMEs capacity in innovation and supply chain collaboration (Hakonsson, Obel & Lauridsen, 2012). In general, supply chain collaboration amongst SMEs contribute to technology transfer and innovation through coordination of activities throughout the supply chain, to facilitate the design, development and delivery of solutions (Liu, Ke & Hua, 2013; Bos-Brouwers, 2010).

Information and Communication Technology SMEs are known for their enthusiasm in use of ICT tools and play a key role in B2B e-commerce development in Kenya and other countries. There were 300 ICT SME's registered by Communication Authority of Kenya website which identified with e-commerce as at September,

2014. However, only 134 firms were actively using B2B e-commerce platform. ICT industry remains competitive and present opportunities for SMEs to be involved in supply chain collaboration (Ghobakhloo, Arias-Aranda & Benitez-Amado, 2011).

1.1.5 Business-to-Business and Small and Medium Enterprises (SMEs) in Kenya

In both developing and developed countries, SMEs make up a majority of start-ups and informal businesses, and employ more workers in service and manufacturing industries (Bayraktar, Demirbag, Koh, Tatoglu & Zaim, 2009). Ghobakhloo, Arias-Aranda and Benitez-Amado (2011) indicated that SMEs while generally lagging in adoption of information and communication technology have the most to gain from increase in productivity thanks to electronic commerce.

Universal trends in developments and competitive forces are increasingly driving SMEs to engage in B2B e-commerce (Wieteska, 2016; Hadjikhani & LaPlaca, 2013). The adoption of B2B e-commerce platforms by SMEs in Kenya is a market-driven process that has lead to higher performance in terms of collaboration and supply chain visibility. The stiff global competition has and continues to draw SMEs into B2B relationship especially for those in service and manufacturing businesses (UNCTAD, 2004; Asare, Brashear-Alejandro & Kang, 2016).

The increase in SMEs adopting B2B e-commerce and relationship could be attributed to the upsurge in the number of buyers, in developed world purchasing goods or services from developing world and demand that their SME suppliers in developing world be connected to the global online supply chain (UNCTAD, 2004; Sreejith & Vinaya, 2017). Although research has indicated that it is mostly large multinational companies that have benefitted the most from B2B e-commerce, it is also evident that SMEs have the greatest potential for productivity gains through e-commerce due to their flexibility in open innovation (Wieteska, 2016; Chesbrough, 2003; Hakonsson, Dorthe, Richard, Børge & Lauridsen, 2012).

Small and medium enterprises in Kenya stand a great chance to benefit from B2B e-commerce due to the availability of youthful population. However, the potential of B2B e-commerce can only be realized if there is adequate infrastructure (Mureithi, 2013). Kenya like any other developing country lacks the appropriate and reliable infrastructure plus legal framework to regulate e-commerce (Mullei & Bokea, 1999).

High prices for bandwidth connectivity and down time are some of the challenges e-commerce faces in Kenya.

1.1.6 Effect of Supply Chain Collaboration

Supply chain collaboration is often defined as the degree to which an organization strategically collaborates with its supply chain partners in managing inter-organization processes to achieve efficient flow of products, with the objective of providing maximum value to customers (Trkman, Budler, Groznik, 2015; Oliva & Watson, 2011). The possibility of sustainable competitive advantage to supply chain partners can stimulate and support collaboration (Hudnurkar, Jakhar & Rathod, 2014). Sustainable competitive advantage is the extent to which an organization is able to create a protectable position over its competitors (Abdallah, Obeidat & Aqqad, 2014; Vanathi & Swamynathan, 2014).

Frameworks for competitive competence are defined as follows; value-to-customer quality, competitive pricing, premium pricing, dependable delivery and innovative production (Porter, 1985). The effect of supply chain collaboration this study sought to investigate were: cost, innovation, planning and risk management collaborations (Sridharan & Simatupang, 2005; Rosenzweig, 2009; Bengtsson & Wang, 2014; Chen, Sohal & Prajogo, 2013; Chopra & Meindl, 2010; Didonet & Diaz, 2012; Oliveira, McCormack, Ladeira, Trkm & Bergh, 2011).

1.1.7 Supply Chain Collaboration Practices

Collaboration effort is the main element of supply chain collaboration that assists the flow of information, communication and cooperative attempts between departments (Simatupang & Sridharan, 2013; Flynn, Barbara, Baofeng & Xiande, 2010). Consequently, highly collaborative supply chain involves the collaboration efforts from suppliers, customers, functional departments as well as inbound and outbound logistics to connect and coordinate the flow of raw material to end users. The critical supply chain collaboration scope for small and medium enterprises include joint innovation, risk management, information sharing, joint decision making, incentive sharing, goal congruence and joint cost management (Scholten & Schilder, 2015; Simatupang & Sridharan, 2008; Cao & Zhang, 2013; Al-Zu'bi, 2016).

1.2 Statement of the Problem

Small and medium-sized enterprises (SMEs) in Kenya account for 85% of the country's labor market and 20% of the country's gross domestic product (Ong'olo & Odhiambo, 2013; BD, 2012). Ong'olo and Odhiambo further state that there are 2.3 million SMEs employing 6.4 million Kenyans. However, small and medium enterprises still face severe challenges in adopting supply chain collaboration resulting in poor B2B relationship. SMEs in general, have the potential to contribute more positively to the Kenyan economy than is currently the case (BD, 2012; Mureithi, 2013; Mullei & Bokea, 1999).

Of greater importance is the role SMEs play in driving Vision 2030 agenda of moving the country from low income to middle income economy (BD, 2012). Nevertheless, to survive in a dynamic turbulent business environment, SMEs have to formulate and implement sustainable supply chain collaboration and B2B strategies (Wieteska, 2016; Sreejith & Vinaya, 2017).

However, despite numerous publications and techniques on how firms can coordinate supply chain collaboration, many SMEs are still lagging behind in tapping the benefits of supply chain collaboration and strength of B2B relationship (Ong'olo & Odhiambo, 2013). This is likely to lead to death of SMEs, in turn lowering of the country's gross domestic product (GDP). Consequently, this decline in GDP stirs worry of economic recession in economists and investors. Several studies have been done in the area of supply chain in Kenya (Bolo & Wainaina, 2011; Barasa, Simiyu & Iravo, 2015; Kingoo, 2013; Ong'olo & Odhiambo, 2013; Ombati, Kirochi & Nyagari, 2015; Rodah & Karanja, 2016). However, there has not been any study on effect of supply chain collaboration on the strength of B2B relationship in Kenya. This shows that limited attention has been paid to supply chain collaboration and B2B relationship model in Kenya. This study therefore filled in on this knowledge gap.

1.3 Objectives of the Study

The general objective of this study was to determine the effect of supply chain collaboration on strength of Business-to-Business relationship amongst small and medium ICT firms in Kenya.

1.3.1 Specific Objectives

This thesis focused on the following objectives:

1. To determine the effect of innovation collaboration on strength of B2B relationship amongst ICT SMEs in Kenya.
2. To identify the effect of planning collaboration on strength of B2B relationship amongst ICT SMEs in Kenya.
3. To determine the effect of cost collaboration on strength of B2B relationship amongst ICT SMEs in Kenya.
4. To determine the effect of risk management collaboration on strength of B2B relationship amongst ICT SMEs in Kenya.
5. To identify the combined effect of innovation, planning, cost and risk management collaborations on strength of B2B relationship amongst ICT SMEs in Kenya.

1.4 Research Hypotheses

To determine how each of the independent variables manipulates the response variable, this study tested the following null hypotheses: -

H_{01}: There is no significant relationship between innovation collaboration and strength of B2B relationship amongst ICT SMEs in Kenya.

H_{02}: There is no significant relationship between planning collaboration and strength of B2B relationship amongst ICT SMEs in Kenya.

H_{03}: There is no significant relationship between cost collaboration and strength of B2B relationship amongst ICT SMEs in Kenya.

H_{04}: There is no significant relationship between risk management collaboration and strength of B2B relationship amongst ICT SMEs in Kenya.

H_{05}: Innovation, planning, cost and risk management collaborations have no significant effect on strength of B2B relationship amongst ICT SMEs in Kenya.

1.5 Justification of the Study

Small and medium enterprises (SMEs) are more and more being considered as part of mainstream economy and as key drivers of innovation within the economies (UNCTAD, 2004). Further, SMEs are also being touted as the main source of job

creation in most countries. This is so since SMEs make up about 80% of businesses globally (Bayraktar, Gunasekaran, Koh, Tatoglu, Demirbag & Zaim, 2010; UNCTAD, 2004). This study's focus was on ICT small and medium enterprises in Kenya, with emphasis on Nairobi City County. The reason why the researcher chose Nairobi is due to the fact that it is the commercial hub of Kenya and East and Central Africa at large. Further, most ICT firms are based in Nairobi city due to its location and availability of ICT infrastructure and other incentives.

SMEs are Kenya's fastest growing industry and this is partly attributed to the preference and reservation of 30% of public procurement budget to disadvantaged groups, rolled out in 2011 to promote equity in development. Further, the enactment of new Public Procurement and Asset Disposal Act 2015 has cemented the preference and reservation rule which has led to the formation of many SMEs. This in turn has contributed to the creation of jobs thus reducing unemployment in Kenya. If SMEs are nurtured well, they can help the country deal with the inequality between exports and imports, considering that Kenya's import bill annually exceeds income from exports (BD, 2012; Mureithi, 2013). Subsequently, SMEs will help Kenya achieve the economic and social pillars outlined in the Vision 2030 of making Kenya middle class economy with robust, diversified and competitive manufacturing sector (BD, 2012).

However, the key role that SMEs play in economic development has often been ignored purely because of the informality of the sector and also little is said about the number of indirect and direct jobs created by SMEs (Ong'olo & Odhiambo, 2013; BD, 2012). This may look dismal if looked at individually but which is significant if put together (Mureithi, 2013), since SMEs accounts for close to 80% of the country's employment creation. Research shows that SMEs suffer considerable losses due to absence or poor coordination of supply chain collaboration which in turn dents their performance (Mureithi, 2013). Besides, there are no studies done in Kenya addressing effect of supply chain collaboration on strength of B2B relationship amongst ICT SMEs. Therefore, this has created a gap in terms of knowledge, in relation to effect of supply chain collaboration on strength of B2B relationship.

1.6 Significance of the Study

The management of SMEs is poised to benefit from this study by appreciating the potential benefits of supply chain collaboration and strength of B2B relationship. B2B e-commerce has proven to reduce costs and increase bottom-line of SMEs adopting it (Ghobakhloo, Arias-Aranda & Benitez-Amado, 2011). The findings of this study will go a long way in assisting researchers with data considering that there is dearth of literature in this area of study in Kenya. Definitely, SMEs in ICT sector can benefit from the rich knowledge this study offers in terms of sustainable collaborative advantage and strength of B2B relationship.

Finally, the findings of this study could provide insights to Government agencies like Public Procurement Regulatory Authority and other policy makers since it shows that supply chain collaboration does affect B2B relationship. Based on the findings, the policy makers can come up with way forward on how to support SMEs to increase their profitability by implementing supply chain collaboration and B2B e-commerce usage.

1.7 Scope of the Study

The study's target population was 134 and the sample size was 100 chosen from information and communication technology SMEs in Nairobi City County. The rationale behind restricting the population to the aforementioned region is because most of ICT SMEs currently using B2B e-commerce are concentrated in Nairobi City County. Further, ICT infrastructure is more developed in Nairobi than any other part of Kenya making it ideal for e-commerce. Besides, Nairobi is the commercial hub of Kenya and East Africa. The study relied on respondents such as owners, information technology and other managers for information. The rationale behind the selection was based on the fact that these managers are the ones involved in running SMEs B2B e-commerce hence have the requisite knowledge.

Small and medium enterprises contribute significantly to the growth of Kenyan economy and usually employ a workforce of between 10 to 250 employees. They also contribute an estimated combined annual turnover of nearly Ksh100 billion and accounts for close to 80% of the country's labor market (Ong'olo & Odhiambo,

2013; BD, 2012). Supply chain collaboration has been studied many times before by scholars (Cao & Zhang 2013; Flynn, Huo & Zhao, 2010; Mamad & Chahdi, 2013; Senge & Prokesch, 2010; Simatupang & Sridharan, 2008). However, they have not been tested in this kind of relationship in sub-Saharan context. Supply chain collaboration has various sub-variables that are non-technical factors hence are commonly studied while technical factors are rarely studied. For the latter, the study wished to interrogate them more to add knowledge on supply chain collaboration, while the former the study wished to test the sub-variables in this kind of relationship to bridge knowledge gap.

1.8 Limitations of the Study

This study explored the views of owners, information technology and other managers regarding supply chain collaboration in their firms. The study experienced certain limitations in that, some SMEs management were not willing to give information due to fear of the same being shared with competitors. This limitation was mitigated by the researcher assuring them that the information was for academic purposes only and would be treated with utmost confidentiality. The researcher also introduced himself and created a working relationship with the SME owners and managers which enhanced trust with the respondents.

Another limitation was that primary data is subject to errors and may not be objective as the respondents express their opinions as opposed to providing factual data. This in turn affects the reliability of the findings. Hence, this limitation was addressed by having objective questions in the questionnaire and avoiding leading questions. Likert scale was used to enable the respondents to clearly assess the statements provided in the questionnaire before responding.

As with most survey research, the respondents provided individual opinions at a single point in time. With efforts made to qualify responses, the study assumed the validity of the results; but recognized that future research from a longitudinal perspective would also be beneficial. This study also faced logistical limitations in that, the study covered a large area which posed a challenge in terms of transport and other related costs. It proved too costly to coordinate the issuing and collection of questionnaires from the field. However, the researcher had planned well in advance

by having in place a budget that ensured the success of the study by addressing all the logistical issues.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter highlights the major studies undertaken on the effect of supply chain collaboration on the strength of B2B relationship. It also incorporates theoretical and conceptual framework of the study and reviewed literature in line with the objectives of the study.

2.1.1 Supply Chain Collaboration

Collaboration has been referred to as the driving force behind effective supply chain management and may be the ultimate core capability in modern global economy (Trkman *et al.,* 2015; Kim & Lee, 2010). Supply chain collaboration is regarded as a key pillar of supply chain management (Ahmed & Ullah, 2012; Al-Abdallah, Abdallah & Hamdan, 2014). Previous studies have viewed supply chain collaboration as the main route to sustainable competitive advantage (Al-Zu'bi, Tarawneh, Abdallah & Fidawi, 2015). Zhao *et al.* (2008) contend that successful internal integration promotes collaboration with supply chain partners.

Wisner and Tan (2001) asserted that severe global competition has forced companies to consider supply chain collaboration that is equally beneficial as a strategic competitive tool. In a survey of Chinese manufacturing SMEs, Zeng *et al*. (2010) found that inter-firm cooperation has the most significant positive impact on the innovative performance of SMEs. Therefore, partnerships provide SMEs with access to comprehensive and external expertise that can help SMEs solve business problems and engage in learning networks (Zeng *et al*., 2010).

Supply chain collaboration can enhance value addition to SMEs by reducing order turnaround time, reducing costs, improving response time to customers, or leveraging resources and improving innovation (Hui, He-Cheng & Min-Fei, 2015). Kim and Lee (2010) posit that the main goal of management should be to elicit collaborative service to supply chain partners in general and customers in particular, so that it can manage relationships within the supply chain in a value creating way. The rise of supply chain management reinforces the incentive for developing supply chain

collaborations between suppliers, manufacturers, logistic service providers, distributors and customers so as to improve performance (Halldórsson, Hsuan & Kotzab, 2015; Fawcett, Stephen & Amydee, 2012).

Tactical supply chain relationships are seen as vital to high performance and budding innovation capacity to meet both supply and demand as globalization force changes in market and organizational operations (Senge & Prokesch, 2010; Min & Yu, 2008; Al-Zu'bi, 2016). Supply chain collaborations are strategically crafted by organizations to attain resultant competencies that guarantee sustainable competitive advantage through innovation capacity of the supply chain (Ambrose, Marshall & Lynch, 2010; Veerendrakumar & Shivashankar, 2015). Palmatier and Crum (2010) argue that supply chain collaboration has a positive impact on the bullwhip effect, supply chain flexibility and inventory costs. While Simatupang and Sridharan (2005) identified three major dimensions in supply chain collaboration as: incentive alignment, information sharing and decision synchronization.

Information sharing in supply chain is linked to the ability to access and propagate information within the supply chain. This information could be in form of order booking, demand forecasts, inventory levels or production schedules (Eksoz, Mansouri & Bourlakis, 2014; Hui *et al.,* 2015). Decision synchronization on the other hand is the ability to manage the system in totality at different stages and time horizons to achieve supply chain collaboration objectives (Donk, Akkerman & Vaart, 2008; Ramanathan, 2014).

This could include the tactical positioning of capabilities and the harmonization of relevant actions. While incentive alignment represent the extent to which partners share risks, costs and benefits facilitate the sustainable functioning of the network (Munksgaard, Stentoft & Paulraj, 2014; Simatupang & Sridharan, 2008). These dimensions are indeed levers of supply chain collaboration that enhance efficiency and performance. Supply chain collaborations are established to solve problems, develop new understandings, and design new products (Daugherty, 2011; Ford & Mouzas, 2010). Spekman, Kammuf and Myhr (1998) differentiated between co-operation, co-ordination and collaboration in supply chain management.

They suggested that co-operation is when firms exchange vital information and engage customers and suppliers in long-term relationships. Co-operation represents the lowest level of relationship between supply chain partners (Spekman *et al*., 1998). The term co-operation is used to describe supply chain associations with little or no interdependency (Chopra & Meindl, 2010; Spekman *et al*., 1998). On the other hand, co-ordination is characterized by transacting firms striving to guarantee a flawless flow of information and resources from one firm to another (Ford & Mouzas, 2010). This represents the next level of interface within supply chain relationship building. While collaboration is seen as a broader and higher level of interaction in supply chain relationship building (Zhao *et al.*, 2011; Hudnurkar *et al*., 2014). Collaboration is characterized by mutual understanding and trust among supply chain partners (Ramanathan, 2014; Spekman *et al.*, 1998). Figure 2.1 shows key transition from open-market negotiations to collaboration.

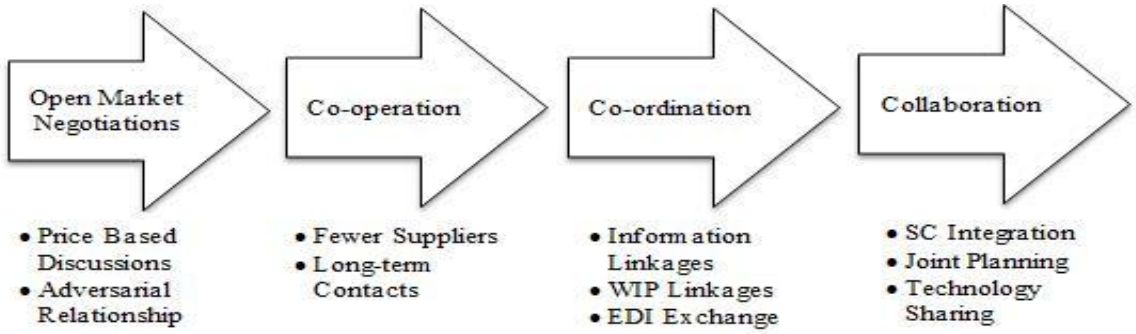

Figure 2.1: The key transition from open-market negotiations to collaboration

Source: Spekman *et al*. (1998)

Although the literature shows that there is need to reinforce supplier and buyers relationships, a study conducted by Pan and Pokharel (2007) in Singapore found that hospitals do not see alliances with suppliers as a strategic option; rather they focus on outsourcing of logistics services. However, Kim and Narasimhan (2002) contend that supply chain integration is strategic since it links organization with its suppliers, customers and other supply chain partners by combining their relationships, processes activities functions and locality. The ability of a firm to develop and manage relations with key suppliers and customers and to deal effectively with them is a core competence that leads to competitive advantage (Scholten & Schilder, 2015; Ramanathan & Gunasekaran, 2012).

Nevertheless, recent contributions by Cao and Zhang (2011) and Simatupang and Sridharan (2008), have highlighted a more encompassing analysis of supply chain collaboration, incorporating the soft features such as incentive alignment, goal congruence and decision synchronization in addition to the more conventional hard aspects of information sharing and resources. In small and medium enterprises, cost-effective supply chain collaboration policy is vital for growth and survival in a turbulent market. Past studies have shown that SMEs can actually gain from supply chain collaboration (Zeng *et al.,* 2010; Rezaei *et al.,* 2015).

Supply chain collaboration provides SMEs with access to technology or external expertise that can guide them to resolve day to day business problems and allow SMEs to make collective agreements in demand planning and lead times leading to collaborative advantage (Zeng *et al.,* 2010; Asare, Brashear-Alejandro & Kang, 2016).

2.1.2 Drivers of Supply Chain Collaboration

Supply chain collaboration can vary from very superficial transactionally focused to extremely integrated close relations or from collaborative communication to supplier development and from inward to outward facing (Hui, He-Cheng & Min-Fei, 2015; Frohlich & Westbrook, 2001). There are various drivers of collaboration; market characteristics, product characteristics and partner characteristics. Collaboration in supply chain under circumstances of uncertainty is normally perceived as beneficial. A study by de Kok *et al.* (2005) found that close supply chain collaboration is mostly effective in highly volatile markets. Information sharing is significant in environments with unknown demand such as promotions or early sales of new products (Ding *et al.,* 2011; Wieteska, 2016; Lee, 2000).

Greater supply uncertainty amplifies the need for vertical integration within supply chain. The more supply is uncertain, like in lead-time uncertainty, the more organizations partner (Wieteska, 2015; de Kok *et al.,* 2005). The added value of sharing information on uncertainties in supply lead-times is important. Further, if markets are growing, organizations are more likely to source internally and if the growth is strong with large market then supplier capabilities bear the danger as well (Scholten & Schilder, 2015). It is commonly accepted that product characteristics or

item criticality plays a vital role in the drawing of buyer-supplier relationships (Ding *et al.*, 2011; Kraljic, 1983). The more vital an item is, the more a relationship is expected to grow.

Item importance is operationalized by numerous characteristics such as; monopoly or oligopoly conditions, product value addition significance, logistics costs or complexity, speed of technological change and the percentage of raw materials in total costs and their impact on profitability, entry barriers and supply shortage (de Kok *et al.*, 2005; Kraljic, 1983). Further, item criticality or importance is characterized by the required level of customization, technical complexity, technology innovation and regularity of design changes (Kraljic, 1983). Firms are more likely to engage in mutual relationships for customized products (Griffith *et al.*, 2005; Kraljic, 1983). Previous studies have confirmed that partner characteristics promote collaboration (de Leeuw & Fransoo, 2009).

The more suppliers have accepted skills, capabilities, possess proprietary technology and are active in research and development; the more strategic relationships are needed (Kraljic, 1983; de Leeuw & Fransoo, 2009). The capabilities consist of; familiarity of an organization with technology, knowledge and competencies or technological and design capabilities (Griffith *et al.*, 2005).Petersen *et al.* (2005) established that supplier process and product knowledge were the most important considerations in close collaboration with suppliers on new product development.

Previous studies have shown mixed thoughts on how power plays out in long-term partnerships. Equal distribution of power involves a more collaborative partnership which can be used to promote integration (de Kok *et al.*, 2005). In every supply chain relationship, there is always a dominating partner that sees the benefits of supply chain collaboration and forces the rest to conform (Griffith *et al.*, 2005; Kraljic, 1983).

2.1.3 Business-to-Business Relationship

A supply chain information exchange structure based on B2B relationship distributes information to all SMEs at the nodes of the supply chain and tightens their association (Ghobakhloo, Arias-Aranda & Benitez-Amado, 2011).

This therefore improves the overall operational efficiency of the entire supply chain and boosts SMEs B2B relationship. A company may set up a B2B e-marketplace to improve operational efficiency of supply chain, promote e-commerce comprehensively and change the management approach of the supply chain (Wieteska, 2016; Lomas, 2016). The B2B relationship referred to in this study is an e-commerce model. Organizations in business-to-business markets are entrenched in a multifaceted network of relationships with customers, suppliers as well as other stakeholders (Lomas, 2016; Asare, Brashear-Alejandro & Kang, 2016).

Trade and industry actions are influenced by the social context in which they are entrenched. Networks of contacts amongst supply chain actors can be important sources of information for the participants. Tan (2001) posit that an established culture that highlights seeking good, short-term performance appears to be in variance with the objectives of supply chain collaboration. The single most important prerequisite is a change in the corporate cultures of all supply chain partners to make it conductive to supply chain collaboration (Wieteska, 2016).

In B2B contexts the value of the relationship is linked to criteria such as the indispensability of the goods, savings from the partnership, substitutability of the buyer or seller and the degree of common interest (Ghobakhloo *et al.*, 2011; Tan, 2001). Common interest refers to strategic objectives while savings a firm can attain in a long-term B2B relationship is transaction costs which decrease over time and consequently leads to lower administration costs. The more precise the products are, the lower the substitutability of the supply chain partner (Tan, 2001; Wieteska, 2016).

The B2B e-commerce increasingly rewards those who respond to the demand for innovation driven by the Internet technology, globalization, mass customization, short product life cycles and shifting demographics (Hadjikhani & LaPlaca, 2013; Sharma, Iyer, Mehrotra & Krishanan, 2010). One of the most important applications of Internet is executing business transactions. To buyers in supply chain management, B2B electronic marketplaces are perceived as new procurement channels enabled by the Internet with potential for competitive advantage (Chan *et al.*, 2012; Lomas, 2016; Chong *et al.*, 2010). Statistics from UNCTAD (2004) shows that, global B2B transactions accounts for over 80% of all e-commerce in the world.

The main challenge with Business-to-business relationship is establishing trust among partners to share sensitive business information to advance collaboration (Sridharan & Simatupang, 2013; Ghobakhloo *et al.,* 2011). Chan *et al.* (2012) found out in their study using the power of Internet technologies that the extended supply chain configurations evolving in today's digital economy reshape the historical chains into new networks or business-webs. A study by Frohlich (2002) on the effect of web-based integration on operational performance measured web-based integration as e-integration with suppliers and customers.

2.1.4 Supply Chain Collaboration in Small and Medium Enterprises in Kenya

Small and medium enterprises play a significant role in Kenya's economy. Mudambi, Schrunder and Mongar (2004) findings show that high levels of cooperative buyer-supplier relations have percolated down to few successful SMEs and managed to accelerate time-to-market capability. Kenyan SMEs have not been left behind. The concept of supply chain collaboration is based on two core ideas; the first is that practically every product that reaches a customer represents the cumulative effort of multiple organizations (Kumara & Rahman, 2015; Hui *et al.,* 2015; Faisal, Banwet & Shankar, 2007). The second idea is that while supply chains have existed for a long time, most organizations have only paid attention to what was happening within their firms.

Few firms understood much less, the entire chain of activities that ultimately delivered products to the customer (Sharma *et al.,* 2010; Hadaya & Cassivi, 2007). Supply chain collaboration, therefore, is the active management of supply chain activities to maximize customer value and achieve a sustainable collaborative advantage (Hudnurkar *et al.,* 2014; Kohli & Jensen, 2010). Chen *et al.* (2009) posit that supply chain collaboration is the management of various sets of activities that aims at seamlessly linking relevant business processes within and across firms so as to eliminate duplicate processes for the purpose of building a better-functioning supply chain. It represents a conscious effort by the supply chain partners to develop and run supply chains in the most effective and efficient way possible. Supply chain activities cover everything from product development, sourcing, production and

logistics, as well as the information systems needed to coordinate these activities (Senge & Prokesch, 2010; Qiu, 2007).

Lambert (2006) emphasized that successful supply chain management needs cross-functional integration of key business processes within the firm and across the network of firms that make up the supply chain. SMEs are widely seen as the catalyst of economic growth in developing economies (Mullei & Bokea, 1999). In developed countries, they are also credited with creating jobs, delivering innovation and raising productivity (UNCTAD, 2004; Hafeez *et al.,* 2012). In Kenya, SMEs have been credited with promoting economic growth and employment opportunities (Mullei & Bokea, 1999). Supply chain collaboration in SMEs may comprise a set of business activities including purchase from open market, manufacturing of subassembly within the plant and delivery to large enterprises using hired transportation to enhance value and ensure long-term regular purchase orders (Daugherty, 2011; Faisal *et al*., 2007).

Mullei and Bokea (1999) in their study on micro and small enterprises in Kenya: an agenda for improving the policy environment revealed that many SMEs in Sub-Saharan Africa operate not in isolation but within formal and informal relationships that link them to a wider business community. The propensity of SMEs to form relationships is based on trust as well as cooperation and common purpose (Bayraktar *et al.,* 2010; Feng, Fan & Ma, 2010).

The benefits of supply chain management for SMEs are; competitive advantage through relationships between clients and suppliers, information sharing and the positive impact on performance (Chan *et al*., 2012; Feng, Fan & Ma, 2010). Harrison and Van Hoek (2005) argued that supply chain is a collection of processes that go beyond the boundaries of organizations. Therefore, supply chain management practices contribute to innovation in SMEs through coordination and integration of tasks and activities throughout the supply chain (Torkkeli *et al*., 2012; Wieteska, 2016).

One major determinant of performance of the organization not only includes the effectiveness of the collaboration between the organization and its business partners but also with the partners' partners (Scholten & Schilder, 2015; Trkman *et al.*, 2015; Chaffey, 2009).Figure 2.2 shows connection between main firm, buyer on the upstream and suppliers on the downstream.

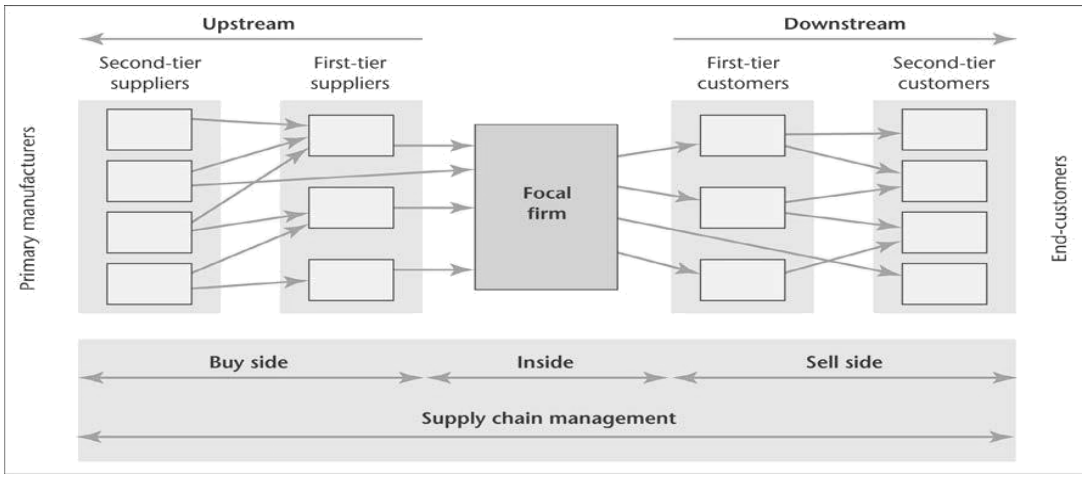

Figure 2.2: Supply chain management

Source: Harrison and Van Hoek (2005)

2.1.5 Importance of Supply Chain Collaboration

The predominant belief amongst academicians is that supply chain collaboration has both strategic and operational significance and enables supply chain partners to become more competitive (Yeng *et al.*, 2015; Pagell, 2004). Most studies have found that collaboration across the supply chain has a positive impact on performance of firms (Simatupang & Sridharan, 2008; Zeng *et al.*, 2010; Flynn *et al.*, 2010). Other scholars have proved that collaboration has a positive influence on supply chain performance and operational performance (Lee & Whang, 2004; Prajogo & Olhager, 2012).

Kim (2006) conducted a study on effect of supply chain management practices, integration and competition capability on performance. The results indicated that in SMEs, efficient supply chain collaboration could play a more critical role for sustainable performance improvement. Besides, the study also found that in big firms, the close interrelationship between the level of supply chain management practice and competition capability may have more significant effect on performance improvement (Kim, 2006; Kumara & Rahman, 2015).

It is widely acknowledged that supply chain collaboration promotes; collaborative planning, new product innovation, technology transfer, joint cost management and risk management over and above increased value for the supply chain partners (Scholten & Schilder, 2015; Prajogo & Olhager, 2012). It also involves personal investments in the relationship and uniform procedures between supply chain partners (Nair, Jayaram & Das, 2015). When supply chain partners work in a synchronized way, it leads to acquisition of transaction specific knowledge as opposed to working alone (Flynn *et al*., 2010; Al-Zu'bi, 2016). Synchronization of processes could create competitive advantage capabilities that are difficult to replicate by competitors (Chopra & Meindl, 2010; Hui *et al.*, 2015).

2.1.6 Effect of Supply Chain Collaboration

Collaboration encourages all members in the supply chain to participate in decision making, planning, information sharing, forecasting, replenishment, incentive sharing and resource sharing (Scholten & Schilder, 2015; Sreejith & Vinaya, 2017; Hudnurkar *et al.*, 2014). In addition, supply chain decisions include combining plans and information, resolving conflicts and establishing procedures and regulations (Cao & Zhang, 2013). Problems may occur in decision-making processes when information is widely dispersed and there is unclear power structure on how the decision should be made in favour of supply chain partner's benefit (Hudnukar *et al.*, 2014; Lau *et al.*, 2010; Abdallah, Anh & Matsui, 2016).

Cannon and Homburg (2001) states that collaboration reduces purchasing costs by lowering contracting costs, frequent communication, improved coordination and acts as a joint approach to operational problem-solving. A study by Simatupang and Sridharan (2005) found that supply chain members who had higher levels of

collaboration practices were able to achieve better operational performance and innovation activities. Supply chain collaboration leads to collaborative advantage which is also referred to as joint competitive advantage (Cannon & Homburg, 2001; Hui *et al.,* 2015). Collaborative planning systems are intended to support enhanced information sharing and collaborative planning between partners in an effort to lessen information asymmetries in the supply chain, which contribute to the bullwhip effect and result in excess inventories (Chopra & Meindl, 2010; Lee, 2000).

Conventionally, organizations tend to execute business processes alone; however, Ding *et al.* (2011) raised concerns that independent decision-making leads to suboptimal performance such as bullwhip effect. Joint competitive advantage refers to strategic benefits achieved over competitors in the marketplace through supply chain partnership (Sreejith & Vinaya, 2017; Ding *et al.*, 2011). Collaborative advantage relates to the desired combined outcome of collaborative activity that could not have been achieved by any firm acting alone (Nyaga *et al.,* 2010; Braunscheidel & Suresh, 2009). The low-cost SMEs generally consider the role of the supply chain collaboration to be one of cost reduction (Ding *et al.*, 2011; Hui *et al.*, 2015).

The value creation from supply chain collaboration leads to cost savings through the transfer of best practices, improved competence and flexibility for collective actions, better decision making and increased revenue through resource synergy (Hudnurkar *et al.,* 2014). Collaborative management of supply chain risks is complicated because sometime risks are often interconnected. Disruption caused in collaborative supply chain refers to the risks which affect the movement of efficient process of information, materials and products among different parts of the supply chain in an organization or in a global supply chain (Chen, Sohal & Prajogo, 2013; Scholten & Schilder, 2015). Supply chain disruptions and delays don't just impact the ability to satisfy a few clients' orders, but also hurts a firm's brand reputation, working capital requirements and cash to cash cycle (Wieteska, 2015). Besides, supply chain collaboration provides firms with access to external expertise that can lead to innovation and guide them to resolve business problems and allow them to engage in learning complexes (Hui *et al.,* 2015; Cao & Zhang, 2013).

The study sought to find out the effects of supply chain collaboration and considered the following; innovation collaboration, cost collaboration, collaborative planning as well as risk management collaboration.

2.2 Theoretical Review

A theory is a set of systematic interrelated concepts, propositions and definitions that are advanced to explain and predict a phenomenon (Cooper & Schindler, 2014). This section dealt with the theories that are relevant in explaining the effect of supply chain collaboration on the strength of B2B relationship.

2.2.1 Principal-Agent Theory

This theory relates to business relationships that consist of a principal and an agent engaged in cooperative behavior but have differing goals and attitudes toward risks (Plambeck & Gibson, 2010; Fayezi, O'Loughlin & Zutshi, 2012; Eisenhardt, 1989). Agency theory is aimed at the ever-present agency relationship in which one party called principal delegates work or tasks to another party called agent, who performs that work on his behalf (Eisenhardt, 1989; Zsidisin & Wagner, 2010). Principal-agent theory has been applied to various activities associated to supply chain management including, risk management, outsourcing, sourcing and supply chain collaboration (Plambeck & Gibson, 2010). In this study, principal-agent theory was adopted to support an incentive alignment dimension of supply chain collaboration to reduce risk factors posed by agents (Bergen *et al.,* 1992).

In spite of the widely acclaimed universal applicability of the agency problem and the similarities between the agency problem and buyer-supplier relationships, applications of agency theory within the supply chain collaboration have been limited to big corporations and not SMEs (Lavassani & Movahedi, 2010). Although the traditional agency theory summarizes the relationship between the principal and agent within the perspective of delegation of authority, this study support the view that examples of agency problem are worldwide and thus, principal-agent theory can be a valuable model for studying relational risk aspects of supply chain collaboration in SMEs (Byrne & Power, 2014).

The conventional buyer (principal)-supplier (agent) relationships in a supply chain closely resemble the agency problem. However, the intricate power dynamics played out in modern supply chain networks may make it difficult to explore multiple relationships in a buyer-supplier context. Griffiths *et al.* (2006) suggests that a more powerful large supplier can exercise control usually referred to as channel power over a small buyer leading to the situation where the supplier may assume the role of a principal. Supply chain collaboration can be characterized by an imbalance of information sharing, hence there is likely to be a dependency relationship between the partners (Byrne & Power, 2014; Lavassani *et al.,* 2008).

Normally, one partner in supply chain often has either more information or better bargaining power than the other partners (Zsidisin & Wagner, 2010). Based on this, principal agent theory recognizes two types of parties to a transaction within supply chain. The principal is a party who desires to secure provision of certain services or goods but does not have the needed specialized skills, understanding or assets (Plambeck & Gibson, 2010; Eisenhardt, 1989). Usually, the principal contracts an agent to undertake the task on their behalf and in the process delegates some control to the agent (Bergen *et al*., 1992; Zsidisin & Michael, 2005).

For example, SME (principal) can appoint distributors (agents) to act on its behalf in terms of distribution of its goods. Further, shareholders of a manufacturing SME (as the principals) can appoint an executive team (agents) to run the business on their behalf. This arrangement allows the executive to make operational decisions on behalf of the shareholders in areas such as minimization of risks and maximization of revenues among other decisions (Byrne & Power, 2014; Simatupang & Sridharan, 2008). In this arrangement, the principal engages the agent who in return acts and makes decisions on behalf of the principal (Lavassani & Movahedi, 2010; Plambeck & Gibson, 2010).This association works very well when the agent is a specialist in terms of making necessary decisions, however, it does not work well when the interests of the principal and agent differ significantly (Plambeck & Gibson, 2010; Lavassani & Movahedi, 2010).

Principal-agent relationships are enacted in a broader supply chain collaboration perspective for the implementation of policies geared towards aligning incentives so as to discourage self-seeking behavior and bounded rationality by agents hence

reduce agency costs (Byrne & Power, 2014). In addition, the operational nature of supply chain expenditures decisions must be taken by the firm's management (agents) on behalf of the company proprietors (principals) under the authority entrusted to them through employment. This theory therefore contends that, the goals of the principal and agents are not in conflict and that the principal and agent can reconcile different tolerances for risk (Lavassani & Movahedi, 2010). Both principal and agent seek to maximize their utility from the same organizations. The trouble faced by the principal is how to secure some service benefit from the agent while not knowing the true value of those benefits, or being forced to accept those benefits the agent wishes to supply (Zsidisin & Wagner, 2010; Fayezi, O'Loughlin & Zutshi, 2012).

Either way the information imbalance can make it difficult for the principal to be sure that the agent is acting in the principal's best interests (Plambeck & Gibson, 2010; Byrne & Power, 2014). Eisenhardt (1989) discussed the assumptions of the theory and raised the issue of principals learning about the agents when there is a long term relationship, when there may be less need for outcome-based contracts. There are some specific differences of the principal-agency theory and the most common is the power asymmetry (Byrne & Power, 2014; Lavassani *et al.,* 2008). In an owner-manager or manager-worker relationship, the principal has the power to design and enforce contracts and hence the power to enter or to dismiss incentives for the managers or employees (Bergen *et al.,* 1992).

Contrary, principal-professional exchanges are intrinsically those in which professionals have the power over principals by virtue of their know-how, functional indispensability and inherent uncertainty associated with the services they offer (Eisenhardt, 1989; Byrne & Power, 2014). It also involves a considerable information asymmetry; the principal does not only know how the professional agent does the job, but also what he or she does. This information asymmetry also makes it difficult for the principals to know beforehand how much service is actually needed. The intention of the owners who are the principals is for the managers (agents) to make decisions that will ensure the SMEs thrive which include supply chain collaboration success (Eisenhardt, 1989).

The objective of agency theory is therefore to design and build a contract that minimizes agency problems (Lavassani & Movahedi, 2010; Byrne & Power, 2014). The most effective and efficient contract must have both the appropriate blend between outcome and behavioral based incentives, in order to motivate the agent to behave in the best interest of the principal (Plambeck & Gibson, 2010; Eisenhardt, 1989). The backbone of agent theory is the trade-off between the cost of measuring behavior and the cost of measuring outcomes and subsequently transferring risk to the agent (Zsidisin & Wagner, 2010; Bergen *et al.,* 1992).

The Principal-agent theory therefore deals with situations in which the principal is in position to induce the agent, to perform some job in the principal's interest though not necessarily the agent's (Lavassani & Movahedi, 2010; Eisenhardt, 1989). Zsidisin and Michael (2005) pointed towards a greater tendency amongst purchasing organizations to mitigate risks by deliberately manipulating a supplier's behavior to achieve greater compliance through supplier development and co-developing of target costing, instead of managing agent activity through the execution of safety stock and multiple suppliers.

While Cheng and Kam (2008) used agency theory to predict how participants respond to risks, which are outside of their control. The study concluded that network collaboration is basically dependent upon the structure of the network, the functional role of each supply chain partner and how principals and agents structure agreements, organize incentives, and accept commitment and trust. This theory hence is better placed in exploring the principal-agent's dilemma and offers opportunity to understand the contextual factors and their implication for managing supply chain collaborations in SMEs (Plambeck & Gibson, 2010; Byrne & Power, 2014; Simatupang & Sridharan, 2008).

2.2.2 Network Theory

Network relations create information sharing that enables buyers and sellers to have access to resources and knowledge beyond their abilities, leading to long-term relationships (Varadarajan, 2010; Yeng *et al.,* 2015). Network theory can be used to provide a foundation for the hypothetical analysis of reciprocity in cooperative relationships (Johnsen & Ford, 2006; Sanders, 2007). In this case, the firm's constant

interaction with other supply chain partners becomes a vital factor in the development of new assets (Varadarajan, 2010; Yeng *et al.,* 2015). Relationships combine the resources of two organizations to achieve more advantages than through individual efforts (Zeng *et al.,* 2010). In network theory, types of collaborations are not only based on economic factors but also on power and trust (Johnsen & Ford, 2006; Cao & Zhang, 2013).

One major determinant of the performance of the organization not only includes the effectiveness of the collaboration between the organization and its business partners, but also the partners' customers (Cao & Zhang, 2013). Chicksand *et al.* (2012) points out that network relation may boost the social capital of an organization making it possible to get easier access to financial support, information and technology transfer. Network theory is used as the basis of reciprocal effect in inter-organizational relationships. Hence, the interactions between different organizations and other players in the layers of the supply chain become very vital for competitive edge (Cao & Zhang, 2011).

Pooling of resources in supply chain results in competitive advantage compared to those firms acting alone (La Londe, 2002; Sundram *et al.,* 2011). Network theory therefore proposes that the value of the resources can be expanded by its combination with other resources and building an effective inter-organizational relationship within the supply chain (Lavassani *et al.,* 2008). This underscores the efforts that organizations put towards developing a successful collaboration with their supply chain partners are vital and crucial to the success of collaboration (Ragatz *et al.,* 2002). The important contribution of network theory to the determination of the inter-organizational collaboration is heavily dependent on personal bond between the supply chain partners (Cao & Zhang, 2013; Ragatz *et al.,* 2002).

Personal bond could include factors such as trust through supply chain collaboration, communication and mutual adoption in terms of culture (Sridharan & Simatupang, 2013; Chicksand *et al.,* 2012). By establishing information sharing and collaborative communication, firms can build B2B relationship with their supply chain partners through the social exchange process to improve their competitiveness (Varadarajan, 2010; Yeng *et al.,* 2015). Network theory provides a useful framework for analysis

of business collaboration situations and it adds a new level of complexity to understanding the relationship perspective (Wang *et al.,* 2009; Welker *et al.,* 2008; Zeng *et al.,* 2010).

This approach is a structure formed by the main dimensions for instance, activities, resources and actors that connect a set of relationships. This theory has been used as the foundation of the reciprocal effect in inter-organization relationships (Cao & Zhang, 2011; Nyaga *et al*., 2010). Collaboration between firms and their supply chain partners aims to govern the daily dynamics within supply chain that includes both exchange process of information, products and change adaptation process (Nyaga *et al*., 2010). The main focus of network theory in supply chain collaboration is to develop long-term relationships based on building mutual trust between supply chain partners (Nyaga *et al*., 2010; Fayezi *et al.,* 2012). In this study, network theory was used to explain network relations that create information sharing enabling buyers and sellers to have access to resources and knowledge beyond their abilities. This theory shows the importance of innovation and information sharing in maximizing product development leading to sustainable competitive advantage.

2.2.3 Stakeholder Theory

Stakeholder theory contends that firms produce externalities that affect many stakeholders which are both internal and external (Lavassani & Movahedi, 2010; Reuter, Goebel & Foerstl, 2012; Freeman, 2010). Externalities often cause stakeholders to increase pressures on firms to decrease negative impacts and increase positive impacts (Sarkis, Gonzalez-Torre & Adenso-Diaz, 2010). Stakeholder theory further states that organizations are responsible toward various stakeholders since they are expected to react to their different claims as an attempt to legitimize their existence (Freeman, 2010; Park-Poaps & Rees, 2010). This theory also suggests that firms are rooted in a network of relationships with stakeholders and that these firms allocate varying amounts of resources and attention to these stakeholders (Parmar *et al.*, 2010).

Organizations tend to favour those stakeholders who are powerful and important to them while stakeholders devote different amounts of attention and resources to crucial firms (Freeman, 2010). From the firm's angle, resources and attention given

depend on an intricate blend of stakeholder moral legitimacy, power and urgency (Lim, 2010; Donaldson & Preston, 1995; Mitchell, Agle & Wood, 1997). According to Freeman (2010) stakeholder studies have largely assumed the organization's point of view, with focus on stakeholder-firm relationships in order to shore up and improve the firm's competitive position within supply chain. Stakeholders can be categorized into direct or indirect, primary and secondary or can also be based on numerous dimensions of power, urgency and legitimacy (Sarkis *et al.*, 2010; Lim, 2010).

This theory exists in the context of the basic premise that internal and external groups will influence organizational practices; externalities may be internalized via stakeholder pressures between supply chain partners (Björklund, 2010; Freeman, 2010). Since stakeholders are usually closely associated with social organizations, hence the confounding relationships with institutional theory could exist. This is so especially if there are norms and legitimacy aspects of stakeholder theory that go beyond institutional theory (Reuter, Goebel & Foerstl, 2012; Björklund, 2010).

However, supply chain as a body has a variety of stakeholders more than individual firms with an expansion of stakeholder groupings especially when environmental issues are involved (Björklund, 2010; de Brito *et al*., 2008). Many of supply chain collaboration research have investigated stakeholder theory from a multi-theoretic perspective or general explanatory theory perspective to clarify specific phenomenon (Björklund, 2010; Sarkis *et al*., 2010). However, the development of stakeholder theory through supply chain management research has not occurred much among SMEs.

Even though unique perspectives have been implemented through other theories such as sphere of influence, where the firm's field of influence may impact supply chain partner environmental initiatives and innovations (Sarkis *et al*., 2010; Matos & Hall, 2007). Globally-centered stakeholder theory could be more relevant as globalization of supply chain collaboration have triggered the stakeholder field to continue growing (Björklund, 2010). Significant investigational opportunities still exist with respect to the roles of stakeholder theory and pressures on supply chain collaboration (Lavassani & Movahedi, 2010; Sarkis *et al*., 2010).

Park-Poaps and Rees (2010) pointed out that consumer and industry peer pressures were significantly related to the companies' internal direction, whilst the industry peers and media were significantly related to their external partnerships. A study by Talavera (2013) on exploring the relationship of supply chain collaboration and trust, found out that a stakeholder's voluntary decision to share information with the other parties in the supply chain depends on trust, which in turn manifest in terms of stability of the relationship and the organizational openness that stakeholders share. The development of partnerships among stakeholders often facilitate both internal and external communication, including; mutual understanding and cooperation on collaborative planning on demand and supply (Simatupang & Sridharan, 2005; Freeman, 2010).

Therefore, the stakeholder engagement is expected to affect how supply chain partners engage each other (Park-Poaps & Rees (2010). This theory was used in this study to support the considerations in developing a supply chain planning collaboration strategy, which is predominantly concerned with the fulfilment of customer orders.

2.2.4 Institutional Theory

Institutional theory states that organizational decisions are not driven purely by coherent goals of efficiency, but also by social, cultural factors and concerns for legality (Cai *et al.,* 2010). Institutional theory has traditionally been concerned with organizational legality and how the need for legality fosters the emergence of norms and practices that are opposed to change (DiMaggio, 1988).Legitimacy is defined as a universal perception or assumption that the actions of a partner are desirable or appropriate within some socially acceptable system of norms and values (DiMaggio, 1988; Björklund, 2010). Institutional theory claims that firms become more similar due to isomorphic pressures and pressures for legitimacy from trading partners in supply chain.

Therefore, this means that firms in the same field tend to become homologous over time, as competition and customer pressures motivate them to copy industry leaders (Cai *et al.,* 2010; Wong, Skipworth, Godsell & Achimugu, 2012). SMEs join supply chain collaboration not because of internally decisions but due to persuasion by

external isomorphic pressures from competitors, suppliers and customers (Cao & Zhang, 2013; Cai *et al.*, 2010). Institutional theory therefore, can offer explanation on how behavior of external forces such as competitors, suppliers, can influence firms like SMEs to adopt B2B e-commerce.

Ranganathan *et al*. (2004) in their study on assimilation and diffusion of web technologies in supply-chain management: An examination of key drivers and performance impacts used institutional theory to propose that, rather than making a purely internally driven decision to adopt e-commerce (B2B), firms are likely to be induced to adopt and use B2B by external isomorphic pressures from competitors, trading partners, customers and governments. It is well known that coercive and normative institutional pressures existing in an institutionalized environment may influence organizations' predisposition toward adoption of collaboration and B2B relationship.

2.2.5 Transaction Cost Economics

Transaction cost economics' basic principle is that the cost of doing transactions could be too high under certain circumstances (Williamson, 2010; Saeed, Malhotra & Grover, 2011). It is an economic approach that reflects different forms of transaction costs such as information sharing, coordination and contracting (Williamson, 2008). The underlying logic of transaction cost economic is that organizations will favor vertical collaboration when transaction costs such as performance assessment and adaptation are greater than internal costs such as production and administration costs (Williamson, 2010). Transaction cost economics is one of the most influential theories on inter-organization collaboration (Verbeke & Kano, 2012; Williamson, 2010). It proposes that firms organize their cross-organizational activities to reduce production costs within the firm and transaction costs within the supply chain (Verbeke & Kano, 2012; Williamson, 2008).

The decision to join supply chain collaboration or B2B market relationship depend on the relative supervisory costs that crop up from bounded rationality and uncertainties due to supply chain partners' self-interest and opportunism (Verbeke & Kano, 2012; Kaufman *et al.*, 2000).Transaction cost economics explains how information advantage in collaboration is useful to firms and information sharing in

supply chain is a transaction cost (Verbeke & Kano, 2012; Williamson, 2010). Some of the transaction costs in supply chain collaboration could include; contracting deals, information sharing, coordination, monitoring and opportunistic behavior risks (Williamson, 2008).

The behavioral suppositions are opportunism and bounded rationality, which forces organizations in supply chain to make self-enforcing promises to act responsibly in light of increasing their bottom-line (Williamson, 2010). Williamson further describes bounded rationality as accepting the limits of the human ability to process information comprehensively. There are three dimensions that describe a transaction within supply chain; asset specificity, uncertainty and frequency (Verbeke & Kano, 2012).

Asset specificity refers to when one supply chain partner invests resources specific to an exchange which has no value in a different exploit (Williamson, 2010; Kaufman *et al.,* 2000). This aspect is a transactional factor of special importance and refers to the transferability of assets that shore-up a given transaction cost, mainly in the form of human specificity or physical specificity (Verbeke & Kano, 2012). Uncertainty on the other hand is linked to economic reasons and transaction behavior and both result in extra costs among supply chain partners (Verbeke & Kano, 2012). The existence of uncertainty in supply chain collaboration makes contracting difficult since the environment shifts unexpectedly. For instance, in the ICT supply chain sector, the transaction costs arise from limited information, opportunism and frequent technological changes.

Frequency of transactions could be referred to as large-scale production. Setup costs and reputation effects are two aspects of frequency (Williamson, 2010). When the prospective demand is large, it is worthwhile to invest in specialized assets and have frequent transactions within supply chain. This relates to the frequency with which transactions occur within supply chain and whether high asset specificity firms should contract out (Verbeke & Kano, 2012). Williamson (2010) draws the cost-determining aspects of individual transactions as their frequency, the environmental political, social or economic risk surrounding them and the level of the transferability of assets associated with them.

There is need to describe cost collaboration dimension that affect transactions such as information sharing. This study argues in favor of adopting transaction cost economics as a theory in favor of understanding cost dynamics in supply chain collaboration. This is an attempt to investigate the supply chain collaboration link from a different angle whose dimensions can have vital authority on the sellers and buyers sharing different benefits and information (Verbeke & Kano, 2012). Transaction cost economics uses the idea of transaction costs to explain the organization of firms and the method of their relations along a supply chain by providing a conceptual framework for studying some of the collaboration challenges and economic risks that supply chain partners face (Verbeke & Kano, 2012; Williamson, 2008).

This theory combines the economic theory with the organization theory to determine the best type of supply chain relationship a firm should develop in the marketplace (Williamson, 2010). Firms make decisions on supply chain collaboration design based on various factors including what investments have to be made specific to the relationship, what activity is critical for effective supply chain collaboration, uncertainty in the relationship with partners and product complexity (Verbeke & Kano, 2012). Investments specific to the collaboration may lock in the supplier and increase the costs of changing to another buyer (Verbeke & Kano, 2012).

The greater the level of asset specificity, the more supply chain partners need collaboration adaptability in adjusting the agreement rather than in quitting the partnership (Williamson, 2010). In the case of a low level of asset specificity, the desire for collaboration flexibility diminishes while the need for exit flexibility is preferred (Verbeke & Kano, 2012). It is also hard to completely eradicate uncertainty because the firm deals with customer orders, which are randomly generated.

While demand uncertainty may force a firm to develop a closer relationship with its suppliers to better meet market needs through standardized products so as to have extra inventory to counter the uncertainty (Verbeke & Kano, 2012; Björklund, 2010; Wever *et al.*, 2012). Uncertainties and threat of opportunism may be mitigated by employing safeguards like long-term contracting, penalty clauses if supply chain partners fail to fulfill their contractual obligations, joint investments and equity

sharing. Cao and Zhang (2013) in their study on supply chain collaboration used transaction cost economics theory to expound on theory and theoretical framework in supply chain collaboration. This theory was used to explain the cost decision process of whether to implement make decisions or outsource the operations instead. It has been shown that lower transaction costs favour supply chain collaboration or outsourcing while higher transaction cost favour in-house operations (Cao & Zhang, 2013).

2.2.6 Relationship Marketing Theory

Relationship marketing theory focuses on the firm's relationship with the final consumer or on its relationship with other supply chain partners (Vieira *et al*., 2011; Zeng *et al.,* 2010). The objectives of relationship marketing theory are to identify and set up, sustain and develop relationships with customers and other partners within supply chain (Vieira *et al*., 2011; Zeng *et al.,* 2010). In essence, relationship marketing theory has the following advantages; it ensures customer loyalty and improves efficiency of the market economy. This theory offers a useful explanations of several processes or dimensions, for example, commitment and cooperation that are significant in studying the inter-relationships between certain phenomena of the buyer-seller relationship (Morgan *et al*., 2009; Vieira *et al*., 2011; Zeng *et al.,* 2010) such as information sharing in supply chain management.

This theory can explain the exporter-producer relationship and its information sharing, offering explanations for the several streams in relationships and the dimensions in relationships (Bhutta *et al*., 2007; Oliveira *et al*., 2011; Lavassani *et al.,* 2008). Conventionally, non-integration of information between supply chain partners in the supply chain is more costly and time consuming. This approach normally involves much higher costs of transport and handling a larger sales force and more involvement from the purchasing team (Oliveira *et al*., 2011; Varadarajan, 2010; Ketchen & Hult, 2007). All this justify approaching the supply chain from a relational perspective, thus the relationship marketing theory and tools can be fully applicable in the B2B platform (Oliveira *et al*., 2011;Sharma *et al*., 2010). Vieira *et al*. (2011) used relationship marketing theory to analyze value of different actions in managing business relationships.

Empirical models often focus on different components of the relationship but use similar key theoretical dimensions to explain relationships (Vieira *et al*., 2011; Gregory, Karavdic & Zhou, 2004). These dimensions include trust, commitment, communication, cooperation, collaboration and information sharing. Trust and information sharing have a functional association that is more likely to be characterized over the life cycle of a positive relationship (Sridharan & Simatupang, 2013; Neven *et al*., 2014). Commitment is the desire to continue with the relationship and is developed in the more mature stage of relationship, after trust is developed in the early stages (Vieira *et al*., 2011; Charles, Lauras & Wassenhove, 2010).

In most of the studies, relationship is a link of benefits and processes for both individuals and firms engaging in several streams such as networks, exchange, governance, exporting and supply chain management to improve relationships and performance (Varadarajan, 2010; Rosenzweig, 2009). These dimensions are processes in the relationship, which work as condition to creating better achievements and sharing of information for the firms. Business-to-business (B2B) relationship generally has a small number of key players in the relationship and a strong interdependence, both buyers and sellers are active and the relationship is often long-term (Morgan *et al*., 2009; Sharma *et al*., 2010). This theory was employed to support the B2B relationship.

2.3 Conceptual Framework

Conceptual framework is a graphical representation of the researcher's conceptualization of the relationships between variables in a study (Orodho, 2008). Orodho further describes it as a hypothesized model identifying the concepts or variables under study and showing their relationships. Mugenda (2008) defined a variable as a measurable characteristic that assumes different values among units of specific population. This study categorized key variables as dependent and independent. Independent variables predict the amount of variation that occurs in another variable while dependent variable is a variable that is influenced by another variable (Kothari, 2009; Moutinho & Hutcheson, 2011).

The dependent variable is the variable that the study wishes to expound on. Based on the theories and literature review, the study proposed the following independent

variables; collaborative planning (Hadaya & Cassivi, 2007;Palmatier & Crum, 2010; Chopra & Meindl, 2010; Simatupang & Sridharan, 2005), innovation collaboration (Azadegan & Dooley, 2010; Adams *et al*., 2014; Al-bayati, 2011; Brahm & Tarzijan, 2016; Rosenzweig, 2009; Oliveira *et al.*, 2011; Chesbrough, 2003), cost collaboration (Vanovermeire & Sörensen, 2014; Choi & Krause, 2006; Yeung *et al*., 2013) and collaborative risk management (Ramanathan, 2014; Hudnukar *et al.*, 2014; Chen, Sohal & Prajogo, 2013; Plambeck & Gibson, 2010).

This study draws on the key concepts from theories and literature on supply chain collaboration and B2B relationship e-commerce to locate and elaborate the theoretical model where supply chain collaboration is basically the idea. Fig. 2.3 shows the conceptual framework and provides an illustration on the causal relationships amongst innovation collaboration, planning collaboration, cost collaboration, risk management collaboration and strength of B2B relationship.

This framework can be used to study supply chain collaboration from a focal firm's angle and test hypothesis amongst the study constructs. This study therefore analyzed the effect of innovation collaboration, cost collaboration, planning collaboration and risk management collaboration on the strength of B2B relationship. The study also went further and determined the combined effect of innovation, cost, planning and risk management collaborations on the strength of B2B relationship.

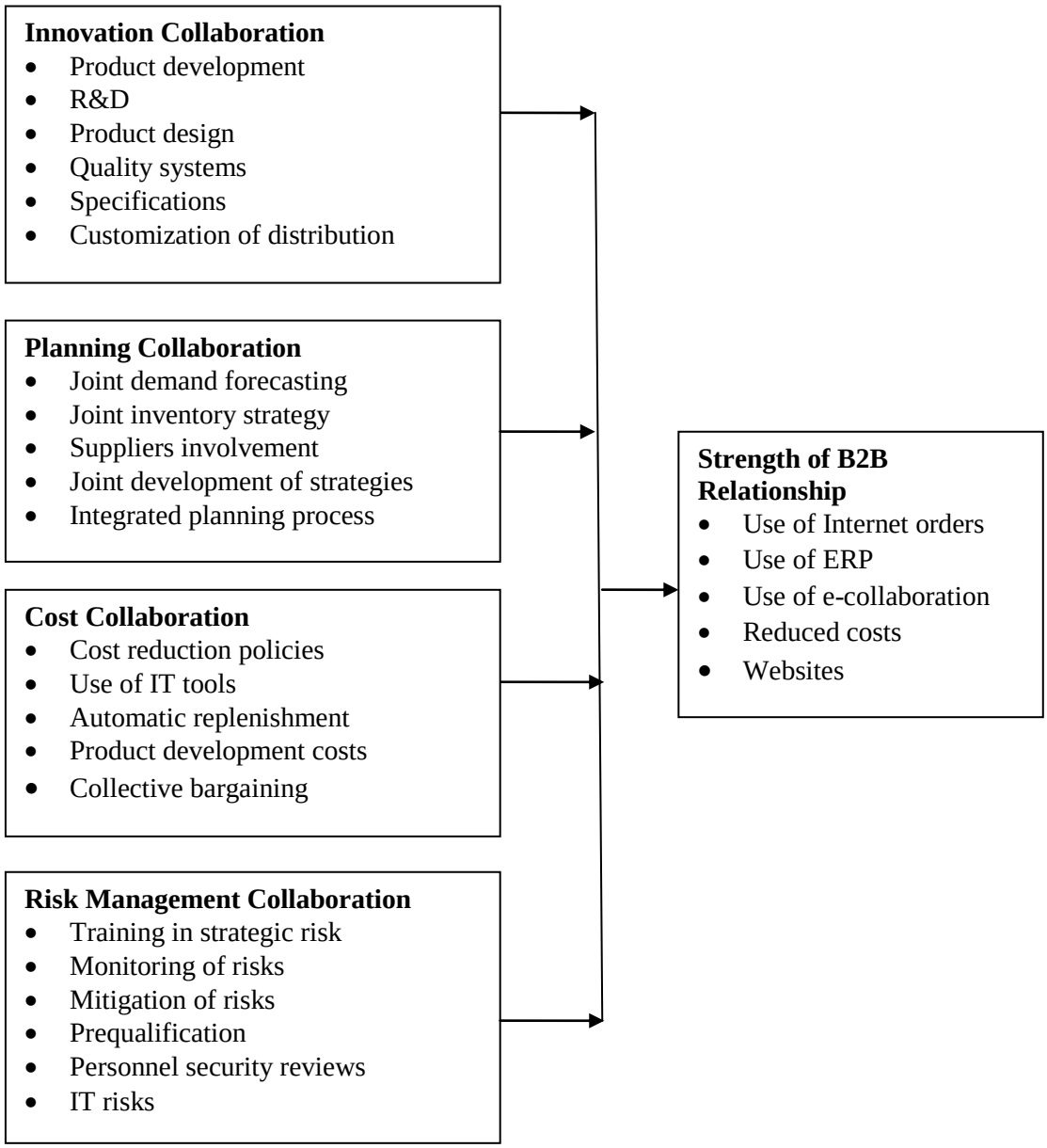

Figure 2.3: Conceptual framework

2.3.1 Supply Chain Collaboration and Innovation Collaboration

Supply chain innovation describes the intra and inter-organizational competence within a supply chain to cooperate to identify, develop and implement original, solution oriented actions that address new problems (Bos-Brouwers, 2010; Blome *et al*., 2014). Supply chain innovation is a set of tools that can improve firm's processes directed towards effective supply chain management through seamless collaboration with suppliers, customers and manufacturers (Subroto & Sivakumar, 2010; Mina, Bascavusoglu-Moreau & Hughes, 2014).

Innovation collaboration can be in form of new product development, process improvements, service delivery, inventory management, technology transfer and or capacity planning (Teece, 2010; Rosenzweig, 2009). There are benefits that come with supply chain innovation such as lead time and cost reduction, generation of new operational tactics and development of flexibility (Hung, 2010; Leavy, 2010; Stundza, 2009). Resources when combined, can lead to increased level of specialization and innovation (Love, Roper & Bryson, 2011).

Innovation collaboration can also lead to collaborative advantage over non collaborating SMEs which is also referred to as competitive edge (Lau, Tang & Yam, 2010; Cao & Zhang, 2011). Innovation collaboration has reduced product life cycles and increased the strain on supply chains to develop new products (Maree & Paul 2009; Subroto & Sivakumar, 2010). The successful application of principles such as business process outsourcing, business process management, total quality management, lean procurement and kaizen have all but promoted innovation (Jauhar, Tilasi & Choudhary, 2012). The modern trends in outsourcing and de-verticalization practices have hastened innovation in the areas of product development and supply chain management especially amongst SMEs.

These innovations have favored perfection in lead times, product lifecycle, quality, efficiency, costs and timely response to market variations (Azadegan & Dooley, 2010). Higher levels of collaboration in supply chain can lead to sharing of knowledge, enhanced knowledge creation, and increased innovation spillovers from suppliers (Leavy, 2010; Hagedoorn & Zober, 2015). Innovation collaboration activities have been linked to sustainable operations and reduced costs within supply

chain (Azadegan & Dooley, 2010). Innovation is part of business management, enabling the implementation of new products, processes and services to respond promptly to customers' needs (Johnsen, 2009; Love *et al*., 2011). New products often create considerable distress on the supply chain partner's finances and research function (Leiponen, 2009; Mihm, 2010; Al-Zu'bi, 2016). The increasingly competitive supply chains place enormous pressures on SMEs to innovate new processes that enhance both cost efficiencies and customer satisfaction (Lau, Tang & Yam, 2010).

Development of new products and new processes and subsequent marketing of the new products can be very risky and financially expensive (Johnsen, 2009; Bigliardi, Colacino & Dormio, 2011). However, through long-term collaborative partnerships, supply chain partners are able to devise the most innovative ways to develop processes that add value and reduce costs (Chesbrough, 2003; Mandal & Korasiga, 2016). Long-term supply chain collaborations create an environment for developing innovative solutions to problems and challenges (Scholten & Schilder, 2015; Lau *et al.*, 2010).

Supply chain innovation capacity indicates the willingness of groups of partners, within the supply chain to take steps or perform activities that ultimately produce output that improves or changes current activities to meet market needs (Hui *et al*., 2015; Leavy, 2010). Modern innovations in B2B e-commerce have radically increased market transparency and visibility globally (Mandal & Korasiga, 2016). Today, market news travels faster through blogs, social networks and via mobile phone applications. Any little mistake by one supply chain partner can send shock waves throughout the supply chain and cause irreparable damage (Wieteska, 2016; Vanathi & Swamynathan, 2014; Chen, Sohal & Prajogo, 2013).

For instance, British Petroleum's (BP) incident in the Gulf of Mexico (innovative off shore drilling) wiped off 55% of its market capitalization in weeks and damaged its reputation. Most supply chains face much greater reputational risk and financial liability with respect to product safety. In terms of developing supply chain innovation capacity, shared learning is important, as is developing joint planning and innovation capabilities. The power to acquire and utilize knowledge effectively is

critical for supply chain innovation activities (Leavy, 2010; Wang & Kafouros, 2009). Firms are increasingly dependent on their customers, suppliers and even competitors as originators of product and process enhancement for new ideas (Didonet & Diaz, 2012; Trkman *et al.,* 2015).

By complementing resources of members who are at the same level within the value chain's horizontal integration, or gaining knowledge from key sources either upstream or downstream of the supply chain vertical integration (Wilhelm, 2011; Sreejith & Vinaya, 2017). However, influential suppliers could be reluctant to share their knowledge and competencies with buyers (Mihm, 2010; Melander, 2014). Moreover, the buying organization may regard its suppliers as possible competitors and therefore restrict the level of knowledge sharing and collaboration (Johnsen, 2009; Haeussler *et al.,* 2012). While other firms may fear that their shared top secret knowledge maybe leaked to competitors through the involvement of suppliers (Mihm, 2010; Al-Zu'bi *et al.,* 2015).

It is widely acknowledged that collaboration can enhance each partner's capability if arrangement is on a win-win basis. This is consistent with the hypothesis that most successful innovations do not come from the laboratory but from suppliers and customers (Bigliardi *et al.,* 2011; Fawcett *et al.,* 2012). A study by Flynn *et al.* (2010) found that supply chain partners who had higher levels of collaboration practices were able to achieve better innovation in new product development and created value for supply chain partners.

While Briscoe, Dainty, Millett and Neale (2004) found out that clients are key drivers of performance improvement and innovation; hence they are the most significant factor in attaining integration in the supply chain. One of the objectives of the study was to determine the effect of innovation collaboration on the strength of B2B relationship. Therefore, the following hypothesis was proposed:

H_{01}: There is no significant relationship between innovation collaboration and strength of B2B relationship amongst ICT SMEs in Kenya

2.3.2 Supply Chain Collaboration and Planning Collaboration

Collaborative planning constitutes the strategic aspect of supply chain collaboration which centers on a strategy, for administering all resources that go into meeting customer demand for a particular product or service (Abdallah *et al*., 2016; Olive & Watson, 2011; Palmatier & Crum, 2010). Success of planning depends on individual commitments based upon careful consideration of how each supply chain partner will execute their respective tasks (Wilhelm, 2011). According to Hadaya and Cassivi (2007) planning could be seen as the bedrock for reliable supply chain performance. The main objective of planning in supply chain is for operational excellence. Operational excellence means consistently doing the right things exceptionally and the right things are those that best benefit the entire supply chain (Chopra & Meindl, 2010; Laursen & Salter, 2014).

According to Turner (2014) another key for supply chain management success is the use of planning tools. Turner further indicates that firms cannot effectively manage cost, offer high customer service and turn into leaders in supply chain management without the incorporation of top of the line information technologies for supply chain planning. Distinguishing which methods and practices will best streamline the supply chain requires close collaboration among all partners (Ali *et al*., 2012; Abdallah *et al*., 2016; Cassivi *et al*., 2008). Ramanathan and Gunasekaran (2012) in their supply chain collaboration model divided collaboration in three main components of collaborative planning, collaborative execution and collaborative decision making with the objective of finding their influence on the future and success of collaboration.

Collaborative planning amongst partners is an effort to reduce information asymmetries in the supply chain, which contributes to bullwhip effect and result in excess inventories (Ramanathan, 2014; Wu, Chuang & Hsu, 2014). Collaboration encourages all members in the supply chain to participate in planning, information sharing, forecasting, replenishment, incentive and resource sharing (Ramanathan, 2014; Hudnurkar *et al.,* 2014). In addition, supply chain collaboration provides SMEs with access to wide-ranging external expertise that can guide them to resolve

business challenges and allow them to engage in learning networks (Hui *et al.*, 2015).

Sundarraj and Talluri (2003) stressed that sharing and coordination of information across the supply chain at the right time are major factors to improving the performance of an organization. Fawcett *et al.* (2008) identified four benefits of supply chain planning as: responsiveness to customer requests, on-time delivery, overall customer satisfaction and order fulfillment lead times which is key to B2B relationship improvement. Forecasting and demand estimation is based on historical orders or delivery information, which might not reflect the actual demand (Palmatier & Crum, 2010; Fawcett *et al.*, 2012). It is therefore vital that each member of the supply chain observes the demand patterns of its customers and in turn produce a set of demand data on its suppliers (Wiehenbrauk, 2010).

According to Palmatier and Crum (2010) the further a firm is upstream in the supply chain, the more distorted is the order stream relative to consumer demand. This phenomenon is known as the 'bull-whip effect' (Ouyang, 2007). Ding *et al.* (2011) stated that independent decision-making tends to suboptimal company performance such as bullwhip effect. It leads to a demand curve with steeper and steeper peaks and downs with less and less reliability the further up the partner is in the supply chain (Ding *et al.*, 2011; Ouyang, 2007). The total cost of the value chain is increased heavily and the reliability and timelines of the deliveries suffer due to bull-whip effect. There are four main causes of bullwhip effect, namely; demand forecast updating, order batching, price fluctuations and rationing and shortage gaming (Babai *et al.*, 2013; de Kok *et al.*, 2005).

The lack of trust from the supplier as well as for the company's internal planning creates these fluctuations (Ding *et al.*, 2011). It is also caused by the multiplied effect of the intra-organizational, cross enterprise sub optimization and non-synchronization in individual processes (Oliva & Watson, 2011). Since each supply chain partner speculates more in their incoming goods' inventory than in their outgoing goods' inventory, bull-whip effect occurs. Reverse bull-whip effect, is caused when a firm speculates more in the outgoing inventory than in the incoming inventory (Palmatier & Crum, 2010).

If there is a balance between the company's inventory management in incoming and outgoing side, there is no bull-whip effect within that company (Ding *et al.*, 2011). In other words, it means that the internal forecasting process is operating well, and the supply chain partners have a common plan or forecast at both ends (Masayasu *et al.*, 2015). The bullwhip effect can be eliminated through collaborative planning and information sharing with suppliers and customers (Babai *et al.*, 2013; Chopra & Meindl, 2010). By sharing information, a common understanding of the real demand can be achieved which aids joint demand planning.

The benefits of collaboration planning is the ability to monitor processes in order to shorten the decision cycle process, allowing upstream suppliers and customers to respond more quickly and consistently (Hung, 2010; Hadaya & Cassivi, 2007). According to Hudnurkar *et al.* (2014) information sharing is perceived as the glue that reinforces the business structure of supply chain partners which then allows supply chain to be more agile. Besides, given that the suppliers are not located in one place, it is vital for the SMEs to exchange timely and accurate information amongst supply chain partners in order to achieve shared goals. From the foregoing argument, therefore, the following hypothesis was tested:

> H_{02}: There is no significant relationship between planning collaboration and strength of B2B relationship amongst ICT SMEs in Kenya

2.3.3 Supply Chain Collaboration and Cost Collaboration

Cost collaboration involves joint control of activities to eliminate waste and plan operations. It is now widely acknowledged that electronic communication can reduce both the costs of coordinating economic transactions and the costs of coordinating production planning efforts (Vanovermeire & Sörensen, 2014; Zhou *et al*., 2016; Choi & Krause, 2006). This process should influence the organization's strategy setting process. Factors such as product pricing, introduction of new products, and distribution of existing products are examples of strategic decisions that are affected by cost management (Yeung *et al*., 2013; Bengtsson & Wang, 2014).

Organizations that once focused primarily on distribution networks, profit differentiation and improved marketing for their success have now embraced

integrated supply chain management, as a pivotal strategy element for development and profitability in the global economy (Cannon & Homburg, 2001; Reuter *et al.,* 2012). In an effort to combat rising costs of raw materials in key categories, most supply chain partners usually employ joint sourcing to buy key commodities (Reuter *et al.,* 2012; Cao & Zhang, 2011; Hudnurkar *et al.,* 2014).

Collaborations within supply chain have resulted in huge cost savings for SMEs that usually do not enjoy economies of scale. The longer the supply chain collaboration or relationship, the more indirect costs are reduced (Vanovermeire & Sörensen, 2014). Cost savings are shared by supply chain partners within the collaboration which increases the shared benefits to all partners (Cannon & Homburg, 2001). Cost savings can also be passed on to customers through reduction in retail prices, thus enhancing the supply chain's competitive edge as cost leader (Choi & Krause, 2006).

Cost management has evolved to become a strategic capability for organizations that are not satisfied with the incremental cost improvements, associated with internally focused cost management processes such as activity-based costing (Vanovermeire & Sörensen, 2014). Poor coordination of supply chain has been cited as one of the reasons why businesses are wasting billion annually (Choi & Krause, 2006). A recent study on supply chain collaboration for merging companies noted that any weakness in the system on first day of the new organization's life can quickly translate into excess inventory, stock outs, or even lost customers (Yeung *et al*., 2013). It can have a similar or even a greater impact on distribution costs, timeliness of deliveries and a variety of other metrics (Zhou *et al*., 2016).

Supply chain cost collaboration techniques transcend the transactional cost benefits that are generally provided by supply chain integration by adding strategic advantages (Bengtsson & Wang, 2014). This includes identifying ways of reducing costs and increasing revenues through activities such as joint product development and joint inter-organizational cost controls (Benavides & de Eskinazis, 2012).
Therefore, the following hypothesis was tested:

H_{03}: There is no significant relationship between cost collaboration and strength of B2B relationship amongst ICT SMEs in Kenya

2.3.4 Supply Chain Collaboration and Risk Management Collaboration

Risk management is the identification, evaluation and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor and control the probability of occurrence and the impact (Lavastre *et al.,* 2014; Juttner *et al*., 2010). Wright (1999) argued that risk management is a process of establishing and maintaining information security inside an organization. The core of risk management is risk evaluation (Zsidisin & Wagner, 2010; Wieteska, 2016). In other words, through supply chain risk evaluation, SMEs can take appropriate measures for cost-effectiveness.

Supply chain risks could also refer to the likelihood and effect of a mismatch between supply and demand emanating from environmental (Spulick, 2015), organizational or supply chain-related variables which cannot be predicted with certainty and which affect supply chain performance (Waters, 2011). All facets of the supply chain should be fully visible to all trading partners, from the minor to the major.

This means that trading partners should have access to production information all the way up to sales and customer data (Lim, 2010; Zsidisin & Wagner, 2010). It will be impossible to manage risk if some of the information is hidden (Waters, 2011; Vanany *et al.,* 2009). Donk *et al.* (2008) posit that uncertainties and complex business conditions increase the need for collaboration. Risk outcome variables in supply chain are costs or quality, that is, the different forms in which the variance becomes evident (Yaakub & Mustafa, 2015). For instance, bullwhip effect caused by the multiple stages in the supply chain coupled with lags in responses, turning around a small initial demand shock to trigger larger variations in demand further back into the supply chain (Bhattacharyya, Datta & Offodile, 2010; Zsidisin *et al.,* 2005).

Agility and pragmatic approach in supply chain collaborations along with supply chain visibility and risk management will enable organizations to sustain their business and remain competitive in the market (Dabhilkar, Bengtsson & Lakemond, 2015). Whereas systemic risk in the financial system has received the most attention in the recent past, owing to the financial meltdown of 2008 in the United States, its effect on SMEs in developing worlds has not been emphasized.

The risks of disintermediation within supply chain where retailers go direct to manufacturers and manufacturers going direct to end customers are real in today's global markets (Samel, 2012). Risk management collaboration in supply chain can potentially reduce risk through pooling of resources and spreading of risks (Wieteska, 2016). This is an economy of scope that go together with economies of scale and comparative advantage that motivate the creation of such networks (Waters, 2011; Samel, 2012).

Supply chain risks are diverse resulting from the interconnection of geologically and institutionally distant actions, that includes risk of disruptions due to trade policy changes (Giannakis & Papadopoulos, 2016) , variations in product demand, natural events and risks emanating from actions of human beings such as climate change due to pollution (Waters, 2011; Wieteska, 2015). Multinational companies which have more diversified suppliers are in a better position to overcome such risk as opposed to SMEs which are smaller in size. The term near-shoring is seen by many as a method of reducing supply chain risks by reducing product risks in the form of obsolete inventories held in the supply chain and disruption risks (Samel, 2012; Waters, 2011).

Increasing regulations on issues such as product safety, human rights and conflict minerals such as diamonds from Liberia in West Africa, are driving supply chain partners towards greater collaboration so as to jointly forestall such reputational risks. For instance, the fire that broke out at a Phillips semiconductor plant in 2000 disrupted production and eventually caused Ericsson $400 million loss (Chopra & Sodhi, 2014).Further, the tsunami, earthquake and the subsequent nuclear catastrophe that occurred in Japan in 2011 caused Toyota production to drop by 40,000 vehicles, costing the company $72 million in profit per day (Pettit, Croxton & Fiksel, 2013).

As natural disasters are hard to predict or prevent, the focus must be on making the right decisions within business relationships to reduce supply chain network vulnerability and improve recovery capability (Chopra & Sodhi, 2014; Mentzer & Gundlach, 2010). Geopolitical disruptions encompass a range of potential disruptions including conflict and unrest, piracy, terrorism, organized crime and corruption (Pettit *et al*., 2013).

The on-going concern about the effects of terrorism on global supply chains is illustrated by the cumulative increase in security expenditure among major powers in the west (Pettit *et al*., 2013). Areas where terrorism or limited law enforcement is prevalent such as Somalia, pose greater risks to SMEs in terms of movement of goods within the supply chain. This necessitates the need for SMEs to employ a dual approach to risk reduction and increased network resiliency within supply chain collaboration (Chen *et al.,* 2013; Liu *et al*., 2013; Vanany *et al.,* 2009). From this discussion, the following hypothesis was proposed:

H_{04}: There is no significant relationship between risk management collaboration and strength of B2B relationship amongst ICT SMEs in Kenya

2.4 Description of the Dependent Variable

This section describes the dependent variable (strength of B2B relationship) in relation to the study. This study was limited to e-commerce model of B2B relationship.

2.4.1 Business-to-Business Relationship

It is anticipated that B2B e-commerce will cause businesses to transform themselves through supply chain to become virtual organizations, reducing business costs, improving quality, reducing delivery lead times and improving performance (Chong *et al.,* 2010; Alrubaiee *et al*., 2012). Web technologies enable B2B partners to enjoy sharing of real-time market information and dynamic pricing (McGrath & Mores, 2001).

The sharing makes it easier than ever before to incorporate the invisible hand of the market and rely on price as a critical market-making mechanism (Brennan *et al.,* 2010). By aligning B2B e-commerce SMEs and other firms can free up scarce human resources to do more value-adding activities (Chong *et al.,* 2010). A good example is Cisco based in the United States of America; which has automated the routine marketing and selling activities of its sales force. This has enabled its sales force to focus more on complex activities including customer care, customization of products, market analysis and proactive marketing to potential customers (Morgan *et*

al., 2009; Alrubaiee *et al*., 2012). McGrath and Mores (2001) in their study on the use of e-commerce to improve Australian pharmaceutical supply chain efficiency within the healthcare sector reveals that e-commerce improved level of data and systems integration.

2.5 Empirical Review

Cao and Zhang (2011) studied supply chain collaboration: Impact on collaborative advantage and firm performance, they revealed that supply chain collaboration affected the organizations performance. They offered theoretical and empirical insights on supply chain collaboration that improved collaboration among partners. The tentative context involved the paradigm of collaborative advantages for the organization. The authors found the large-scale measurements of collaborative advantages prompted validations of second-order constructs that gathered relationships between small and large firms proportional to statistical significance. Banerjee and Ma (2012) studied the B2B e-markets framework of four SMEs and contend that changes in environmental characteristics, organizational characteristic and perceptions of e-business over time influence movement along the routinization course. While Hadjikhani and LaPlaca (2013) noted the significance of changing the B2B marketing model to relationship marketing could result in an improved competitive advantage and relationship.

Besides, Pedro and Aleda (2012) developed a new construct of B2B e-service capability, a term that captures a broad set which comprise five interrelated and complementary dimensions, that is, e-customization, e-service recovery, service portfolio comprehensiveness and ease of navigation. The results of the study showed that service orientation and customer receptiveness to technology are two factors influencing B2B e-service capability. Chang and Graham (2012) in their study on e-business strategy in supply chain collaboration: An empirical study of B2B e-commerce project in Taiwan, investigated six different global organizations based in Taiwan. The supply chain collaboration between B2B, e-commerce and Taiwan's information technology (IT) industry offered the authors ingenuity and interrelation in the study that demonstrated concise collaboration. The delicate perspective utilized various theoretical viewpoints following assimilated literature based upon e-business strategies, B2B collaborative advantages, and supply chain performance.

A study by Anbanandam *et al.* (2011) measured the extent of the collaboration between apparel retails and manufacturers in the retail industry in India. They employed a quantifiable method that classified variables such as information sharing, trust between supply chain partners, management commitment, long-term relationships, risk and incentive sharing. The hypothetical basis for the study included statistical analyses that advanced further collaboration among supply chain partners. The findings showed that there is a positive relationship between collaboration and operational performance. They also conveyed the research through a well-organized study that produced a collaboration index.

Fawcett *et al*. (2012) reported the essential components of supply chain collaboration that included the role of the environment, nature of the system design and system goals relative to the expected outcome. The data was acquired through a qualitative approach of systematic interviews set up over time. The framework of assumption in this study was made-up of systems design, change management and competency development that viewed the dynamic interaction within the firm. The clarity of the study delivered indisputable data analysis that transforming supply chain collaboration environments improved organizational performance.

Kumar and Banerjee (2014) on recognition of development and measurement of supply chain collaboration index arranged cooperative activities in terms of importance. The methodology utilized for the study weighted the index variables and suggested that the main mechanisms of supply chain collaboration draw competitive advantages through achieving superiority in core competencies. Nour-Eddine, Oussama and Houda (2013) examined the collaborative behaviors between key suppliers and the effects on logistics and organizational performance in the food, textile, and leather industries offered an essential outlook on global supply chain management collaboration. The authors utilized survey and interview approach to gather information from the respondents. The findings indicated that the collaborative behaviors resulted in positively related logistics and organizational performance.

Lado *et al.* (2011) empirically investigated the degree to which customer focus drives the development of supply chain relational capabilities and performance. Supply chain capabilities were operationalized as a multidimensional construct comprised of

four factors: long-term relationship, collaborative communication, cross-functional teams and supplier involvement. The study used relationship marketing theory as the backdrop for building their research model. Consequently, in line with relationship marketing theory; the study proposed customer focus as the key to driving strategy formulation, business growth and achieving better performance

2.6 Critique of the Existing Literature

Simatupang and Sridharan (2005) sought to determine supply chain collaboration using the following measures: incentive alignment, information sharing and synchronization practices. The study also measured supply chain collaboration in terms of information sharing, joint planning and decision making. However, future studies should consider the incentive alignment, risk and reward-sharing scope and joint performance evaluation scope of supply chain collaboration (Olorunniwo & Li, 2010).

Begin and Boisvert (2002) analyzed strategic factors that influence e-commerce implementation in Canada. They did a micro level study to discover these factors. In their study focus was to identify the developments within the firm that were influencing e-commerce implementation. However, external environment was completely ignored in this study. The study only identified these factors similar to the strength and weakness. It was described as internal factors or inhibitors. The biggest limitation of this study was that it did not take into account any of the external factors and their study does not take into account any statistical analysis of the problems that are affecting the implementation of e-commerce.

Weingarten *et al*. (2010) proposed different levels of information sharing within supply chain as involving strategic, operation and tactical information exchange. However, future research should describe information sharing in different levels depending on the criticality of information being shared. The scope and coverage of information sharing should not just be limited to sharing of databases, this is because firms that are not yet in supply chain collaboration arrangement could be sharing information in areas such as production plans, demand forecasts, material plans and production schedules (Cao & Zhang, 2011).

2.7 Summary of the Literature Review

This chapter covered theoretical review, theories, conceptual framework and literature gaps. The theoretical review has provided a theoretical understanding of the research by reviewing the concepts related to the study. The literature has confirmed that SMEs experience performance related constraints due to high costs, redundant processes, ineffective supply chain collaboration, which consequently impact negatively on their competitiveness. Theories have provided a theoretical understanding of the research by reviewing theories related to this study. Hartley (1997) developed an evolutionary model of learning within alliances. He described how initial conditions may facilitate or hamper learning processes in an alliance. Supply chain partners assess the relationship on the value creation potential, partner behavior and the adjustment capabilities of the partners (Senge & Prokesch, 2010; Nair *et al.,* 2015).

Relationship evaluation is based on effectiveness, equity and adaptability. Relationship marketing theory is a useful perspective offering explanations of several processes or dimensions such as commitment and cooperation (Lavassani *et al*., 2008; Hadjikhani & LaPlaca, 2013). Such dimensions are significant in studying the interrelationships between certain phenomena of the buyer-seller relationship, in regard to information sharing in supply chain management (Wieland & Wallenburg, 2013). Network theory was used in this study to provide a basis for the theoretical analysis of reciprocity in cooperative relationships (Zeng *et al.,* 2010; Sanders, 2007). The organization's constant dealing with other supply chain players becomes a vital factor in the development of new assets (Varadarajan, 2010; Yeng *et al.,* 2015). Relationships combine the resources of two organizations to achieve more innovation and sustainable collaborative advantages than through individual efforts (Zeng *et al.,* 2010).

In Principal-agent theory, long term relationships with vendors (agents) may accord the principal an opportunity to learn about the agents when there may be less need for outcome-based contracts. This may in the long run lead to higher effectiveness, due to the stability of the relationship being dependent on controlling goal conflicts (Byrne & Power, 2014; Plambeck & Gibson, 2010). In this study, agent theory was adopted to support an incentive alignment dimension of supply chain collaboration to

reduce risk factors posed by agents. Even though the course of action that the principal wishes the agent to undertake has been established to a reasonable extent, a motivation problem remains. The principal needs to put in place an incentive structure that motivates the agent to act appropriately (Plambeck & Gibson, 2010).

Stakeholder's theory was used to refer to groups such as customers or employees and also to subgroups of customers and employees, for instance SME sales team, suppliers and managers who may have dissimilar and competing interests (Björklund, 2010). This study noted the need to work as a team within supply chain so as to share real time demand and supply information for planning purposes. Consequently, the synergy in information sharing reduces bullwhip effect and also distortion of market information. The study also noted that there was conflicting goals between different external stakeholders within the supply chain especially between big firms and big vendors. This theory was used to support planning collaboration as a means to reducing conflicting goals among supply chain partners.

Transaction cost economics states that the market governances are ineffective and fail when interactions occur in an environment that has a high level of uncertainty and a small number of prospective partners, whereby the competitive forces are unable to control supplier opportunism (Zhou *et al*., 2016). Further, transaction cost economics states that for firms, the transaction costs involved in managing relationships and interactions with the potential suppliers such as prequalification, negotiating and monitoring execution of the transactions are considerably economically valuable (Wever *et al*., 2012; Williamson, 2008). The adoption of B2B e-supply chain integrations will be able to reduce the governance costs of transactions with external parties relative to the internal coordination costs (Scholten & Schilder, 2015).

However, studies have shown that in spite of the availability of many methods and literature on how firms can manage supply chain collaborations, SMEs still face serious constraints in ensuring efficient supply chain collaboration.

As a result, SMEs continue to engage in redundant and cost increasing processes. However, effective supply chain collaboration and strength of B2B relationship can lead to the acquisition of competitive advantage by, minimizing risks and maximizing value adding processes.

2.8 Research Gaps

Several studies have been undertaken in supply chain collaboration, including Oliveira *et al*. (2011) Supply Chain Process collaboration and Internet Utilization: An International Perspective of business-to-business relationships; Adams *et al.* (2014) in their study on supply chain collaboration, integration, and relational technology: How complex operant resources increase performance outcomes. Ralston (2014) in a study on supply chain collaboration: A literature review and empirical analysis to investigate uncertainty and collaborative benefits in regards to their practical impact on collaboration and performance; Cao and Zhang (2013) in their study on supply chain collaboration and Cao and Zhang (2011) in a study on supply chain collaboration: Impact on collaborative advantage and firm performance.

But none has so far tested effect of supply chain collaboration on the strength of B2B relationship. Furthermore, the few studies that have been done in the area of supply chain collaboration and B2B mostly in the United States of America, Europe and Asia fail to relate supply chain collaboration to B2B relationship. For example, Bayraktar *et al*. (2009) in their study on a causal analysis of the impact of information systems and supply chain practices on operational performance:

Evidence from manufacturing SMEs in Turkey; while Lau *et al*. (2010) investigated the effects of supplier and customer integration on product innovation and performance: Empirical Evidence in Hong Kong Manufacturers. Others are Dung (2015) studied factors affecting the Collaboration in Supply Chain of Mechanical Enterprises in Vietnam; Al-Dmour and Al-Surkhi (2012) in their study on factors affecting SMEs adoption of internet-based information systems in B2B and the value-added on organization's performance.

Besides, only a few studies have been carried out in Kenya on supply chain collaboration including Barasa *et al.* (2015) on the impact of supply chain

collaboration practice on the performance of steel manufacturing companies in Kenya; Bolo and Wainaina (2011) in a study on An Empirical Investigation of Supply Chain Management Best Practices in Large Private Manufacturing Firms in Kenya; Kingoo (2013) in a study on Supply Chain Governance and Organizational Performance among Parastatals in Kenya. However, there is no study in Kenya carried out on effect of supply chain collaboration on strength of B2B relationship. This is an indication that little attention has been paid to supply chain collaboration and strength of B2B relationship model in Kenya.

This study consequently filled in on this existing knowledge gap and added value to existing literature by providing experiential supply chain collaboration and B2B measures that SMEs in Kenya can adopt so as to gain sustainable collaborative advantage. The study relied on descriptive research survey design where the respondents were asked to describe viewpoints on the item in the instrument as at the time of the study.

However, it is evident that some success factors of supply chain collaboration are strategic and dynamic in nature. Hence, a longitudinal study design would be more ideal as it could provide a deeper insight and perspective of the effect of supply chain collaboration on the strength of B2B relationship in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the design and theoretical assumptions behind this research study. Further, it explains the target population, sample size and sampling techniques, data collection instruments, data collection procedure, hypotheses testing and analysis methods. Finally, it highlights the operationalization of the study variables and outlines statistical measurement models used in this study.

3.2 Research Design

This study adopted a positivist philosophy. Positivism adheres to the view that only factual knowledge gained through observation, including measurement is trustworthy (Hair *et al.*, 2010). The researcher assumed an uninterested stance and objectivity in data collection and analysis. Bryman and Bell (2011) asserts that the role of the researcher is limited to data collection and interpretation through objective approach with research findings always quantifiable and observable. Therefore, quantitative approach was essentially used. This approach is strongly linked to deductive testing of theories through hypotheses, while a qualitative approach to research normally is concerned with inductive testing (Cooper & Schindler, 2014). Thus, this study adopted a positivist philosophy so as to enhance objectivity.

Descriptive research survey design is used when the researcher wants to describe specific behavior as it occurs in the environment (Cooper & Schindler, 2014). This study adopted descriptive research survey design. Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to mix relevance to the research purpose with economy in the procedure (Orodho, 2008). Orodho further states that, decisions regarding where, how, when and by what means concerning an analysis or research study constitutes research design. Kothari (2009) view research design as constituting the blue print for collection, measurement and analysis of the data.

Kothari further affirms that, research design incorporates an outline of what the researcher intends to do from writing hypothesis and its operational implications to the final analysis of data. While Cooper and Schindler (2014) states that research design enables the researcher in allocation of limited resources by posing crucial choices in methodology. This method is appropriate where the study seeks to describe the characteristics of certain groups, estimate the proportion of respondents who have certain characteristics and make predictions (Hair *et al*., 2010; Pallant, 2013).

Bartezzaghi (2007) recommends descriptive survey design for its ability to produce statistical information about aspects of study objective that interest policy makers and researchers. Therefore, this research design was appropriate for this study which comprehensively tested and analyzed the relationships between variables. Rodah and Karanja (2016) in their study on Influence of Supplier Appraisal on Supply Chain Risk Management in Egerton University; employed a descriptive survey research design. Barasa *et al*. (2015) in their study on the impact of supply chain collaboration practice on the performance of steel manufacturing companies in Kenya used descriptive survey design.

Descriptive survey design has the ability to ensure minimization of bias and maximization of reliability of evidence collected (Hair *et al*., 2010). It describes the relationship between variables and their influence on dependent variable, giving room for testing hypotheses and validating theories (Field, 2013). This research design is also a quantitative method (Tabachnick & Fidell, 2013). Quantitative method is appropriate since the study is expected to generate substantial quantitative data. Qualitative approach helps the research to go beyond the statistical results reported in the quantitative research and best explains human behavior (Mugenda, 2008; Field, 2013). The researcher used primary data in this study. Mugenda (2008) defined primary data as data the researcher collects from respondents while secondary data comes from other sources. Primary data is considered more reliable and up to date than secondary data. Alrubaiee *et al*. (2012) in their study on Relationship between B2B e-Commerce Benefits, e-Market-place Usage and Supply Chain Management, used primary data collected from a sample of

companies operating in different industries involved in e-commerce in 2011 in Amman, Jordan (Al-bayati, 2011).

3.3 Population of the Study

Kothari (2009) defined population as the large collection of all subjects from which a sample is drawn for research. While target population is defined as a group of individuals, objects or items from which samples are taken for measurement (Field, 2013). The target population is also referred to as the unit of observation which in this case was ICT SMEs in Nairobi City County. While the respondents who are also referred to as the unit of analysis, comprised of SME owners, IT and other managers. The sampling frame was composed of 134 ICT SMEs in Nairobi City County. The rationale behind restricting the population to the aforementioned group is because most ICT SMEs currently using B2B e-commerce are concentrated in Nairobi City County. Further, ICT infrastructure is more developed in Nairobi more than any other part of Kenya making it ideal for e-commerce.

Besides, Nairobi is also the commercial hub of East Africa. To get the total population of registered ICT small and medium enterprises in terms of the use of B2B e-commerce, the researcher obtained a list of 300 SME's from the Communication Authority of Kenya website as at September, 2014 prior to the study. Further, to ascertain the usefulness of the 300 organizations in relation to the study's objective of B2B e-commerce usage, the researcher obtained some of the organizations' contacts and called to confirm whether they were using B2B e-commerce or not prior to the study. For those organizations whose contacts were not available, the researcher paid a visit to their premises through research assistant. Thus, the confirmed number of SME's that were actively using B2B e-commerce was 134, which the researcher utilized as the target population (see appendix III).

The choice of study population limited the study to Nairobi City County thereby excluding the other counties. However, the researcher hopes that the findings from this study can be generalized and replicated in other parts of Kenya and indeed the rest of the world. Paulraj (2011) in a study on understanding the relationships between internal resources and capabilities, sustainable supply chain management

and organizational sustainability, also contacted each firm by telephone to request their participation in the survey.

3.4 Sample Size and Sampling Technique

According to Mugenda (2008) a sample is a small proportion of a population selected for observation and analysis. This sub-set was carefully selected so as to be representative of the whole population. This study utilized purposive sampling which is a sampling technique where a researcher relies on his or her own judgment when choosing members of population to participate in the study (Kothari, 2009). The researcher used purposive sampling to ascertain how many SMEs out of 300 acquired through Communication Authority of Kenya website were using B2B e-commerce. Through phone calls the researcher found 134 SMEs were already using B2B and hence were selected for the study. Further, to determine the size of the sample in this study, the researcher used Yamane (1967) formula. This formula states that the desired sample size is a function of the target population and the maximum acceptable margin of error referred to as the sampling error (Yamane, 1967). The formula that was used to generate sample size as provided by Yamane (1967) is as follows:

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

Where:

n =sample size

N = target population

e =maximum acceptable margin of error (5%)

Therefore, the desired sample size given that there were 134 ICT SMEs using B2B e-commerce as at September 2014 in Kenya is:

$$n = \frac{134}{1+134\ (0.05)^2} \quad \mathbf{n = 100}$$

The study used a 5% margin of error; therefore, 100 respondents were targeted by use of questionnaires. To enable the study findings to be generalized to the whole population, a total of 100 SMEs were requested to participate in the study.

Statistically, in order for generalization to take place the study must ensure that the sample is representative and not biased (Hair *et al*., 2010; Mugenda, 2008). Namusonge *et al.* (2015) in their study on Information Sharing, Cooperative Behaviour and Hotel Performance: A Survey of the Kenyan Hospitality Industry undertook sample size determination using Yamane (1967) formula. The formula resulted in a sample of 50 town hotels either globally or locally managed. While Kingoo (2013) in a study on Supply Chain Governance and Organizational Performance among Parastatals in Kenya, used a target population of 96 parastatals, where she used Yamane (1967) formula to determine a sample size of 77 respondents.

3.5 Data Collection Instruments

Data collection is the method of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses and evaluate outcomes (Pallant, 2013; Field, 2013). The data collection component puts emphasis on ensuring accurate and honest collection of data. Kothari (2009) posit that data collection instruments are means through which primary data are collected in social research. There are a number of ways of collecting data which differ considerably in terms of time, financial costs and other resources available to the researcher (Orodho, 2008). These include mailed questionnaires, self-administered questionnaires, observations, telephone interviews and personal interviews.

This study used a self-administered, structured questionnaire to obtain primary data. Questionnaires consist of a series of specific, short questions that are asked verbally by the interviewer or answered by the respondents on their own (Wooldridge, 2011; Bryman & Bell, 2011). Bryman and Bell further states that the number of closed-ended questions in any survey must exceed those of open-ended questions. This study further utilized customized version of Dillman's (2000) total design method in order to increase response rate. The researcher made numerous calls to respondents requesting them to fill out the questionnaires so as to increase response rate. The questions in a study should be directly related to the research questions (Cooper & Schindler, 2014). Blome *et al.* (2014) in their study on Supply chain collaboration

and sustainability: a profile deviation analysis, sent multiple e-mails soliciting individual's for their participation, which they followed up with telephone calls. Sarah and Ntayi (2010) also used a self-administered structured questionnaire in their study on procurement practices and supply chain performance of SMEs in Kampala. The researcher chose to use questionnaire because it is easy to administer, less costly and less time consuming.

3.6 Data Collection Procedure

Primary data was collected through questionnaires self-administered to the owners, IT and other managers in the selected SME firms based in Nairobi City County with the help of trained research assistants. The researcher/research assistants assured the respondents of high degree of confidentiality and anonymity in the exercise. Qualitative data was collected from research done by other scholars, journals, Internet and from library. Alrubaiee *et al.* (2012) used a self-administered questionnaire in their study on relationship between B2B E-commerce benefits, e-market-place usage and supply chain management.

The reason why the questionnaires were self-administered and collected in person was because the mail survey has been criticized for nonresponse bias. If persons who respond differ significantly from those who do not, then, the results may not openly allow one to say how the whole sample would have responded (Armstrong & Overton, 1977). Generally, there are three methods for estimating non-response bias, that is, comparisons with known values for the target population, extrapolation and subjective estimates. This study adopted extrapolation technique which is based on the supposition that subjects who respond late are more like non-respondents (Armstrong & Overton, 1977).

The most common approach of extrapolation requires the comparison of successive respondent waves and assumes that bias does not exist if no considerable difference exists among the waves on the survey variables (Armstrong & Overton, 1977). Armstrong and Overton further states that successive waves approach is based on last responders or final wave being similar to non-responders. This method only estimates, rather than measure non-response bias. The results were collected as soon as the respondent had finished answering the questions as suggested by Dillman

(2000). Whitten, Green and Zelbst (2012) in their study on triple-A supply chain performance used extrapolation approach by comparing successive respondent waves. The results of the analysis showed that there were no significant changes between the waves.

3.7 Pilot Study

Pilot test is carried out to detect weaknesses in design, instrumentation and to provide proxy data for selection of probability sample (Kothari, 2009; Cooper & Schindler, 2014). The procedures used in pilot-testing the questionnaire was the same as those that were used during the actual data collection. The number of respondents in the pilot-test should be small, usually 10% of the target population (Hair *et al.*, 2010; Mugenda, 2008). In this study research instrument was tested on 10% of the total sample size. This translated to ten respondents. Thawatchai and Sushil (2012) used pilot study in their study on Comparative Study of Supply Chain Relationships, Mass Customization, and Organizational Performance between SME(s) and LE(s). Henry, Rado and Scarlett (2012) conducted pilot-test to evaluate the questionnaire developed in order to find out if potential inconsistencies or errors existed or questions that needed clarifications so as to improve the research instrument, as suggested by Dillman (2000). All the items in the variables were noted to be above the minimum 0.7 which is an acceptable ratings on the Cronbach's alpha.

3.7.1 Reliability of Data Collection Instruments

This is the measure of dependability, consistency or trustworthiness of a test. Reliability is consistency of measurement or stability of measurement over a variety of conditions in which basically the same results should be obtained (Hair *et al.*, 2010; Drost, 2011). Reliability is the extent to which a given measuring instrument produces the same result each time it is used (Mugenda, 2008). Distinctive methods used to estimate and test reliability in behavioral research are; alternative forms, test-retest reliability, inter-rater reliability, internal consistency and split-halves (Tabachnick & Fidell, 2013; Hair *et al.*, 2010).

This study therefore adopted internal consistency method due to its stability over other methods (Cooper & Schindler, 2014). Cronbach Alpha statistic was used to test internal consistency (Hair *et al.,* 2010). Cronbach Alpha measures consistency within the instrument and evaluates how well a set of items measures a given characteristic within the test. To ensure a test is internally consistent, the estimates of reliability must be based on the average inter-correlations among all the single items within a test (Pedhazur & Schmelkin, 2013; Drost, 2011). According to Pallant (2013), where Cronbach's Alpha coefficient is used for reliability test the value should be above 0.7.

The Pearson product-moment correlation coefficient was also used to find out the degree of relationships (Drost, 2011). A correlation is considered strong when the negative result is from -1.0 to -0.5 and when the positive result is from 0.5 to 1.0 (Creswell, 2013; Hair *et al.,* 2010). Alpha is measured on the same scale as the Pearson's Product-moment correlation coefficient and typically varies between 0 and 1. The closer the alpha is to 1, the greater the internal consistency of items in the research instrument (Pallant, 2010; Mooi & Sarstedt, 2011).

Kumar and Banerjee (2014) used Cronbach alpha to check the reliability of the data collection instrument in their study on Supply chain collaboration index: an instrument to measure the depth of collaboration, benchmarking. While Mandal and Korasiga (2016) in their study found all the Cronbach's alpha values were higher than the cut off value of 0.70 as suggested by Nunnally (1978). Further, Cronbach's alpha values demonstrated significant confidence regarding the scales' reliability. Al-Zu'bi (2016) confirmed the reliability of the measurement scales by using Cronbach's α-coefficient. All three scales showed reliability of $\alpha \geq 0.70$ that implied a good reliability and internal consistency as supported by Hair *et al*. (2010). In this study, the reliability of the instrument was estimated using Cronbach's Alpha Coefficient at the acceptable reliability coefficient of 0.7 and above (Nunnally, 1978).

3.7.2 Validity of Data Collection Instruments

This study adopted construct validity. Mugenda (2008) defined validity as the degree

to which results obtained from the analysis of the data actually represent the phenomenon under study. According to Bryman and Bell (2011) validity is described as the degree to which an instrument measures what it purports to measure. According to Drost (2011) there are four types of validity i.e. statistical conclusion validity, internal validity, construct validity and external validity. Construct validity refers to the degree to which a measure assesses the construct it is purported to assess (Drost, 2011; Hair *et al.,* 2010). Therefore construct validity checks whether a measure of a concept relate strongly with another measure that it should strongly correlate with and negatively with measures it should not agree with (Mooi & Sarstedt, 2011; Drost, 2011).

Blome *et al.* (2014) in their study on Supply chain collaboration and sustainability: a profile deviation analysis, used construct validity to confirm instrument validity and the findings were acceptable. Content validity was examined to ensure the instrument answered all the study questions (Cooper & Schindler, 2014). Content validity is a qualitative type of validity where the field of the concept is made clear and the analyst judges openly whether the measures fully represent the domain (Hair *et al*., 2010). Therefore, this study also explored content validity. Based on the analysis of the pilot-test results, the researcher made corrections, adjustments and additions to the research instrument. Exploratory Factor Analysis (EFA) was also used to validate hypothetical constructs by clustering those indicators or characteristics that appeared to correlate highly with each other (Brett, Ted & Andrys, 2012).

3.8 Data Processing and Analysis

Data analysis is the application of logic to understand the data that has been collected with the aim of determining consistent patterns and summarizing the relevant particulars revealed in the research (Pedhazur & Schmelkin, 2013). Data processing involves editing, categorization and tabulation of data collected so that they are agreeable to analysis. Consequently, data entry translates information gathered by primary methods to a medium for viewing and handling (Cooper & Schindler, 2014; Pallant, 2013). The Statistical Package for Social Sciences (SPSS) version 21.0 was used for data entry, cleaning, analysis and administration of the exploratory factor

analysis (EFA). Other software application used was Ms-Excel for case cleaning, screening of variables and as transit software since the data from SPSS was saved in Ms-Excel.

Mandal and Korasiga (2016) tested the scale reliability of the measurement items using Exploratory Factor Analysis (EFA), the results portrayed high communalities showing that the majority of the measures variance was explained by the constructs and indicated item appropriateness. Ashenafi *et al.* (2016) in their study on Analysis of the Supply Chain and Logistics Practices of *Warqe* Food Products in Ethiopia, computed descriptive statistics using MS Excel and IBM SPSS Statistics software version 22. While Vurro, Russo and Costanzo (2014) in their study on Sustainability along the Value Chain: Collaborative Approaches and their Impact on Firm Performance relied on the statistical software SPSS to perform data analysis. Measurement is the assignment of numbers to an object that reflects the degree of possession of a characteristic by that object (Hair *et al.*, 2010).

This study used a 5-point Likert scale method of summated ratings where respondents were asked to record their opinion ranging from strongly agree to strongly disagree. Strongly agree represented 5 while strongly disagree represented 1 on the Likert scale. According to Sekaran and Bougie (2010) Likert scale is essentially an interval scale designed to examine how strongly subjects agree or disagree with a statement. This scale was suitable for the study as it provided an interval or ratio based scale.

Hair *et al.* (2010) points out that Likert scale is the most powerful scale for statistical analysis while Kothari (2009) on the other hand, posit that 5-point Likert scales are used because they are more reliable and can provide more information. Likert scaling is a unidimensional scaling method whose concepts are generally easier to understand. The participants were asked to either agree or disagree with the statements using a 5-point Likert scale where 1=strongly disagree; 5=strongly agree. Blome *et al.* (2014) in their study on Supply chain collaboration and sustainability: a profile deviation analysis used a 5-point Likert scale. While Vurro *et al.* (2014) asked respondents to rate each item on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The final sample included 91 usable responses, representing a response rate of 91%.

This study further employed factor analysis as a means to confirming expected correlations between variables. The main purpose of factor analysis is to investigate if some factors can be found from a larger number of variables i.e. the results on the variables can be explained by a smaller number of hidden variables (Tabachnick & Fidell, 2013). Thus, the method is used with a pure descriptive purpose and no further factor scores being performed (Cooper & Schindler, 2014; Mugenda, 2008). Correlation between variables is a measure of how well the variables are related (Pallant, 2013; Hair *et al.*, 2010). The most common measure of correlation in statistics is the Pearson Correlation, which shows the linear relationship between two variables (Tabachnick & Fidell, 2013; Creswell, 2013). This study used Pearson correlation to test the correlations between independent and dependent variables.

The model which was tested for each of the four independent variables is represented by:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon.$$

So that;

$$Y = \beta_0 + \beta_1 IC + \beta_2 PC + \beta_3 CC + \beta_4 RMC + \varepsilon.$$

Where:

Y=Strength of B2B relationship

X1=IC: Innovation Collaboration

X2=PC: Planning Collaboration

X3=CC: Cost Collaboration

X4=RMC: Risk Management Collaboration

ε= Error margin

The t-test is a test for significance of an independent variable (Hair *et al.*, 2010). The study used t-statistics to test whether the hypothesized model was significant at 95% significance level. It was used to determine significance, for example:

H_0: βj=0 on Y

Versus;

H_1: βj ≠0 on Y

For j=1, 2, 3, 4

If H_0 is true, it implies that xj has no significant influence on Y. If H_1 is true; it implies that xj has an influence on Y. The reason for doing an ANOVA test is to see if there is any difference between groups on some variable (Pedhazur & Schmelkin, 2013). It separates the total variability found within a data set into two components: random and systematic factors (Hair *et al.,* 2010). The use of ANOVA demands from the material that parametric tests can be performed, i.e. that the variables have a normal distribution (Field, 2013). All significance levels were set at 95%. The combined effect of independent variables on dependent variable was demonstrated as:

$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

Versus:

H_1: at least one $\beta j \neq 0$ If H_0 is true, it means that innovation, and planning, cost and risk management collaborations have no combined influence on Y. If H_1 is true, then it implies that innovation, planning, cost and risk management collaborations have a significant combined effect on Y.

3.9 Diagnostic Tests

Further, tests were conducted to ascertain the extent to which the study data met the assumptions of multiple linear regression analysis. This was in line with the fact that when the assumptions of various assumptions by statistical techniques are not met, the results may not be valid, resulting in either type I or type II error, or under or over-estimation of significance (Field, 2013; Kothari, 2009). Kothari (2009) highlights that violation of assumptions lead to serious biases and meaningless results. Hence, assumptions relating to normality of data, heteroscedasticity, multicollinearity and linearity and non-response bias were conducted. Normality is important in knowing the shape of the distribution and helps to predict dependent variables scores (Pallant, 2013). To test for normality, degree of skewness and kurtosis were applied.

3.9.1 Test for Heteroscedasticity

Heteroscedasticity means a situation in which the variance of the dependent variable varies across the data, as opposed to a situation where Ordinary Least Squares (OLS) make the assumption that variance of the error term is constant (Nordgaard *et al*., 2010; Field, 2013). Heteroscedasticity makes analysis complex because many methods in regression analysis are based on an assumption of equal variance (Cooper & Schindler, 2014). To test heteroscedasticity, Breusch-Pagan/ Cook-Weisberg test of detecting heteroscedasticity in linear models was used (Tabachnick & Fidell, 2013).

3.9.2 Test for Multicollinearity

Multicollinearity was tested using variable inflation factor (VIF) and Tolerance statistics. Multicollinearity is the undesirable situation where the correlations among the independent variables are strong (Martz, 2013; Hair *et al.,* 2010). Multicollinearity is assumed to be present where Variance Inflation Factor (VIF) is less than 10 and Tolerance greater than 0.1 (Mason & Perreault, 1991; Talavera, 2013).

3.9.3 Test for Linearity

To ensure linearity, outliers ought to be identified and removed from the data (Tabachnick & Fidell, 2013). Hair *et al*. (2010) asserts that linearity can be fixed by removing outliers. Assumption of linearity which is consistent relationship between the independent and dependent variables makes regression easy.

3.9.4 Non-Response Bias

Non-response bias means that, since the non-respondents are dissimilar from the respondents, the result of a study is not representative of the population from which the sample was taken from (Armstrong & Overton, 1977). Non-response bias occurs in statistical surveys if the answers of respondents differ from the potential answers of those who did not answer (Armstrong & Overton, 1977). The main reason why non-response bias analysis is done is to ensure that the non-respondents are more

similar to the late respondents than they are to the early respondents. A common technique of measuring non-response bias involves comparing the first and fourth quartiles of responses for differences in demographics and key constructs. If their answers don't differ significantly from those who answered the survey, there might be no non-response bias. In this study, the extrapolation technique proposed by Armstrong & Overton (1977) was used to estimate non-response bias.

The significance in the differences between the means was tested at 95% confidence level using t-test. The assessment of non-response bias was done by comparing the means of the characteristics of early and late responses. The student test (t-test) results revealed no significant differences between early and late responses (p=0.05) providing evidence of a representative and unbiased research sample. Mandal and Korasiga (2016) in their study on An integrated-empirical logistics perspective on supply chain innovation and firm performance, tested for non-response bias by comparing the early and late respondents and found that there were no significant mean differences between the groups on key measures such as firm size and industry affiliation.

3.9.5 Normality Test

The normality of data distribution was evaluated by examining its skewness and kurtosis (Pallant, 2013). A variable with an absolute skew-index value greater than 3.0 is extremely skewed whereas a kurtosis index greater than 8.0 is an extreme kurtosis (Hair *et al.*, 2010; Pallant, 2010). Cunningham (2008) posits that skewness index smaller than an absolute value of 2.0 and an absolute value of 7.0 is the least breach of the assumption of normality. Kurtosis which is a measure of the "peakedness" or "flatness" of a distribution was used in testing the normality of the study variables (Field, 2013; Pallant, 2013). A kurtosis value near zero indicates a shape close to normal. A negative value indicates a distribution which is more flat than normal, and a positive kurtosis indicates a shape peaked than normal (Pedhazur & Schmelkin, 2013). A kurtosis value of +/-1 is considered very good for most empirical use, but +/-2 is also usually acceptable (Mooi & Sarstedt, 2011).

Further, to test the null hypothesis that the data on dependent variable was normally distributed, Kolmogorov-Smirnov and Shapiro-Wilk statistics were used. The

Kolmogorov-Smirnov test compares the shape of two cumulative distribution functions to test the hypothesis that two samples come from a population with the same distribution shape (Mooi & Sarstedt, 2011; Creswell, 2013). Kolmogorov-Smirnov and Shapiro-Wilk statistics is used to compare an observed cumulative distribution functions to an expected normal cumulative distribution, but there are biases because it uses the sample mean and standard deviation to estimate the population mean and standard deviation, so the Shapiro-Wilk test is better for testing normality (Green & Salkind, 2011; Pallant, 2013).

3.10 Factor Analysis

Exploratory Factor Analysis (EFA) was employed in order to identify the constructs that were thereafter regressed against the dependent variable (Hair *et al.*, 2010; Tabachnick & Fidell, 2013). Prior to carrying out EFA, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity were done. These tests were conducted to confirm whether there was a significant correlation among the variables to warrant the application of EFA (Field, 2013; Creswell, 2013).

The KMO statistics vary between 0 and 1. A value of zero indicates that the sum of partial correlation is large relative to the sum of correlations indicating diffusions in the patterns of correlations, and hence factor analysis likely to be inappropriate (Tabachnick & Fidell, 2013). A value close to 1 indicates that the patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors (Mooi & Sarstedt, 2011; Pedhazur & Schmelkin, 2013).

Mostafa *et al*. (2016) in their study on The Impact of Supply Chain Relationship Quality and Cooperative Strategy on Strategic Purchasing, used Kaiser-Meyer-Olkin (KMO) and the result was 0.689 showing that the sample size was enough. Further, the significance in Bartlett test was lower than 0.05 which indicated a high level of reliability for the questionnaire. Bartlett's Test of Sphericity tests the hypothesis that one's correlation matrix is an identity matrix, which would indicate that the variables are unrelated and therefore unsuitable for structure detection (Hair *et al.,* 2010). Small values ($p < 0.05$) of the significance level indicate that a factor analysis may be useful with one's data (Hair *et al.,* 2010). The values obtained from the two tests indicated factor analysis to be appropriate.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

The main objective of this chapter was to provide the analyses of the results, interpretation of the results and findings. In this chapter, quantitative and qualitative analyses as well as inferential analyses were undertaken. The chapter shows the results of the statistical analysis as well as test of hypotheses and concludes with extensive discussion of the results and findings of the study.

4.2 Response Rate

Response rate is the percentage of all questionnaires returned. A total of 100 questionnaires were distributed and a total of 91 were returned. Nine (9) SMEs did not return the questionnaires citing the fact that they were busy and could not participate. This resulted in a response rate of 91% which was quite adequate for the study. Mugenda (2008) observed that a 50% response rate is adequate, 60% good and over 70% rated very good while Babbie (1990) stated that a response rate of 50% or more is adequate for a study. Hence, a response rate of 91%, taking cognizance of the nature of the study, is quite sufficient. The high response rate could be attributed to the data collection procedure where the researcher pre-notified the potential respondents i.e. business owners and managers of the intended visit.

Self-administered questionnaires were issued to the respondents who filled in and were picked shortly after. Where necessary, follow up calls were made to clarify queries as well as urge the respondents to spend a shorter turnaround time to fill in the questionnaires. Al-Zu'bi (2016) in a study on Collaboration with Suppliers and Lead Users in New Product Development and Open Innovation: Empirical Evidence from Jordanian Companies, paid visits personally to all companies in order to ensure a high participation rate in data collection. The study yielded a response rate of 52.8%.

In another related study carried out by Oliveira *et al*. (2011) on Supply Chain Process Collaboration and Internet Utilization: An International Perspective of Business-to-

Business Relationships in Brazil, response rate realized was 21.4%. While a study by Blome *et al.* (2014) on supply chain collaboration and sustainability: a profile deviation analysis yielded a response rate of 18.5%.Only very few studies have crossed the 50% mark, for example the study by Alrubaiee *et al*. (2012) on Relationship between B2B E-Commerce Benefits, E-Market-place Usage and Supply Chain Management realized a response rate of 63%.

The low response rate realized by the three scholars in the above studies might be attributed to administration of data collection instruments via mail to the respondents instead of self-administration. Most people do not read their e-mails frequently while others may possibly have changed their e-mail addresses. Postal mailing has the risk of inefficiency of the service provider which may result in low response rate (Dillman, 2000). However, self-administering means meeting face-to-face with target respondents, which may lead to high response rate due to respect for the effort made. Table 4.1 summarizes the response rate in this study:

Table 4.1: Response Rate

Response	**Frequency**	**Percentage (%)**
Responded	91	91
Not responded	9	9
Total	**100**	**100**

4.3 Reliability Analysis

The reliability of an instrument refers to its ability to produce consistent and stable measurements. Most of the measures are usually geared towards not only hypothetical meaning of the focused construct but also measurement error (Creswell, 2013). Reliability can be viewed from two dimensions i.e. reliability referring to the extent of accuracy and unreliability referring to the extent of inaccuracy (Hair *et al.*, 2010). It is important to validate the construct so as to filter the measures of inaccuracies before testing the hypotheses (Pallant, 2013).The most common reliability coefficient is the Cronbach's alpha, which estimates internal consistency by determining how all items on a test relate to all other items and to the total

internal coherence of data. Reliability is expressed as a coefficient between 0 and 1(Drost, 2011). The higher the coefficient, the more reliable the test is.

Table 4.2: Reliability Test of Constructs

Variable	Cronbach's Alpha	Mean	Std. Dev	Items	Acceptability
IC	0.799	47.1	2.741	11	Accepted
PC	0.805	28.11	3.928	7	Accepted
CC	0.718	35.1	3.772	9	Accepted
RMC	0.757	35.63	4.88	10	Accepted
BB	0.705	38.88	2.875	9	Accepted

Innovation collaboration (IC) had a Cronbach's Alpha of 0.799, planning collaboration (PC) 0.805, cost collaboration (CC) 0.718, risk management collaboration (RMC) 0.757 and business-to-business relationship (B2B) 0.705. Innovation collaboration was measured by 11 constructs and had a mean of 47.1 and standard deviation of 2.741. Planning collaboration was measured by 7 constructs and had a mean of 28.11 and standard deviation 3.928. Cost collaboration was measured by 9 constructs and had a mean of 35.1 and standard deviation of 3.772, risk management collaboration was measured by 10 constructs with a mean of 35.63 and standard deviation of 4.88. Business-to-business relationship on the other hand was measured by 9 constructs and had a mean of 38.88 and standard deviation of 2.875.

Detailed reliability test on all the constructs are shown in Appendix VIII. All constructs depicted a value of Cronbach's Alpha above the suggested value of 0.7 thus the study was reliable (Tabachnick & Fidell, 2013; Cooper & Schindler, 2014). On the basis of reliability test, the scales used in this study were reliable to capture the constructs. Therefore, the study variables could be relied upon to determine the relationship between supply chain collaboration and strength of B2B relationship. Yeng *et al.* (2015) in their study on E-Commerce Adoption among Small and Medium Enterprises (SMEs) in northern state of Malaysia, used mean and standard deviation that indicated the respondents averagely agreed with the questions in general. The findings indicated that the constructs of the study's theoretical framework possessed convergent validity, as seen from the standardized factor

loadings of the items that are mostly greater than 0.7 and not less than 0.5 (Drost, 2011). The difference is minimal, hence this was considered acceptable since it compared well with previous studies by Mandal and Korasiga (2016) in which all the Cronbach's alpha values were higher than the cut-off value of 0.70 as suggested by Nunnally (1978). Further, Cronbach's alpha values demonstrated significant confidence regarding the scales' reliability.

4.4 Validity of Data Collection Instruments

Validity is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study (Hair *et al*., 2010). Validity also refers to the degree to which an instrument measures what it purports to measure (Drost, 2011; Mugenda, 2008). Validity therefore, is concerned with the meaningfulness of research components. Therefore, it is significant to confirm the construct and fine tune the measures before testing the hypotheses. Convergent validity is the degree to which item associated to a specific construct are sharing high proportion of their covariance (Drost, 2011; Pallant, 2013). The questionnaires validity was determined using construct validity method. Construct validity is the degree to which test measures an intended hypothetical construct (Hair *et al.*, 2010; Mugenda & Mugenda, 2003).

This study adopted construct validity. The study dealt with different groups of experts in the field of supply chain management, who were issued with the questionnaires. Draft questionnaires were given to a panel of five experts in the field of supply chain management, especially those familiar with the utilization of B2B e-commerce. These experts were asked to review the instrument and make recommendations for improving its validity. The recommendations were then incorporated into a second draft which was then given to a small sample of the relevant professionals. Where relevant, these comments were incorporated into a third draft of the test instrument. Factor analysis was then used to obtain loading for the study constructs. Brett *et al*. (2012) cited a loading of 0.32 for minimum loading of an item, equivalent to approximately 10% overlapping variance with other items in that factor.

Cooper and Schindler (2014) recommend that factor loadings greater than 0.3 in absolute value are considered to be significant, while Creswell (2013) indicated that a factor loading of 0.40 should be used when factor analysis is used to refine construct validity. This study used a threshold of factor loading of 0.4 to assess validity of the variable constructs. This was consistent with a study by Zhou, Chong, Zhen and Bao (2016) in their study on E-Supply Chain Integration Adoption: Examination of Buyer–Supplier Relationships, found factor loadings were all greater than 0.5, no items were deleted in measuring the constructs. While Al-Zu'bi (2016) in a study on Collaboration with Suppliers and Lead Users in New Product Development and Open Innovation: Empirical Evidence from Jordanian Companies, where construct validity factor loadings were greater than 0.40 and eginvalue greater than 1 (Hair *et al.*, 2010).

4.5 Firm Demographics

Demographic features of SMEs were gathered and reviewed. The analysis was based on the information provided by the respondents in the questionnaire. The data included, gender, level of education, years worked, designation and number of employees were captured and the results shown in figure 4.1.

4.5.1 Respondents' Gender

The study sought to determine the gender of the respondents and the results indicated that majority (67%) of the respondents were female while a few (33%) were male. The high number of female respondents could be attributed to the fact that, the new constitution has empowered women economically. The empowerment can be seen through various statutory regulations such as the gender parity rule, provision of business loans through Uwezo Fund, Women Fund and 30% Government procurement reservation for women, persons with disability and youths. The findings also implied more women involvement in entrepreneurship. Figure 4.1 shows graphical presentation of respondents' gender:

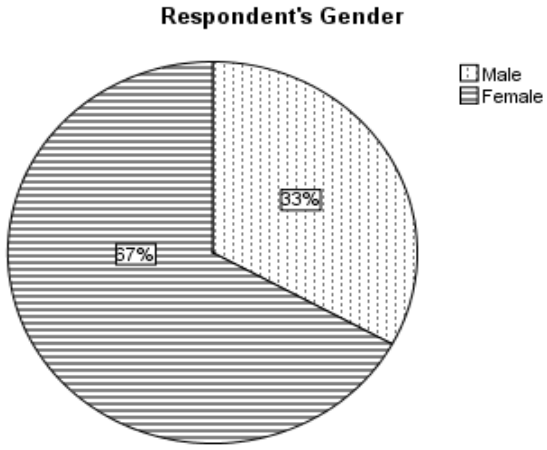

Figure 4.1: Gender of the respondents

The invention of electronic commerce has radically increased market penetration, visibility and transparency through B2B platforms within supply chains (Oh, Lee & Yang, 2015). The invention of social media has also made it easy for news to travel faster within supply chain courtesy of mobile phones. This finding can be an indication of the role of women in driving B2B e-commerce and supply chain collaboration in ICT SMEs especially in organizations where women hold decision making positions.

4.5.2 Respondent's Education Level

When asked about the level of education, majority (81%) of the respondents indicated that they had undergraduate qualifications, (15%) indicated they had post graduate qualifications while a few (4%) indicated they had diploma level in qualification. No respondent registered a certificate level of education in this study. Notably, majority of the respondents had under graduate and post graduate qualifications. The high level of education exhibited by the respondents could be attributed to the need for strategic relationships building skills due to globalization. It could also be credited to the accessibility of education facilities in Kenya leading to availability of skilled workforce needed to spur B2B e-commerce. Highly skilled employees will ensure things are done right first time, and will promote development of sustainable innovative ideas in B2B relationship, processes and products.

A study by King and McGrath (2002) on Globalization, Enterprise and Knowledge, found that the education of the owner is positively related to the success of the business. Consistent with the findings of this study, majority of the respondents were well above diploma level. Highly skilled employees are an asset that can guarantee the supply chain competitive advantage over competitors. Skilled staff will instil the culture of quality management and will ensure reliable capacity planning and forecasts within the supply chain. Figure 4.2 shows respondents' education level:

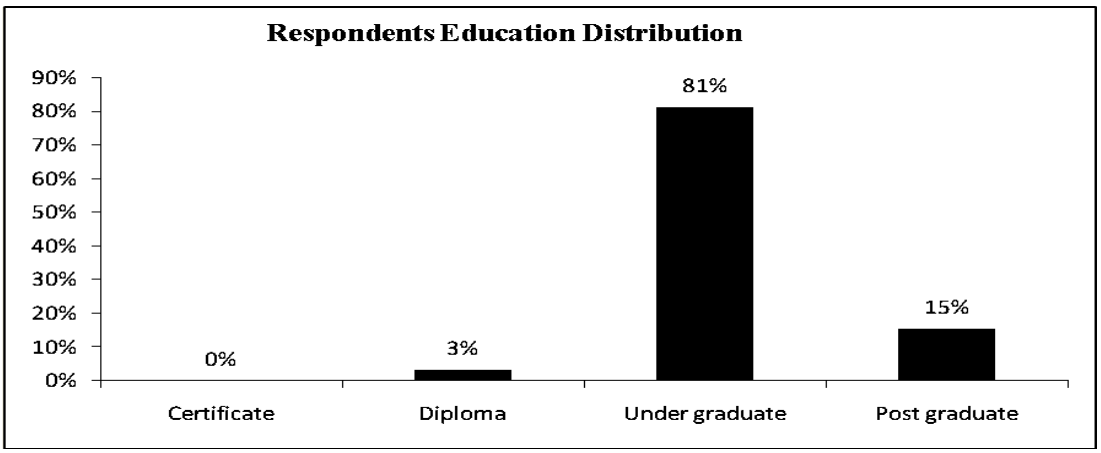

Figure 4.2: Respondents' Education Level

4.5.3 Respondent's Number of Years Worked

This part sought to determine the number of years the respondents had worked in SMEs under B2B e-commerce platform. Majority (46%) of the respondents indicated that they had worked under B2B e-commerce in their firms between 5 to 10 years, 33% said they had worked for less than five years while a few (21%) of the respondents indicated that they had worked for over 10 years. Most of the respondents had worked long enough in their respective SMEs, indicative that they were well versed with the study topic and would tend to be more reliable source of information. Supply chain collaboration is all about long-term relationships with supply chain partners that are characterized by teamwork and mutual trust (Vieira, Paiva, Finger & Teixeira, 2012). Figure 4.3 shows the respondents' years worked:

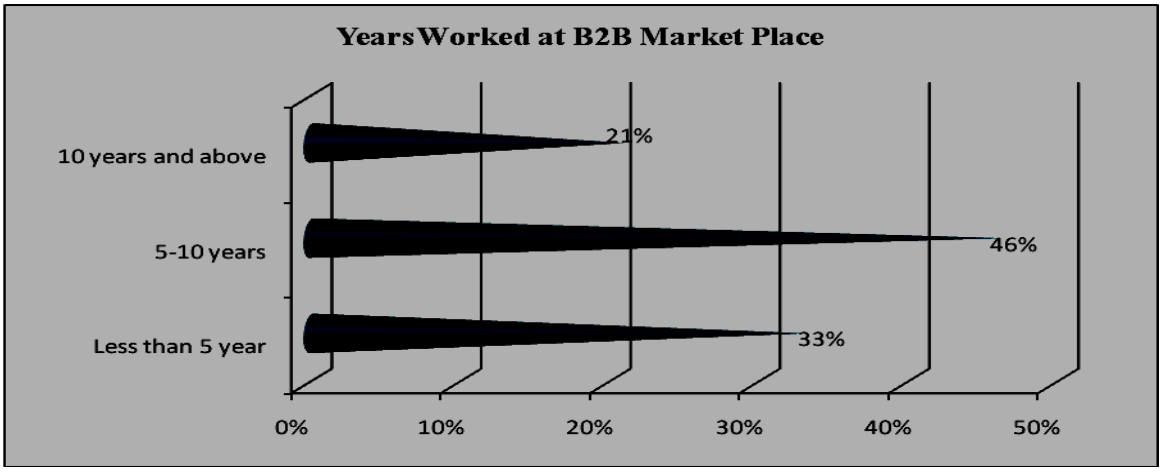

Figure 4.3: Years Worked at Business-to-Business Market Place

4.5.4 Designation of Respondents

The study sought to know the position held by respondents in their firms, majority (40%) of the respondents said they were information technology managers, 38% of the respondents indicated that they were owners of the SMEs while (22%) indicated other manager. The designation of the respondent determines the ability of the respondent to provide accurate and reliable information since they have a good understanding of their firm's partnerships.

Table 4.3: Designation of Respondents

Designation	Frequency	Percent
SME owner	35	38%
Information Technology Managers	36	40%
Other Managers	20	22%
Total	**91**	**100**

The high response rate by IT managers could be attributed to the fact that firms under study were all SMEs within ICT sector. SME Owners response rate of 38% could also be attributed to the fact that some firms were small and run by the owners who were available for the study. The low response rate on other managers could be due

to the fact that SMEs do not have many hierarchies and hence the few number of line managers.

4.5.5 Number of Employees

When asked how many employees were employed in their firm, majority (66%) indicated that they had employed 10 to 50 employees, 31% had engaged fewer than 10 employees while a few (3%) indicated employment of 50 to 250 employees. Figure 4.4 shows number of employees:

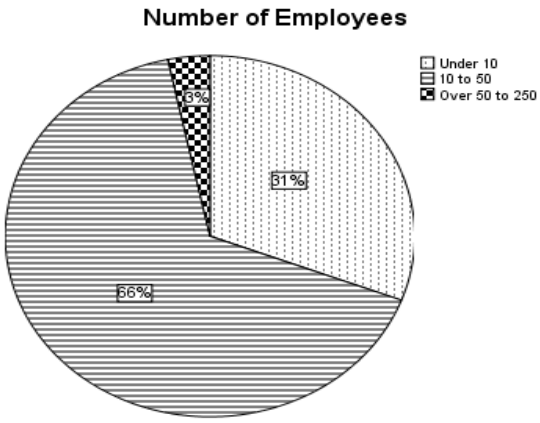

Figure 4.4: Number of Employees

The implication of the findings was that majority of the studied SMEs were small scale enterprises since they had employed 10 to 50 employees. The study actually targeted this group employing 10 to 50 employees. The low response rate for medium sized firms could be attributed to the fact that the SMEs that responded were not in manufacturing business which employs between 50 and 250 employees. This could also be attributed to the high cost of labour in production. Only (3%) of the firms had employed above 50 to 250 employees. The lean workforce can also be attributed to automation of processes in manufacturing such as sales, marketing and production. Automation of operations in supply chain reduces costs by eliminating redundancies since buyers can place orders online thus eliminating human error (Chen, 2010). Use of B2B e-commerce reduces time to market for products which reduces sales team and support mass customization within supply chain (Cheng, 2011; Giannakis & Papadopoulos, 2016).

4.6 Factor Analysis of the Study Variables

The description of factors of the study variables is shown in Appendix IV. This description was pretty helpful in cross referencing given that the factors were used in data analyses, model scrutiny and all through the entire study. Planning collaboration variable had 7 factors, while innovation collaboration had 11 factors, cost collaboration had 9 factors, risk management collaboration had 10 factors and lastly B2B relationship had 9 factors. Consequently, there were 46 factors in total. Jafar, Roland and Paul (2015) in their study on how SMEs can benefit from supply chain partnerships, used 45 factors in total to measure partnerships between firms and their partners.

4.7 Descriptive and Quantitative Analysis of the Study Variables

The research instrument was divided into six sections for each of the research variables, with the first section dealing with respondent's background information. This section offered closed ended questions meaning respondents had to choose from options provided by ticking what suits their response. There were no explanations required. The questions were then subjected to quantitative analysis which involved sorting, classification, open coding and select coding. Thereafter, the answers were analyzed and presented in tables and figures. The next section (B-F) involved the five variables where all respondents were subjected to questions in a 5-point Likert scale in a table. This scale was appropriate for the study since it addressed all aspects of the variables. Vurro *et al.* (2014) used the same format in their study on Sustainability along the Value Chain: Collaborative Approaches and their Impact on Firm Performance where they asked respondents to rate each item on a 5-point Likert scale.

4.7.1 Analysis of Innovation Collaboration amongst ICT SMEs in Kenya

The study sought the extent to which ICT SMEs had collaborated in innovation. To achieve this, the respondents were required to rate a number of statements using a five point Likert scale. The findings are presented in Table 4.4.

Table 4.4: Innovation Collaboration

Innovation Collaboration		SA	A	N	D	SD	Mean	Std. Dev
IC1	%	17.6	75.8	6.6	0	0	4.11	0.482
IC2	%	44	15.3	40.7	0	0	4.03	0.924
IC3	%	22	75.8	2.2	0	0	4.2	0.453
IC4	%	33.0	64.8	2.2	0	0	4.31	0.51
IC5	%	39.6	60.4	0	0	0	4.4	0.492
IC6	%	33.0	60.4	6.6	0	0	4.26	0.574
IC7	%	13.2	80.2	4.4	2.2	0	4.04	0.515
IC8	%	73.6	26.4	0	0	0	4.74	0.443
IC9	%	24.2	73.6	2.2	0	0	4.22	0.467
IC10	%	71.4	26.4	0	0	0	4.67	0.597
IC11	%	19.8	72.5	7.7	0	0	4.12	0.513

When asked whether their organizations were involved in joint product development with their business partners, majority (93.4%) agreed while 6.6% remained neutral. No respondent disagreed. Majority of the respondents considered joint product development as one of the vital components of innovation collaboration. Supply chain collaboration has been touted as an enabler of innovative product development within supply chain which in turn leads to sustainable collaborative advantage. The finding is consistent with that of Khan *et al.* (2012) that integrating product development and supply chain improves resiliency, responsiveness, market position and competitive advantage of a company. The product design process is shifting away from silo design practices to concurrent engineering approach where technology and managerial capabilities interact (Hong *et al.*, 2009; Bianchi *et al.*, 2010).

Hong *et al.* (2009) found that product development and design bears a strategic role and determines the direction and competitive advantage of an organization. Innovation creates new technical skills and knowledge that can be used by SMEs to develop new products and services for end users (Mina *et al.*, 2014). By pooling resources, SMEs can increase specialization levels and innovation within supply chain for product development. Joint product development has the advantage of cost savings and flexibility in development which in turn leads to sustainable collaborative advantage.

On being asked whether their organization was engaged in joint research and development (R&D) with suppliers within the supply chain, majority (59.3%) agreed while 40.7% remained neutral. No respondent disagreed in this case. The finding shows that 59.3% of SMEs are engaging in joint research and development with suppliers for value addition and development of new products. However, it is evident that research and development is expensive for majority of SMEs, no wonder 40.7% of the respondents were neutral. Consequently, through collaboration SMEs are able to tap into research expertise of their supply chain partners and by doing so acquire new technology. Ignoring research and development could also be one of the reasons why most SMEs do not survive the stiff competition in the global supply chain network.

Miozzo *et al.* (2016) in a study on innovation collaboration and appropriability by knowledge-intensive business service firms found a significant positive association between higher research and development investments and the importance of innovation collaboration with other external partners such as suppliers, competitors or private research and development firms. SMEs that are more active in R&D may be more capable of translating external knowledge into internal capabilities, thus improving strength of B2B relationship (Laursen & Salter, 2014; Mina *et al.*, 2014). Given that customer expectations are dynamic in nature, SMEs need to review them regularly to align and refine their customer focus and adjust its research and development strategy (Khan *et al.*, 2012). The ever increasing cost of undertaking research and development and the need for expert skills to create new technologies has encouraged inter-firm networking among SMEs (Arora, Athreye & Huang, 2016; Paulraj, 2011).

When asked whether their organizations continuously devise new processes to reduce cost within supply chain, this study established that majority (97.8%) agreed while 2.2% were neutral. No respondents disagreed. The number of respondents who answered in the affirmative is comparatively high at 97.8%. This shows that majority of the ICT small and medium enterprises surveyed understood the need for continuous improvement as a way of maintaining supply chain agility.

Continuous improvement contributes to improvement of organizational performance as well as process efficiency through reduction of costs by increasing employee productivity, infrastructure capacity and eliminating wastes (Lofti *et al.,* 2013; Wiengarten & Pagell, 2012). SMEs must continually monitor changing market dynamics to ensure that new improvement concepts are in line with customer needs so as to survive turbulent markets.

Asked whether their organizations, suppliers and customers engaged in the process of new product development, majority (97.8%) agreed while 2.2% remained neutral. No respondent disagreed. The overwhelming response of almost 98% is an indication that collaboration facilitates the process of new product development. The involvement of suppliers in new product development increases customer responsiveness, firm performance and competitiveness (Ellram & Martha, 2014; Khan *et al*., 2012). Supply chain collaboration and new product development are correlated since supply chain produces and distributes the product, which is the output of the product developed (Vanathi & Swamynathan, 2014).

According to Oh *et al*. (2015) supporting complicated new product development procedures is important for total production process and maintaining product quality in supply chain. Melander (2014) argued that companies collaborate with suppliers in new product development in order to get access to new or advanced technology that the suppliers may have. Such technological integration may open new opportunities for the buying firm in designing and developing new products by incorporating the supplier's technology as complementary to internal technology (Wisner, Tan & Leong, 2016; Haeussler *et al.,* 2012).

On being asked whether their organization did joint product design with its customers and suppliers, majority (100%) agreed. No respondent disagreed or remained neutral. The affirmative response can be attributed to the changing customer preferences and the need for customized products requiring input from customers at design stage. Gerwin (2004) hypothesized the supply chain collaboration with product design and clearly showed that, in the contractual relationship between buyers and suppliers, synchronization requirement and the ability of coordination in product development are lower than that in integrated product development.

Small and medium enterprises pursuing mass customization and modularity strategies can benefit greatly by involving their customers early in the product design (Lehrer *et al.,* 2013). Such collaboration can increase the number of products offered by the selling firm and enhance the company's innovativeness through increased modularity (Oh *et al.,* 2015; Abdallah & Matsui, 2009). The design, manufacture and supply of customized products typically calls for the exchange of product related information such as customer specifications and technical details across multiple functional areas of supply chain (Abdallah *et al.,* 2016; Lau, Tang & Yam, 2010).

Further, when the respondents were presented with the statement that their organizations jointly developed and implemented quality monitoring systems with their suppliers and customers, majority (93.4%) agreed while 6.6% remained neutral. No respondent disagreed. The 93.4% of the respondents agreeing to collaboration signifies the importance of having quality monitoring systems within supply chain. Quality monitoring significantly improves customer responsiveness and reduces costs associated with product rejects (Singh *et al.*, 2011). Collaborative implementation of quality monitoring systems can enhance supply chain's technical capacity to produce quality products and increase the effectiveness of communications and improve safety of processes (Boiral, 2012; Jauhar, Tilasi & Choudhary, 2012). Closs *et al.* (2011) suggested a training guide for sustainable supply chain management. For supplier training, buyers can consistently work with a supplier to ensure proper knowledge of relationship expectations and product specification standards (Closs *et al.,* 2011).

Respondents were also asked whether their organizations had a platform for receiving customers feedback on products through social media, this study established that majority (93.4%) agreed, 4.4% remained neutral while a few (2.2%) disagreed. The number of respondents who agreed is relatively high at 93.4%, showing that majority of SMEs have social media handles for interaction with customers. The use of social media enhances supply chain visibility and improves strength of B2B relationship.

It is also a pointer that fostering customer relationships through real time interaction can lead to better customer care through information sharing and strength of B2B relationship. The managers of SMEs can take advantage of social media platforms to

market their products and engage with customers. Brady and Cronin (2001) suggested that customers consistently perceive firms that prioritize receiving and responding to customer opinions, as providing not only higher service quality, but also better physical product quality and employee performance.

On being asked whether their organizations developed new technologies within the supply chain, majority (100%) agreed. No respondents disagreed or remained neutral. The number of respondents who answered in affirmative is comparatively high at 100%, indicating that majority of the SMEs managers appreciate the importance of investing in new technologies for sustainable competitive advantage and strength of B2B relationship. The rapid pace of technological change and the demands of customers for new and better products require SMEs to innovate continually and bring these innovations to market as quickly as possible (Koufteras *et al*, 2002; Mandal & Korasiga, 2016). Abereijo *et al.* (2009) discovered that clients and suppliers are the most important sources of technological innovations in Nigerian firms and a source of competitive advantage. Development of new technology has several advantages such as manufacturing flexibility for products with more volatile demand (Bianchi *et al.,* 2010).

When asked whether their organizations had tailored their manufacturing process specifications with those of suppliers, majority (97.8%) agreed, 2.2% remained neutral with no respondent disagreeing. Aligning manufacturing process specification with those of suppliers is important in ensuring seamless integration of functions and promotion of just in time (JIT) production. Majority of respondents responded in affirmative, showing that tailoring of manufacturing process specifications with those of suppliers can improve customer responsiveness and B2B relationship. Manufacturing process synchronization within supply chain will ensure goods are produced right first time and eradicate cost associated with rework. Hadaya and Mentzer *et al.* (2000) in Spulick (2015) findings show that collaboration also resulted in faster product to market cycle times, improved service levels based on stock outs, lead times, quality and a better understanding of end customer needs throughout the entire supply chain.

When respondents were asked whether their organizations created, transferred and implemented new ideas across the supply chain, it was established that majority

(97.8%) agreed. No respondents disagreed or remained neutral. Transferring of new ideas within supply chain enhances innovative culture in SMEs and results in market leadership. The transfer of ideas could also be an indication that SMEs have overcome the challenge of trust which militates against collaboration (Haeussler *et al.,* 2012). Narasimhan *et al.* (2010) argue that external and internal supply chain practices might impact each other as firms might benefit from resources, particularly knowledge, generated within or outside the firm. The benefits of transferring new ideas include improved inventory management, higher sales and better understanding of demand (Mihm, 2010).

Further, the respondents were asked whether their organizations explored joint customization of distribution and warehousing activities within the supply chain, majority (92.3%) agreed while 7.7% remained neutral with no respondent disagreeing. The high response rate is indicative that joint customization of distribution and warehousing within supply chain is vital in enhancing value addition, supply chain visibility and performance. Customization of distribution and warehousing activities include the following benefits such as; better product positioning, cost reductions, improved end customer satisfaction, improved information visibility and increased competitiveness (Al-Zu'bi, 2010). Lejeune and Yakova (2005) opined that interdependence was central to supply chain collaboration performance because it allowed firms to have competitive advantage over others. Analysis conducted by Ou, Liu, Hung and Yen (2010) demonstrated that customer-firm-supplier relationship management improves operational performance and customer experience. The findings imply that ICT SMEs had collaborated in innovation to a large extent hence increasing the strength of B2B relationship.

4.7.2 Analysis of Planning Collaboration amongst ICT SMEs in Kenya

The study sought to establish the planning collaboration practices adopted by SMEs. To achieve this, the respondents were required to rate a number of statements using a five point Likert scale. The results are presented in Table 4.5.

Table 4.5: Planning Collaboration

Planning Collaboration		SA	A	N	D	SD	Mean	Std. Dev
PC1	%	65.9	33.0	1.1	0	0	4.65	0.503
PC2	%	65.9	33.0	1.1	0	0	4.65	0.503
PC3	%	67.0	28.6	3.3	0	1.1	4.6	0.665
PC4	%	14.3	50.5	20.9	12.1	2.2	3.63	0.95
PC5	%	15.4	41.8	26.4	15.4	1.1	3.55	0.969
PC6	%	13.2	39.6	28.6	14.3	3.3	3.46	1.007
PC7	%	16.5	37.4	29.7	14.3	2.2	3.52	1.004

When asked whether their organizations liaised on joint demand forecasting across the supply chain, majority (98.9%) of the respondents agreed that there was joint demand forecasting across supply chain and 1.1% were neutral with no respondent disagreeing. The overwhelming response shows the respondents were confident that supplier collaboration increases the quality of forecast information and strength of B2B relationship. The shared demand forecast information brings additional benefits such as reduced inventories and costs, shortened planning time and enhanced ability to perceive demand fluctuations more quickly (Phan *et al.,* 2011; Oliva & Watson, 2011). Through sharing supply and demand forecast, SMEs can further reduce the 'bullwhip effect' while increasing responsiveness to market demands and customer service (Ding *et al.,* 2011). Balan, Vrat and Kumar (2007) contend that there is need to reduce errors associated with forecast demand, between the nodes of supply chain to allow smooth information flow by reducing the vagueness in the chain.

On being asked whether their organizations had collaborative determination of supply and inventory positioning strategy, majority (98.9%) agreed and 1.1% remained neutral with no respondent disagreeing. About 98.9% of the managers agreed that there was collaborative determination of supply and inventory positioning strategy. This finding can be attributed to probably the use of pull as opposed to push system by SMEs under study. Pull system has the ability to reduce inventory holding since production is based on demand, it also lowers product obsolescence and lead time which has significant impact on the performance of supply chain (Oliva & Watson, 2011). Stiess (2010) pointed out that information sharing helps reduce wasteful activities by improving material flows and reducing inventories.

High levels of information sharing can result in reduced demand amplification, which is highly related to unnecessary inventory levels throughout the supply chain (Stiess, 2010). Corbett *et al*. (1999) found that process improvement in inventory management and order fulfilment led to better results when supply chain partners got involved in aligning joint optimization with logistics and commercial benefits.

Majority (95.6%) of the respondents agreed to the opinion that their organization involved suppliers in minimizing bias as part of reducing forecast error. However, 3.3% were neutral while a few (1.1%) disagreed. This result is an indication that SME managers have invested in ensuring forecast errors are minimized, so as to achieve customer satisfaction by fulfilling customer orders. According to Elkady, Moizer and Liu (2014) collaboration between suppliers and retailers can improve forecast accuracy because suppliers are further away from the customer than the retailers are. Busch (2011) attributes increasing errors in forecasts to diminishing data quality in those instances where each supply chain partner plans individually without a supply chain-wide data exchange. The benefit of information sharing in minimizing forecast error greatly depends on the forecast accuracy of the customer demand in a variable demand environment (Ali, Boylan & Syntetos, 2012). Internet technology has led to the emergence of advanced planning, optimization and scheduling softwares that can minimize bias (Eksoz *et al*., 2014; Masayasu *et al.*, 2015).

When asked whether their organizations had joint development of strategies for planning effectiveness within the supply chain, majority (64.8%) agreed while 20.9% remained neutral and a few (14.3%) disagreed. Nearly 65% of the respondents were in agreement that collaborative development of strategies for planning effectiveness within the supply chain leads to improved strength of B2B relationship. This result clearly shows that SMEs appreciate the benefit of joint strategic supply chain planning that combines aspects of tactical supply chain planning and business strategy formulation. Petersen, Ragatz and Monzca (2005) posit that effective collaborative planning is expected to improve supply chain performance by facilitating decisions that reflect a broad view of the supply chain and take into account interactions among the firms in the supply chain. Potential benefits of collaborative planning include, fewer emergency orders, reduced inventories, fewer

backorders, reduced transportation costs, improved cycle times and customer service (Babai *et al.*, 2013; Qiu, 2007).

Asked whether their organizations liaised with supply chain partners in forecasting and prioritizing demand planning efforts, majority (52.8%) agreed, 28.6% remained neutral while a few (17.6%) disagreed. Slightly over 52% of the respondents agreed that their firms were engaged in prioritization of demand planning with suppliers; clearly indicating how important demand planning is within supply chain. Collaborative demand planning enhances the accuracy of forecasting since all factors affecting that forecast can be viewed by all stakeholders, upstream and downstream (Senge & Prokesch, 2010). Chopra and Meindl (2010) points out that a more accurate forecast can be derived through collaboration with supply chain partners.

When presented with the question whether their organizations carry out joint future product development plans with their suppliers, majority (53.8%) agreed, 29.7% were neutral while a few (16.5%) disagreed. Slightly more than 53% of the respondents were of the opinion that future product development plans were being shared with suppliers which leads to sustainable competitive advantage. Ohno (2009) stated how Toyota has developed the new concept for supplier involvement which benefits from both innovative features and faster launches of products and their support. This contribution begins from simple consultation for design to make the suppliers responsible for their whole design components which will be used in the final product (Ohno, 2009).

The findings indicate that most SMEs had engaged in planning collaboration thereby enhancing the strength of B2B relationship. Walter *et al*. (2001) observed that high-performing collaborative relationships require not only a focus on direct value-creating or buyer-supplier functions, but also an equal focus on the indirect relationship building and sustaining functions for value addition within supply chain.

4.7.3 Analysis of Cost Collaboration amongst ICT SMEs in Kenya

The study sought to determine cost collaboration amongst ICT SMEs by requiring the respondents to indicate whether they agree or disagree with the statements presented. The findings are presented in table 4.6.

Table 4.6: Cost Collaboration

Cost Collaboration		SA	A	N	D	SD	Mean	Std. Dev
CC1	%	13.2	56.0	27.5	3.3	0	3.79	0.707
CC2	%	11.0	48.4	38.5	2.2	0	3.68	0.697
CC3	%	14.3	56.0	28.6	1.1	0	3.84	0.671
CC4	%	14.3	46.2	33.0	6.6	0	3.68	0.801
CC5	%	16.5	47.3	28.6	7.7	0	3.73	0.831
CC6	%	39.6	47.3	12.1	0	1.1	4.24	0.75
CC7	%	36.3	46.2	15.4	1.1	0	4.19	0.733
CC8	%	36.3	50.5	12.1	1.1	0	4.22	0.696
CC9	%	22.0	42.9	26.4	8.8	0	3.78	0.892

When asked whether their organizations were working with supply chain partners jointly to formulate cost reduction policies, majority (69.2%) agreed, 27.5% remained neutral while a few (3.3%) disagreed. Majority of the respondents agreed that their firms engaged in joint formulation of cost reduction policies with suppliers as a way of enhancing B2B relationship and operational efficiency. Juttner *et al*. (2010) indicated that supplier and customer relationships which are components of market orientation, influence supply chain performance in terms of shorter lead time and total supply chain costs. While a study by Vereecke and Muylle (2006) indicated that supply chain collaboration had an impact on performance improvement in terms of delivery, cost, quality, lead time and time to market. Cost reduction can lead to competitive pricing thus achieving price leadership in the market for collective advantage (Wisner *et al.,* 2016).

Further, when asked whether purchase cost was an important consideration for procurement within the supply chain, majority (59.4%) agreed, 38.5% remained neutral while a few (2.2%) disagreed. About 59.4% of the managers assenting to collaboration is an indication that purchase cost is an important factor in supply chain which can lead to improved strength of B2B relationship. Supply chain integration influences operational performance and the extent of integration also has a positive impact on cost and efficiency (Paulraj, 2011). Ryu *et al.* (2009) pointed out that a manufacturer that trusts its supplier will most likely not exercise vertical control over its supplier leading to a reduction in transaction costs.

Asked whether use of information technology (IT) reduces transaction cost within the supply chain, majority (70.3%) agreed, 28.6% remained neutral while a few

(1.1%) disagreed. Information Technology is a strategic communication tool that improves the firm's competitiveness, allowing cost reduction and promoting B2B relationships (Autry, Grawe, Daugherty & Richey, 2010). Turner (2014) found out that firms cannot effectively manage cost, offer high customer service, and become leaders in supply chain management without the incorporation of top of the line information technologies. While Bayraktar *et al.* (2010) in their study on an efficiency comparison of supply chain management and information systems practices: a study of Turkish and Bulgarian small and medium-sized enterprises in food products and beverages, found out that use of IT can significantly improve supply chain performance and efficiency. And Liu *et al*. (2013) posit that information technology capabilities have significant relationship with firm performance through absorptive capacity and supply chain agility.

When asked whether the eventual total cost was highly influenced by prevailing exchange rates which had a strong influence on supply chain collaboration, majority (60.5%) agreed, 33% remained neutral while a few (6.6%) disagreed. It is unfortunate that 33% of the SME managers do not perceive exchange rate as affecting the overall supply chain performance. This could be attributed to the fact that most of these firms are not engaged in export and import business. However, 60.5% of the respondents were of the opinion that total cost was highly influenced by prevailing exchange rate. This is an indication that SMEs acknowledge the need to cushion themselves from exchange rates fluctuations so as to improve profitability.The ever fluctuating price of oil in the global market means that SMEs will front high transport costs, exchange rates and tariffs (Quayle, 2006).

Amiti, Itskhoki and Konings (2012) argued that the effect of exchange rate on supply chain can only be understood by taking into account the fact that the largest exporters are also the largest importers. This is vital especially when exporters are battered by exchange rate shock in the target market, they typically face a compensating movement in the marginal costs if they are importing their intermediate inputs (Bianchi & Saleh, 2011). Burstein and Gopinath (2013) found that nominal exchange rate movements do not impact domestic sales prices; in the short to medium run, there seems to be a low exchange rate pass through.

Further, on being asked whether the organizations shared product development costs with supply chain partners, majority (86.9%) agreed, 12.1% remained neutral while a few (1.1%) disagreed. Product cost information sharing can increase the supply chain efficiency and B2B relationship. By extending the scope of supply chain much earlier in the development process, the conventional percentage of pre-determined costs can become much more variable. This then allows the supply chain significantly more leverage on the cost side. Supply chains are usually viewed exclusively in performance terms, with a focus on the ability to plan, build, make and deliver. According to Lee (2007) information sharing within business units and with suppliers and other strategic partners is essential to assure the seamless execution of a supply chain plan, to enjoy the maximum execution benefits and to gain competitive advantage.

When asked whether their organizations engaged in collective bargaining for goods and services within the supply chain to increase economy of scale and reduce costs, majority (82.5%) agreed, 15.4% remained neutral while a few (1.1%) disagreed. Collective buying or bargaining guarantees SMEs economies of scale and discounts on purchases when they buy as a group. Further, a study by Nollet and Beaulieu (2005) on should an organization join a purchasing group?, found that a purchasing group increases volume consolidation, making it possible to have only one negotiation, in order to increase group members' purchasing power in relation to that of its suppliers.

When asked whether the organizations shared product cost information with other supply chain partners in order to reduce non value adding processes, majority (86.8%) agreed, 12.1% remained neutral while a few (1.1%) disagreed. Sharing of product cost information within supply chain can enhance firm competitiveness and responsiveness. The decision by SMEs to collaborate in sharing cost information is a pointer that they understand the importance of information sharing especially in cost management. Arguably, increased coordination and information sharing on product cost should lead to improved supply chain performance (Richey *et al.,* 2010). Chinomona and Pooe (2013) found out that timely and accurate sharing of strategic information can foster the reduction of unwarranted wastages and costs in a supply chain, thus leading to increased SME profitability.

Truly integrated supply chain network contributes more than reduced costs and emphasizes the added value of sharing information resulting in savings, higher profit margins, improved customer service performance and multiplication of shareholder values (Kim & Lee, 2010). Deming (2000) opine that there is need to build a total system of external customer relations with a common goal to reduce waste and costs. While Ragatz *et al.* (2002) posit that supplier integration can reduce material costs, product development time and cost, and manufacturing cost while improving functionality. Cost collaboration can eliminate unnecessary activities within the supply chain that contributes to operational costs; hence enhance achievement of strength of B2B relationship.

4.7.4 Analysis of Risk Management Collaboration amongst ICT SMEs in Kenya

The study sought to determine the level of risk collaboration among the SMEs. To achieve this, the respondents were required to agree/disagree with a number of statements using a five point Likert scale. Risk management collaboration was operationalized and results presented in Table 4.7.

Table 4.7: Risk Management Collaboration

Risk Management Collaboration								
		SA	**A**	**N**	**D**	**SD**	**Mean**	**Std. Dev**
RM1	%	15.4	59.3	17.6	7.7	0	3.82	0.783
RM2	%	12.1	26.4	15.4	25.3	20.9	2.84	1.352
RM3	%	7.7	37.4	39.6	14.3	1.1	3.36	0.863
RM4	%	9.9	47.3	38.5	4.4	0	3.63	0.725
RM5	%	9.9	45.1	39.6	5.5	0	3.59	0.745
RM6	%	14.3	47.3	31.9	6.6	0	3.69	0.799
RM7	%	9.9	50.5	34.1	5.5	0	3.65	0.736
RM8	%	9.9	51.6	24.2	14.3	0	3.57	0.858
RM9	%	11.0	44.0	31.9	13.2	0	3.53	0.861
RM10	%	28.6	39.6	29.7	2.2	0	3.95	0.821

When asked whether their organization and supply chain partners collaborated on training with the right enterprise risk management techniques, majority (74.7%) agreed, 17.6% remained neutral while a few (7.7%) disagreed. In modern day, risks are not seen as threats but as would be opportunity hence the need for strategic risk management techniques. This finding shows that training staff on strategic risk

management techniques is vital to SMEs as a preventive mechanism. Disaster preparedness is a source of strategic competence that enhances strength of B2B relationship. Cao *et al.* (2010) suggests that supply chain collaboration could help reduce risks such as conflicts, uncertainty that enhances the relationships between the stakeholders. Strategic risk management is the organisation's response to these uncertainties and opportunities. It involves a clear understanding of corporate strategy, the risks in adopting it and the risks in executing it (Lavastre *et al*., 2014; Tang, Matsukawa & Nakashima, 2012).

On being asked whether their organizations have segments in their supply chains to improve profits and reduce supply chain fragility, majority (46.2%) agreed, a few (38.5%) disagreed while 15.4% remained neutral. The results indicate that supply chain fragility is not considered as a vital component of the overall strategy by SMEs due to the high number of respondents who disagreed. However, slightly over 46% of the respondents agreed that collaboration can reduce fragility and improve profit and flexibility within supply chain. A study by Skipper and Hanna (2009) found out that top management support, information technology usage, resource alignment, and external collaboration profoundly contributes to the flexibility and thus reduces the exposure to supply chain disruption risks. Segmentation helps in coordination of manufacturing and distribution systems and strategies, enable firms to better serve their customers by offering tools for locating desired items, allows them to react and adapt to supply problems more rapidly, and helps to reduce lead time and risks caused by market fragility (Ralston, 2014).

When asked whether their organizations nudges trade-offs in favour of reducing risk by overestimating the likelihood of a disruption, majority (45.1%) agreed, 39.6% remained neutral while a few (15.4%) disagreed. With majority of the respondents assenting to collaboration could be a pointer that overestimation of likelihood of a disruption, guarantees SMEs better strategy to prevent risk occurrence, leading to supply chain resilience and strong B2B relationship. A study by Chopra and Sodhi (2014) using analytical models and simulation found that underestimating the likelihood of a disruptive event is far more expensive in the long run than overestimating the likelihood. When a disruption occurs, the loss sustained usually inundates any savings from not investing in risk mitigation strategies at all. While

Yaakub and Mustafa (2015) findings showed that there is a significant relationship between risk mitigation strategies and company performance.

When asked whether their organizations and suppliers jointly monitor current changes, incidents, exceptions and disruptions within supply chain, majority (57.2%) agreed, 38.5% remained neutral while a few (4.4%) disagreed. Joint monitoring of risk factors within supply chain can enhance firm's agility and strength of B2B relationship. Braunscheidel and Suresh (2009) posit that augmenting supply chain agility serves as a critical driver for mitigating supply chain risks. They further stated that, agility is of value for response and mitigation strategies, highlighting fast, preventive measures when confronted with supply chain risks.

On whether their organizations were jointly developing and implementing document retention policies for ease of reference and business continuity in case of accidents such as fire, majority (55%) agreed, 39.6% remained neutral while a few (5.5%) disagreed. With 55% of the respondents consenting to collaboration, is a clear indication that SMEs are fortifying their supply chains against disasters by backing up their documents. SMEs seem to have installed risk management processes to ensure continuity and resilience for the long haul. A study by Kern, Moser, Hartmann and Moder (2012) found that superior risk identification supports the subsequent risk assessment and this in turn leads to better risk mitigation, as there is a significant relationship between these three supply chain risk management processes.

Supply chain partners with higher levels of collaboration practices are able to achieve better operational performance and innovation activities (Simatupang & Sridharan, 2008). Business continuity is a key issue in supply chain management since availability of documents can support quality management systems for proper filing of suppliers documents for ease of reference (Waters, 2011; Zsidisin & Wagner, 2010).

When asked whether their organizations pool resources to reduce supply chain costs incurred to mitigate recurrent risks, majority (61.6%) agreed, 31.9% remained neutral while a few (6.6%) disagreed. Pooling of resources has the advantage of transferring collective benefit such as lowering cost of operation, within supply chain

as opposed to when SMEs work as individual firms in tackling disruptive events. Kleindorfer and Saad (2005) asserted that continuous collaboration, cooperation and coordination among supply chain partners are imperative for risk avoidance, reduction, management and mitigation such that the value and benefits created are maximized and shared fairly. While Thun and Hoenig (2011) revealed that risk is characterized by a cross company orientation aiming at the identification and reduction of risks not only at the company level, but rather focusing on the entire supply chain. Sharing of resources and improving visibility in the supply chain network can reduce risk uncertainty and goal conflict among partners (Vanany *et al.*, 2009; Zsidisin & Wagner, 2010).

When asked whether they were confident that their organizations mitigates risks across the supply chain to reduce the financial impact if an event occurs, majority (60.4%) agreed, 34.1% remained neutral while a few (5.5%) disagreed. This result shows how important risk mitigation is to the surveyed SMEs, mitigating supply chain risk is a critical component of SMEs supply chain overall risk management and strength of B2B relationship. Uncertainty negatively affects company performance; however, this can be reduced if a strategic relationship with critical suppliers is established. Social uncertainties such as religion, language, cultural issues, limitations of communication and also the technology used in other countries might interfere with supply chain planning (Bhattacharyya *et al.*, 2010; Cao & Zhang, 2013). While Hofmann (2011) discussed the concept of natural hedging in supply chains, the results showed that natural hedging of currency and commodity price fluctuations can reduce supply chain vulnerability and increase flexibility.

When asked whether a standardized process for prequalifying suppliers is used within the supply chain to minimize risks, majority (61.5%) agreed, 24.2% remained neutral while a few (14.3%) disagreed. With close to 62% of the respondents assenting to collaboration is a pointer that standardized process of prequalifying suppliers can minimize risks of supplier failure, reputational risks and achieve customer experience. Handfield, Cousins, Lawson and Petersen, (2015) found that careful selection of suppliers prior to new product development commencement and involving suppliers in setting technical goals improved new product development performance.

Suppliers are usually selected on the basis of their technological, relational capabilities, experience and specialization of the needed parts and components. Tracey and Tan (2001) opine that effectively selecting and evaluating these qualified suppliers and managing their involvement in critical supply chain activities enable manufacturers to achieve the four dimensions of customer satisfaction; competitive pricing, product quality, and product variety and delivery service.

Further, on being asked whether there were personnel security reviews for systems login within the supply chain to eliminate risks, majority (55%) agreed, 31.9% remained neutral while a few (13.2%) disagreed. The 55% of the respondents agreeing to collaboration is a demonstration, that personnel security reviews for systems login within the supply chain can eliminate risks and improve strength of B2B relationship. The use of password authentication relies upon the use of a secret knowledge shared between two parties that could be easily disclosed either by the user's behaviour or by a bad implementation of the authentication protocol. A study by Canavan (2001) on Fundamentals of Network Security revealed that information security is not just about protecting properties from outsiders, but ensuring sufficient physical security such as hiring right personnel, developing and holding procedures and policies, strengthening and monitoring networks and systems are all key elements to attain supply chain resilience.

On whether security risks associated with using IT were evaluated and managed within the supply chain, majority (68.2%) agreed, 29.7% remained neutral while a few (2.2%) disagreed. Majority of the respondents agreed that there is need to manage risks associated with using IT within the supply chain to ensure supply chain continuity and strength of B2B relationship. However, to manage more complex information processes, SMEs have to adopt a technology that supports rather than hinder the flow of information. A study by Doherty and Fulford (2006) revealed that the organizations should have information security policy and strategic information system plan in place, to operate in secure manner and to effectively deploy new information systems to meet organization's strategic objectives.

Finally, the results show that SMEs had collaborated in risk management which improved their performance and strength of B2B relationship.

The findings support a study by Rao *et al.* (2007) who indicated that buyers' perceived risks and expected benefits had an influence on their usage of B2B e-marketplaces. While Johnson and Nagarur (2012) found out that, the reason for organizational lack of performance in supply chain is due to lack of knowledge on disruption event and mitigation.

4.7.5 Analysis of strength of B2B Relationship amongst ICT SMEs in Kenya

This part sought to establish the strength of B2B relationship amongst SMEs in ICT industry. To achieve this, the respondents were required to agree or disagree with a number of statements using a five point Likert scale. The results are shown in table 4.8.

Table 4.8: Strength of B2B Relationship

Business- to-Business		**SA**	**A**	**N**	**D**	**SD**	**Mean**	**Std. Dev**
BB1	%	73.6	23.1	2.2	1.1	0	4.69	0.571
BB2	%	17.6	80.2	2.2	0	0	4.15	0.42
BB3	%	54.9	35.2	9.9	0	0	4.45	0.671
BB4	%	27.5	63.7	8.8	0	0	4.19	0.576
BB5	%	26.4	51.6	22.0	0	0	4.04	0.698
BB6	%	62.6	33.0	3.3	0	1.1	4.56	0.67
BB7	%	30.8	56.0	12.1	1.1	0.0	4.16	0.671
BB8	%	46.2	41.8	11.0	1.1	0.0	4.33	0.716
BB9	%	47.3	38.5	11.0	3.3	0	4.3	0.796

When asked whether most customers place orders for goods and services through the internet, majority (96.7%) agreed, 2.2% remained neutral while a few (1.1%) disagreed. Close to 97% of the managers agreed that customers were placing orders for goods and services through the internet improves lead time and cost efficiency within supply chain. Oliveira *et al.* (2011) found that Internet utilization in supplier and customer oriented processes was positively related to collaborative practices in B2B relationships. In addition, supplier oriented process performance was found positively associated with customer oriented process performance. According to Lothair and Norbridge (2002) Internet facilitates business transactions such as ordering, invoicing and payment. Internet allows product information to be called up from an on-line catalogue and ordering can be done by sending e-mail.

When asked whether their organizations used enterprise resource planning system integrated with its supply chain partners, majority (97.8%) agreed while 2.2% remained neutral with no respondent disagreeing. Majority of respondents agreed that enterprise resource planning (ERP) system when fully integrated can increase B2B relationship by providing real time market information. Real time market information can be used for supply chain positioning and for competitive advantage. Sanders and Premus (2005) in Henry *et al*. (2012) posted a positive relationship between Information Technology capability and collaboration and company performance, as measured by, among other items, costs reduction and time performance improvement. While a study by Stank *et al.* (1999) on the benefits of inter-firm coordination in food industry in supply chains, found that the food firms benefit from more accurate and timely information and ERP improves inventory management and helps in comprehension of the order cycle.

Further, on being asked whether the use of e-Collaboration in product design was high, majority (90.1%) agreed while 9.9% remained neutral. No respondent disagreed. With 90.1% of the respondents answering in affirmative, demonstrates the importance of e-collaboration in product design for competitive advantage and increase in B2B relationships. SMEs that have embraced high levels of internet-based supply collaboration and demand integration usually experience highest levels of performance (Napier, Judd, Rivers & Wagner, 2001). Cassivi *et al.* (2008) indicated that in a supply chain context, e-collaboration facilitates coordination of various decisions and activities beyond transactions among supply chain partners, both for suppliers and for customers, over the Internet and over other inter-organizational information systems. Mihm (2010) found that there was a positive relationship between product design improvement and frequency of design-related communication with supplier.

On whether e-procurement tools exist, majority (91.2%) agreed while 8.8% remained neutral with no disagreement reported. The overwhelming agreement by 91.2% of the respondents shows that use of e-procurement tools enhances strength of B2B relationship and operational efficiency. A study by Soares-Aguiar and Oalma-dos-Reis (2008) noted that a key motivation for e-procurement implementation was the fear of falling behind competitors that had already become adopters and had started

to enjoy the benefits. The main benefit of e-procurement is cost reduction, from lower purchase prices and lower transaction costs through increased standardization of specifications, supply base reduction and greater contract compliance (Ralston, 2014; Carter *et al.*, 2015).

On whether the supply chain partners have interactive websites, majority (78%) agreed while 22% remained neutral. No respondent disagreed. Interactive websites play a key role in creation of competitive advantage through customer loyalty. SMEs can use websites to improve customer care, to build long term B2B relationships, to improve the use of website productivity and to increase the integration of web sales and customer care. A study done by Tim (2007) states that through the use of communication tools, such as the web sites, industrial organizations can build value in their supply chain relationships. Web sites or customer portals enable customers to directly interact with a supplier's sales order system. With web-based order entry systems, the information exchanged between the customer and supplier is consistent with the supplier's system, resulting in a lower error rate and minimal rework of the information, as compared to voice- or paper-based transactions (Tim, 2007).

When asked whether most supply chain partners use email for communication with organizations, majority (95.6%) agreed, 3.3% remained neutral while a few (1.1%) disagreed. The 95.6% of the respondents agreed that use of e-mail for communication within SMEs contribute to operational efficiency in terms of information sharing. E-mail communication represents real time information sharing and can lead to collaborative advantage to supply chain partners (Prajogo & Olhager, 2012). Lee and Rhee (2007) found e-mail information sharing within business units both with internal and external customers as essential to guarantee the seamless exchange of information in real time which leads to competitive advantage.

When asked whether most transactions are done online including supplier payments, majority (86.8%) agreed, 12.1% remained neutral while a few (1.1%) disagreed.
Of all the respondents, about 87% agreed that collaboration can enhance value addition through online transactions and B2B relationship. A good automated purchasing system such as online payment will promote purchasing and contract compliance, use appropriate financial controls to ensure accurate billing and take

advantage of early payment discounts thereby enhancing B2B relationship. Stradford and Tiura (2003) suggests that buyers negotiate early payment discounts with suppliers and that organizations develop automated payment processing systems that will operate quickly and efficiently for value addition.

Further, on being asked whether there is existence of e-collaborative forecasting and production planning, majority (88%) agreed, 11% remained neutral while a few (1.1%) disagreed. The 88% of the respondents showed that SMEs have realized that e-collaboration forecasting and production planning can lead to sustainable competitive advantage. A study by Lee (2000) on creating value through supply chain integration established that supply chain collaboration forecasting is a vehicle to redesign decision rights, workflow and resources planning between network members to leverage better performance in terms of higher profits, improved B2B relationship through customer service performance and faster response time. While Napier *et al.* (2001) pointed out that by implementing and using e-commerce sellers can access narrow markets segments that are widely distributed while buyers can benefit by accessing global markets with larger product availability from a variety of sellers at reduced costs.

When asked whether use of information technology within the supply chain was high, majority (85.8%) agreed, 11% remained neutral while a few (3.3%) disagreed. This result shows that SMEs are aware that information technology can substantially reduce cost of business process within supply chain, through collaboration and real time information sharing thus improving strength of B2B relationship. Firms that lack essential resources like IT will seek to establish supply chain relationships with other firms in order to attain the needed technology and resources. Seggie *et al*. (2006) argued that information technology (IT) alignment and inter-firm system integration between supply chain partners is a facilitator of brand equity. Further, their study found out that information technology use has a significant direct impact on both intra and inter-firm collaboration and performance. Information technology can benefit SMEs through differentiation of products and services so as to reduce the differentiation advantages of competitors, and focus products and services at selected market niches (Wieland & Wallenburg, 2013). Finally, it is evident that SMEs were using B2B e-commerce tools such as e-collaboration and e-procurement within

supply chain for B2B relationship. Chen *et al.* (2013) argue that process and collaboration quality have significant effects on usefulness and satisfaction, reinforcing the objective of using B2B e-commerce systems across supply chain network.

4.8 Relationship between Study Variables

This section sought to create visual relationship between the study variables. This was in relation to the specific objectives of the study which were to determine the effect of innovation collaboration on the strength of B2B relationship, to identify the effect of planning collaboration on the strength of B2B relationship, to determine the effect of cost collaboration on the strength of B2B relationship, to determine the effect of risk management collaboration on the strength of B2B relationship and to identify the combined effect of innovation collaboration, planning collaboration, cost collaboration and risk management collaboration on the strength of B2B relationship.

4.8.1 Innovation Collaboration and strength of B2B relationship

Innovation collaboration has a positive influence on the strength of B2B relationship as shown in Figure 4.5. The positive coefficient of 0.4167 indicates that as innovation collaboration increases strength of B2B relationship increases too.

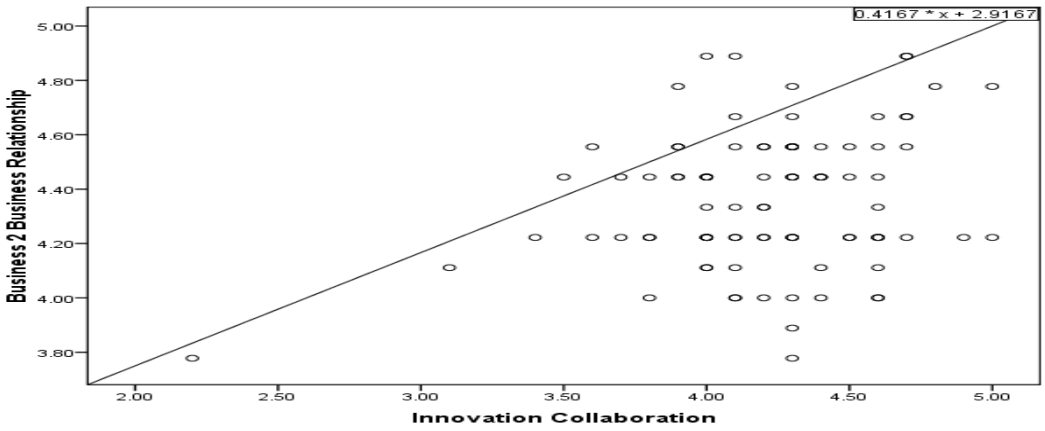

Figure 4.5: Innovation Collaboration and strength of Business-to-Business relationship

4.8.2 Planning Collaboration and strength of B2B relationship

Planning collaboration has a positive effect on the strength of B2B relationship as shown in Figure 4.6. The coefficient of 0.6667 indicates that the relationship between planning collaboration and strength of B2B relationship is positive. This implies that with increase in planning collaboration there is also an increase in strength of B2B relationship.

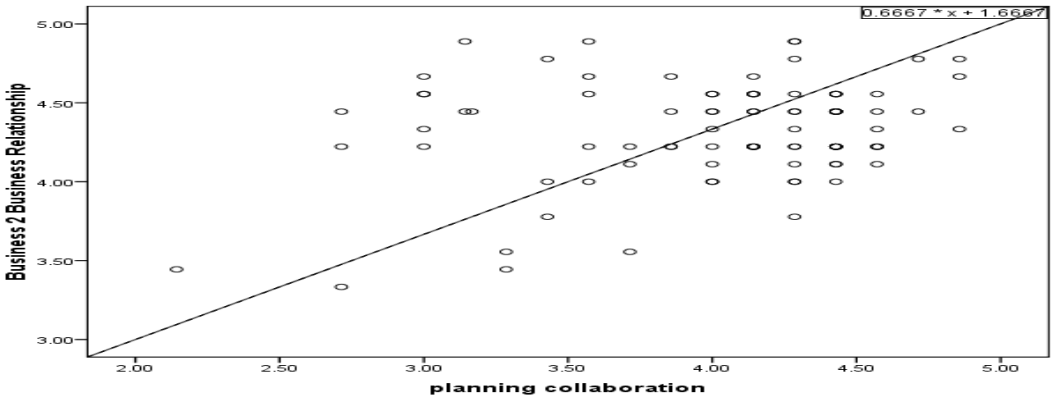

Figure 4.6: Planning Collaboration and strength of Business-to-Business relationship

4.8.3 Cost Collaboration and strength of B2B relationship

The relationship between cost collaboration and strength of B2B relationship shown in Figure 4.7 indicates that cost collaboration has a strong positive influence on the strength of B2B relationship. Cost collaboration has a positive coefficient of 0.8 indicating that its increase will lead to an increase in strength of B2B relationship.

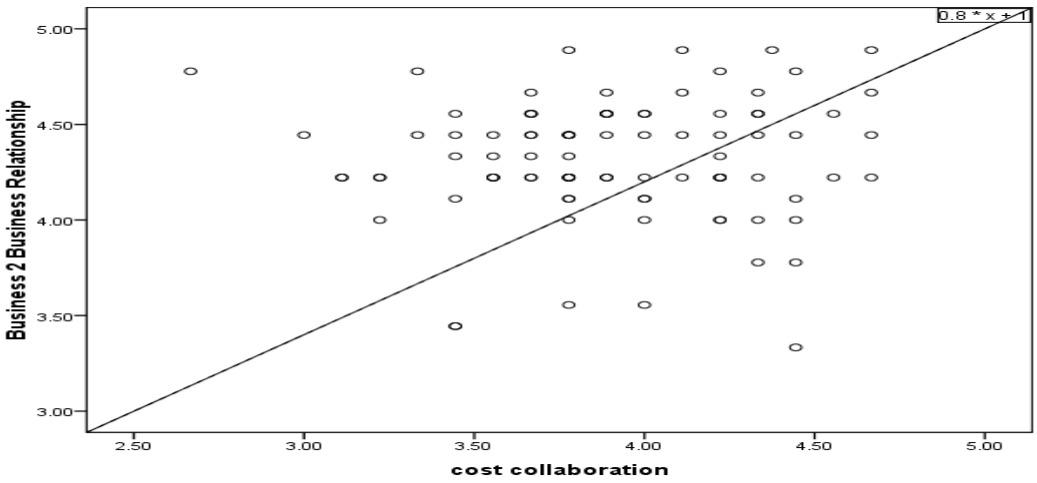

Figure 4.7: Cost Collaboration and strength of Business-to-Business relationship

4.8.4 Risk Management Collaboration and strength of B2B relationship

Risk Management collaboration has a positive relationship with strength of B2B relationship. The scatter diagram and line of best fit is presented in Figure 4.8.The positive coefficient of 0.8 indicates that risk management collaboration has a strong positive influence on the strength of B2B relationship. As risk management collaboration increases strength of B2B relationship also increases.

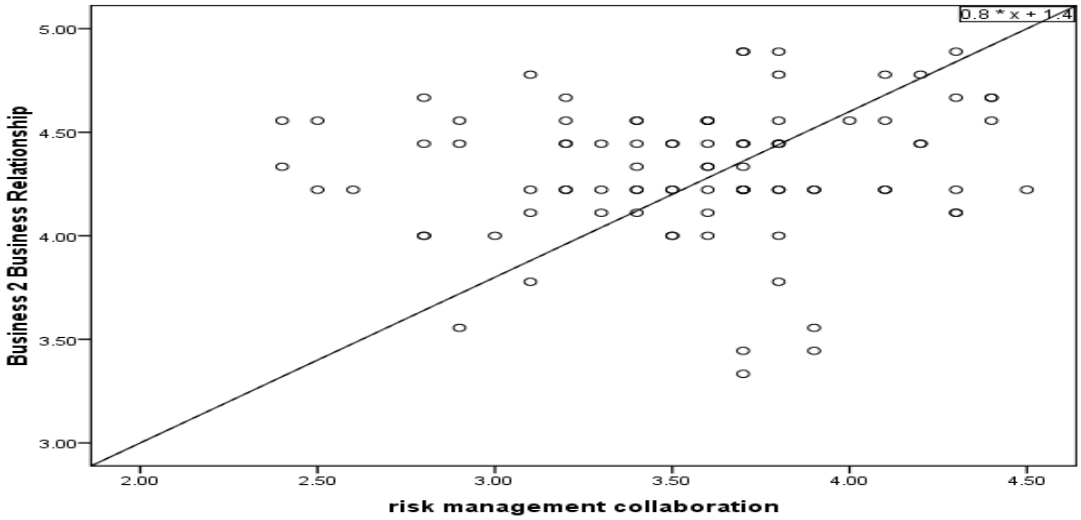

Figure 4.8: Risk Management Collaboration and strength of Business-to-Business relationship

4.8.5 Supply Chain Collaboration and strength of B2B relationship

Supply chain collaboration factors were made of innovation collaboration, planning collaboration, cost collaboration and risk management collaboration. To obtain graphical presentation of the relationship, mean of the four predictor variables were determined. The relationship between supply chain collaboration and strength of B2B relationship is presented in Figure 4.9.

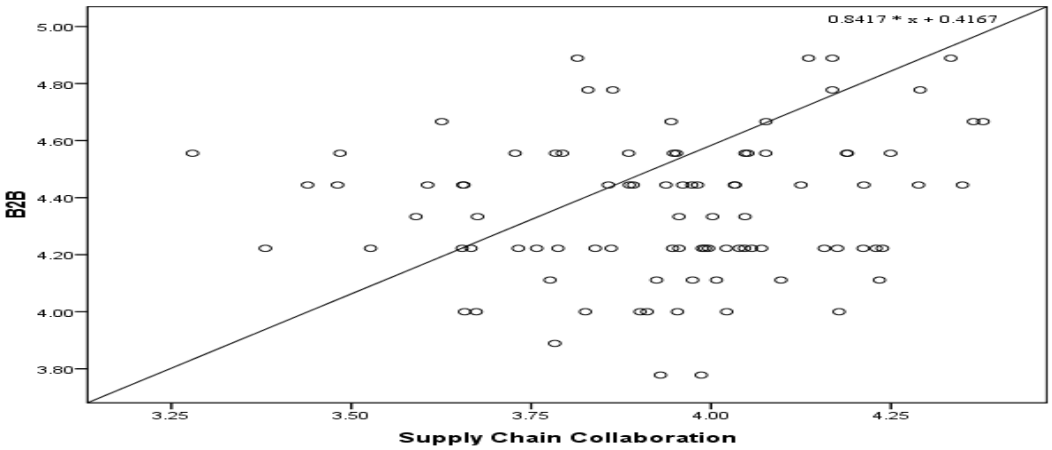

Figure 4.9: Supply Chain Collaboration and strength of B2B relationship

The positive coefficient of 0.8417 indicates that increase in supply chain collaboration leads to an increase in strength of B2B relationship. Oliveira *et al.* (2011) in their study found that internet utilization in supplier and customer oriented processes had positive relationship with collaborative practices in B2B relationships. Collaborative practices in supplier and customer-oriented process in turn, demonstrated potential effects on performance (Oliveira *et al.,* 2011). While Flynn *et al.* (2010) obtained a positive effect of integrating internal and external operations across the supply chain of a firm on its performance. A study by Alrubaiee *et al.* (2012) found that the indirect effects of e-commerce benefit on supply chain management was positive and highly significant, therefore, the effect flow only through e-marketplaces usage (indirect standardized coefficient =0 .672; $p < .001$). The study further found that there was a significant positive impact of E-marketplace usage on supply chain collaboration.

Farouk (2015) in his study on The Impact of Supply Chain Logistics Performance Index on the control of neglected tropical diseases in low- and middle-income countries, used the regression model, and the residual scatter plot which predicted that the two variables are linearly related, such that variations in logistics services correlates with MDA coverage. However, the relationship between the two was statically insignificant ($p = 0.078$) at 95% confidence interval (-1.26 to 23.44). Claypool, Norman and Needy (2015) in their study on Design for Supply Chain: An Analysis of Key Risk Factors, assembled scatter plots by plotting the likelihood of occurrence averages against the Impact of Risk averages. These plots revealed almost identical top risks as those identified from the entire population.

4.9 Test of Assumptions of the Study Variables

When the assumptions of the linear regression model are accurate, then ordinary least squares (OLS) presents efficient and unbiased estimates of the parameters under consideration (Mooi & Marko, 2011). To guarantee that there was no violation of the assumptions, this study tested for homoscedasticity, linearity, multicollinearity, non-response bias and normality of the data. Talavera (2013) exploring the relationship of supply chain collaboration and trust also conducted multicollinearity test and normality before analyzing the data to ensure conformity to the assumptions. A study

by Henry *et al.* (2012) used a general linear model for multiple regression models, where response Y was related to a set of qualitative independent variables.

4.9.1 Test for Heteroscedasticity

Heteroscedasticity occurs when the variance of the errors varies across the observations (Pallant, 2013). Pallant further states that when the errors are heteroscedastic, the ordinary least squares estimator remains unbiased, but it become inefficient and in effect renders the usual procedures for hypothesis testing inappropriate. If the error terms do not have constant variance, they are said to be heteroscedastic. This study used Breusch-Pagan/ Cook-Weisberg to test for heteroscedasticity. The Breusch-Pagan/ Cook-Weisberg test is the most common method of detecting heteroscedasticity in linear models (Mooi & Marko, 2011). Breusch-Pagan / Cook-Weisberg test the null hypothesis that the error variances are all equal versus the alternative that the error variances are a multiplicative function of one or more variables. A chi-square value larger than 9.21 (Pallant, 2010; Hair *et al.,* 2010) would show the existence of heteroscedasticity.

Henry *et al*. (2012) in their study on Critical Factors Affecting Supply Chain Management: A Case Study in the US Pallet Industry, Pathways to Supply Chain Excellence, employed chi-square to analyze non-respondents and categorical data. Results obtained are presented in Table 4.9:

Table 4.9: Test for Heteroskedasticity

H0	Variables	Chi2 (4)	Prop>Chi2
Constant variance	IC, PC, CC,RMC	0.073	0.7127

The study obtained a chi-square value of 0.073 indicating heteroscedasticity was not a problem.

Ho: Constant variance

Variables: Innovation collaboration, planning collaboration, cost collaboration and risk management collaboration.

A study by Amentae, Tura, Gebresenbet and Ljungberg (2016) applied Breusch-Pagan / Cook-Weisberg test for heteroscedasticity and found null hypothesis residuals variance was homogenous, with p-value less than 10% probability; hence based on the rule they concluded that there was no problem of heteroscedasticity in their model. However, Kumar, Dakshinamoorthy and Krishnan (2007) conducted the Breusch-Pagan / Cook-Weisberg test for heteroscedasticity on ordinary least squares models and found that the null hypothesis of no heteroscedasticity was rejected indicating that the models suffered from significant heteroscedasticity problem.

4.9.2 Test for Multicollinearity

Multicollinearity is the undesirable situation where the correlations among the independent variables have a high degree or are strong (Field, 2013). Multicollinearity is a result of highly correlated variables which can lead to unreliable results in regression analysis (Hair *et al.*, 2010; Pedhazur & Schmelkin, 2013). Hence, it makes some variables statistically insignificant while they should be otherwise significant. Tolerance of a particular independent variable is calculated from 1 - R^2. A tolerance with a value near 1 show there is little multicollinearity, while a value closer to 0 implies that multicollinearity could be a threat (Martz, 2013). In this study, multicollinearity problem was solved by ensuring that the sample was large enough since multicollinearity is not known to exist in large samples.

Multicollinearity can also be solved by deleting one of the highly correlated variables (Mooi & Sarstedt, 2011). Variance Inflation Factor (VIF) measures multicollinearity in the model in such a way that if no two independent variables are linked, then all the VIF values will be 1, meaning, there is no multicollinearity among the factors (Pedhazur & Schmelkin, 2013; Hair *et al*., 2010). However, if VIF value for one of the variables is close or greater than 5, then there is multicollinearity related with that variable (Hair *et al*., 2010). Table 4.10 shows the test results for multicollinearity using both the VIF and tolerance.

Table 4.10: Multicollinearity Test

Variable	Tolerance	VIF
Innovation Collaboration	0.929	1.076
Planning Collaboration	0.963	1.039
Cost Collaboration	0.968	1.033
Risk Management Collaboration	0.973	1.028

With VIF values less than 5, it was concluded that there was no presence of multicollinearity in this study. The VIF helps the researcher to know how much the variance of the coefficient estimate is being inflated by multicollinearity. In their study Miozzo *et al.* (2016) used Variance Inflation Factor to assess the risk of multicollinearity in the regression analysis. The maximum estimated VIF across explanatory variables for both models was 4.87 and the mean value was 1.86, which are well below the recommended ceiling of 10. Other scholars like Al-Zu'bi (2016) also used Variance Inflation Factor (VIF) technique to ensure that the results were not affected by multicollinearity and reported VIF values for the independent variables below 1.3 showing that multicollinearity was not a concern. While Vurro *et al.* (2014) in their study reported all the variables; models presented variance inflation factors (VIF) consistently below the rule of thumb cut-off of ten, thus providing evidence that multicollinearity among predictors and control variables did not exist.

4.9.3 Linearity Test

Linearity is the consistent slope of change that represents the relationship between an independent variable and a dependent variable (Wooldridge, 2011). There are several ways of testing for linearity. The easiest way is the deviation from linearity test. If the significant value for deviation from linearity is less than 0.05, the relationship between independent and dependent variables is not linear and this could present problems during modelling (Creswell, 2013; Pedhazur & Schmelkin, 2013). Linearity can be fixed by removing outliers (Hair *et al*., 2010; Mason & Perreault, 1991).Given that this was already done, linearity of the variables was assumed.

4.9.4 Non-Response Bias

Non-response bias means that, since the non-respondents are dissimilar from the respondents, the result of a study is not representative of the population from which the sample was taken from (Armstrong & Overton, 1977). Non-response bias occurs in statistical surveys if the answers of respondents differ from the potential answers of those who did not answer (Armstrong & Overton, 1977). The main reason why non-response bias analysis is done is to ensure that the non-respondents are more similar to the late respondents than they are to the early respondents. A common technique of measuring non-response bias involves comparing the first and fourth quartiles of responses for differences in demographics and key constructs. If their answers don't differ significantly from those who answered the survey, there might be no non-response bias.

Generally, the lower the response rate the greater the likelihood of a non-response bias (Armstrong & Overton, 1977). In this study, the extrapolation technique proposed by Armstrong & Overton (1977) was used to estimate non-response bias. The significance in the differences between the means was tested at 95% confidence level using t-test. Out of 91 responses, 82% (n=75) were considered as early responses while 18% (n=16) were considered as late responses. The assessment of non-response bias was done by comparing the means of the characteristics of early and late responses.

The student test (*t*-test) results revealed no significant differences between early and late responses (p=0.05) providing evidence of a representative and unbiased research sample. Mandal and Korasiga (2016) in their study on An integrated-empirical logistics perspective on supply chain innovation and firm performance, tested for non-response bias by comparing the early and late respondents and found that there were no significant mean differences between the groups on key measures such as firm size and industry affiliation. While Jafar, Roland and Paul (2015) in their study on how SMEs can benefit from supply chain partnerships, used an extrapolation method to estimate the magnitude of non-response bias. They used the first two-thirds of sample (186) as the first wave, and the last third (93) as the second wave. The results of the analysis showed that there were no significant changes between the waves.

4.9.5 Test for Normality of the Independent Variables

The normality of data distribution was evaluated by examining its skewness and kurtosis (Pallant, 2013). A variable with an absolute skew-index value greater than 3.0 is extremely skewed whereas a kurtosis index greater than 8.0 is an extreme kurtosis (Hair *et al*., 2010; Pallant, 2010). Cunningham (2008) posits that skewness index smaller than an absolute value of 2.0 and an absolute value of 7.0 is the least breach of the assumption of normality. Findings are presented in Table 4.11.

Table 4.11: Normality Test of Independent Variables

	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
IC	3.55	4.64	4.2817	0.24917	-0.145	-0.042
PC	2.14	4.86	4.0065	0.56501	-1.03	0.587
CC	2.67	4.67	3.9052	0.41971	-0.259	-0.172
RMC	2.4	4.5	3.5626	0.488	-0.356	-0.154
B2B	3.33	4.89	4.3199	0.31939	-0.797	1.207

The variables tested for normality where; Innovation collaboration had a minimum of 3.55, maximum of 4.64, mean of 4.2817 and standard deviation of 0.24917. Planning collaboration had a minimum of 2.14, maximum of 4.86, mean of 4.0065 and standard deviation of 0.56501. Cost collaboration had a minimum of 2.67, maximum of 4.86, mean of 3.9052 and standard deviation of 0.41971. While risk management collaboration had a minimum of 2.4, maximum of 4.5, mean of 3.5626 and standard deviation of 0.488. B2B had a minimum of 3.33, maximum of 4.89, mean of 4.3199 and standard deviation of 0.31939.

Kurtosis which is a measure of the "peakedness" or "flatness" of a distribution was used in testing the normality of the study variables (Field, 2013; Pallant, 2013). A kurtosis value near zero indicates a shape close to normal. A negative value indicates a distribution which is more flat than normal, and a positive kurtosis indicates a shape peaked than normal (Pedhazur & Schmelkin, 2013; Bartezzaghi, 2007). A kurtosis value of +/-1 is considered very good for most empirical use, but

+/-2 is also usually acceptable (Mooi & Sarstedt, 2011). Kurtosis results indicated that innovation collaboration, planning collaboration, cost collaboration, risk management collaboration and strength of B2B relationship had statistics of -0.042, 0.587, -0.172, -0.154 and 1.207.

Kurtosis values were all close to 0, +2 or -2 indicating that the data was distributed towards respective means and hence normal. Skewness which is the extent to which a distribution of values deviates from symmetry around the mean was also evaluated. A value of zero means the distribution is symmetric, while a positive skewness indicates a greater number of smaller values and a negative value indicates a greater number of larger values. Values for acceptability for empirical purposes are (+/-1 to +/-2) (Pedhazur & Schmelkin, 2013; Creswell, 2013).

Skewness statistics for innovation collaboration, planning collaboration, cost collaboration, risk management collaboration and strength of B2B relationship were -0.145, -1.03, -0.259, -0.356 and -0.797. This indicates that data analysed was normal as per the assumptions of regression analysis. The findings are consistent with those of Al-Zu'bi (2016) who assessed normality using tests of skewness and kurtosis, the values of skewness ranged from -0.154 to 0.060, while kurtosis test gave values between 0.230 and -0.549. Both tests proved that the data was normally distributed and appropriate for regression analysis.

4.9.6 Test for Normality of the Dependent Variable

Dependent variable was tested for normality of data distribution. The results of the normality test of the dependent variable indicated skewness and kurtosis in the range of -1 and +1 as shown in Table 4.12. This implied that the assumption of normality was satisfied.

Table 4.12: Normality Test of Dependent Variable

Factor		Statistic	Std. Error
Business-to-Business Relationship	Mean	4.3614	0.02642
	Median	4.3333	
	Variance	0.064	
	Std. Deviation	0.25207	
	Minimum	3.78	
	Maximum	4.89	
	Range	1.11	
	Inter-quartile Range	0.33	
	Skewness	0.065	0.253
	Kurtosis	-0.322	0.5

4.9.7 Test for Outliers on Dependent Variable

Outliers are observations showing characteristics or values that are markedly different from the majority of other cases in a data set (Hair *et al.,* 2010). Such cases are normally dropped from the data set. The reason being that they distort the true relationship between variables, by either creating a correlation that ought not to exist or stifling a correlation that ought to exist (Hair *et al.,* 2010). Outliers were examined by use of Q-Q plots on each of the study variables.

Accordingly, testing of outliers on the dependent variable produced reasonable Q-Q plots as shown in Figure 4.10, where all the constructs were symmetrical with no significant outliers identified. Therefore, for all the measures of B2B relationship, there were no outliers identified. Farouk (2015) in his study on the impact of supply chain logistics performance index on the control of neglected tropical diseases in low- and middle-income countries, tested for outliers on the dependent variable which was found to have normality with no extreme outliers affecting statistical assumptions of the model.

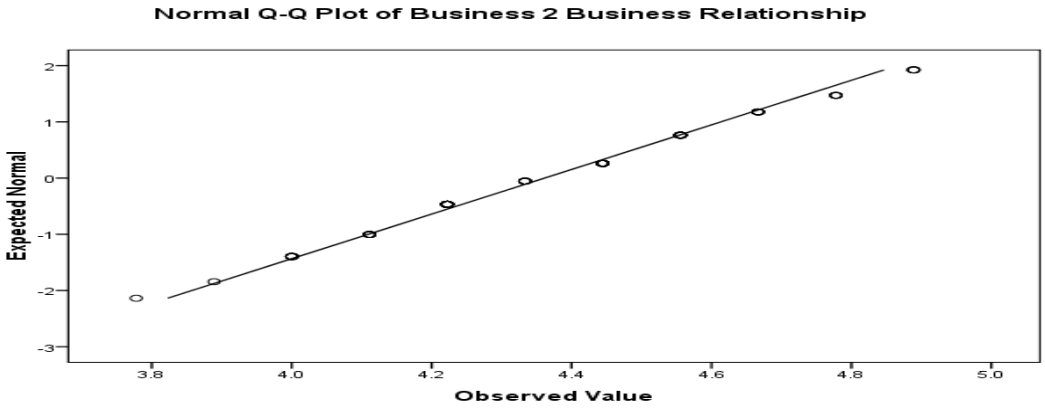

Figure 4.10: Q-Q Plot on Internet Orders

To further establish the existence of outliers in the study variables, univariate testing of outliers was done and results presented in Figure 4.11. The figure shows that the boxplot for strength of B2B relationship was symmetrical and hence there were no outliers on the study variables. Robinson (2014) in a study on organizational identification and supply chain orientation: examining a supply chain integration paradox, used boxplot to identified extreme univariate outliers, in which eight observations were eliminated from the analysis.

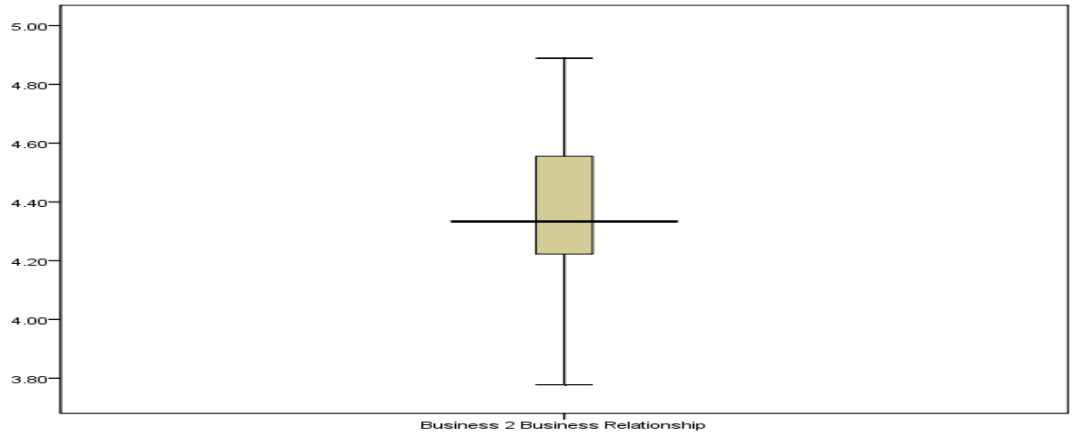

Figure 4.11: Testing for Outliers on Dependent Variable

4.9.8 Kolmogorov-Smirnov and Shapiro-Wilk Test for Normality

Further, to test the null hypothesis that the data on dependent variable was normally distributed, Kolmogorov-Smirnov and Shapiro-Wilk statistics were used. The Kolmogorov-Smirnov test compares the shape of two cumulative distribution functions to test the hypothesis that two samples come from a population with the same distribution shape (Mooi & Sarstedt, 2011; Creswell, 2013). It can be used to compare an observed cumulative distribution functions to an expected normal cumulative distribution functions, but there are biases because it uses the sample mean and standard deviation to estimate the population mean and standard deviation, so the Shapiro-Wilk test is better for testing normality (Green & Salkind, 2011; Pallant, 2013). The results are presented in Table 4.13.

Table 4.13: Testing for Normality using Kolmogorov-Smirnov and Shapiro-Wilk

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
B2B	0.916	91	0.749	0.965	91	0.614

a. Lilliefors Significance Correction

The result indicates a p-value greater than 0.05 for all the variables for Kolmogorov-Smirnov and Shapiro-Wilk tests and hence the null hypothesis that the data was normally distributed was accepted. Therefore, the data on dependent variable was normal and not violating normality assumptions. A study by Farouk (2015) tested for normality using Kolmogorov-Smirnov and the statistics gave normality of scores with a non-significant result ($p > 0.05$) indicating normality (Pallant, 2013). Another study by Spulick (2015) on the effect of executive style on risk management: A healthcare supply chain context, assessed variables for normality using Kolmogorov-Smirnov and Shapiro-Wilk normality tests. The result showed that for all variables, the scores were significant (<.05), indicating an absence of normality in distribution (Hair *et al*., 2010).

4.10 Factor Analysis

Prior to conducting exploratory factor analysis, several tests were done to assess the suitability of the respondent data for factor analysis and result shown in Table 4.14. These tests included Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The KMO index ranges from 0 to 1, with 0.50 considered suitable for factor analysis (Williams, Brown & Onsman, 2010; Hair *et al.*, 2010). The Bartlett's Test of Sphericity should be significant ($p<0.05$) for factor analysis to be suitable (Pallant, 2013; Mooi & Sarstedt, 2011). Table 4.14 shows the results of the test for suitability of structure detection. Table 4.14 shows results of the test for suitability of structure detection.

Table 4.14: Results of test for Suitability of Structure Detection

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	**Bartlett's Test of Sphericity**	
0.513	Approx. Chi-Square	2 546
	df	1035
	Sig.	0.0000

It is evident that KMO value of 0.513 is greater than 0.5 and hence data was considered suitable for factor analysis. Mostafa *et al.* (2016) in their study on The Impact of Supply Chain Relationship Quality and Cooperative Strategy on Strategic Purchasing, used Kaiser-Meyer-Olkin (KMO) and the result was 0.689 showing that the sample size was enough. Further, the significance in Bartlett test was lower than 0.05. This indicated a high level of reliability for the questionnaire. In another related study by Miozzo *et al*. (2016), Kaiser-Meyer-Olkin measure of sampling adequacy result was 0.864. Further, the results showed a $p < 0.05$ in the Bartlett's Test of Sphericity, this is an indication of suitability of data for structure detection and hence data suitable for analysis.

Factor analysis was performed to identify the patterns in data and to reduce data to manageable levels. Factors with Eigen values (total variance) greater than 0.5 were extracted and coefficients below 0.49 were deleted from the matrix because they were considered to be of no importance (Hair *et al*., 2010). By using factor analysis, a factor loading for each item and its corresponding construct was determined.

Ralston (2014) in a study on Supply chain collaboration: A literature review and empirical analysis to investigate uncertainty and collaborative benefits in regards to their practical impact on collaboration and performance, had factor loadings ranging from 0.58 to 0.89 for the constructs. With the loadings returned being greater than 0.50, convergent validity within each construct is supported (Hair *et al.*, 2010).

While Šerić, Rozga and Luetić (2014) in their study used Kaiser-Meyer-Olkin measure of sampling adequacy, Bartlett's test of sphericity and Kaiser's criterion on the size of Eigen values and the percentage of variance explained. Factor loadings were all greater than 0.5 which was very satisfactory. Only the items that loaded on their corresponding factors at levels of 0.5 or greater were retained for the rest of the analysis. As shown in Appendix VI, all the variables relating to innovation collaboration, planning collaboration, cost collaboration and risk management collaboration had component loading factors ranging between 0.4 and 0.5. This indicated that no items were deleted in the whole questionnaire.

4.11 Regression Analysis on Study Specific Objectives

Simple regression analysis was used to show the statistical relationship between the study variables and consequently achieve the study specific objectives. The specific objectives to determine the effect of innovation collaboration on strength of B2B relationship amongst ICT SMEs in Kenya, to identify the effect of planning collaboration on strength of B2B relationship amongst ICT SMEs in Kenya, to determine the effect of cost collaboration on strength of B2B relationship amongst ICT SMEs in Kenya, to determine the effect of risk management collaboration on strength of B2B relationship amongst ICT SMEs in Kenya and to identify the combined effect of innovation, planning, cost and risk management collaborations on strength of B2B relationship amongst ICT SMEs in Kenya.

4.11.1 Innovation Collaboration and Strength of B2B Relationship

The results for simple regression analysis on innovation collaboration and strength of business-to-business relationship are presented in Table 4.15.

Table 4.15: Regression Results on Innovation collaboration and Strength of B2B Relationship

	R	R^2	Adjusted R^2	Std. Error		
Summary	.837a	0.701	0.697	0.40271		
ANOVA		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
	Regression	33.793	1	33.793	208.372	.000a
	Residual	14.434	89	0.162		
	Total	48.227	90			
Coefficients(a)		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	0.413	0.213		1.938	0.056
	IC	0.911	0.063	0.837	14.435	0.000

a. Predictors: (Constant), Innovation Collaboration (IC)
a. Dependent Variable: B2B

The correlation results indicate that innovation collaboration and strength of B2B relationship had coefficient ($r=0.837$, $p<0.05$). This indicates that innovation collaboration has a positive effect on the strength of B2B relationship. The implication therefore, is that as innovation collaboration increases, B2B relationship also increases. Subsequently, the effect of innovation collaboration on the strength of B2B relationship is significant at 95% confidence level ($p < 0.05$). Therefore, an increase in innovation collaboration will lead to significant increase in B2B relationship. Al-Zu'bi (2016) findings showed that lead user collaboration in new product development had a positive and significant effect on open innovation.

4.11.2 Planning Collaboration and Strength of B2B Relationship

The results for simple regression analysis on planning collaboration and strength of Business to business relationship are presented in Table 4.16.

Table 4.16: Regression Results on Planning Collaboration and Strength of B2B Relationship

Summary	R	R^2	Adjusted R^2	Std. Error		
	.524a	0.274	0.266	0.62718		
ANOVA		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	13.218	1	13.218	33.603	.000a
	Residual	35.009	89	0.393		
	Total	48.227	90			
Coefficients(a)		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	1.795	0.289		6.219	0.000
	PC	0.522	0.09	0.524	5.797	0.000

Predictors: (Constant), Planning Collaboration (PC)
Dependent Variable: B2B

The coefficient of correlation between planning collaboration and strength of B2B relationship ($r=0.524$, $p<0.05$). This indicates that planning collaboration has a positive effect on the strength of B2B relationship. It further shows that as planning collaboration increases so does the strength of B2B relationship. This is an indication that positive relationship between planning collaboration and strength of B2B relationship is significant at 95% confidence level. Hence change in planning collaboration will lead to significant change in strength of B2B relationship. Accordingly, a study by Mlaker Kač *et al.* (2015) findings showed that trust had a statistically significant influence on collaboration between partners in supply chains.

4.11.3 Cost Collaboration and Strength of B2B Relationship

The results for simple regression analysis on cost collaboration and strength of Business to business relationship are presented in Table 4.17.

Table 4.17: Regression Results on Cost Collaboration and Strength of B2B Relationship

Summary	R	R Square	Adjusted R Square	Std. Error		
	.823a	0.677	0.673	0.41857		
ANOVA		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
	Regression	32.634	1	32.634	186.266	.000a
	Residual	15.593	89	0.175		
	Total	48.227	90			
Coefficients		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	0.595	0.212		2.81	0.006
	CC	0.868	0.064	0.823	13.648	0.00

a. Predictors: (Constant), Cost Collaboration (CC)
b. Dependent Variable: Business to Business Collaboration

Further, the coefficient of correlation between cost collaboration and strength of B2B relationship ($r=0.823$, $p<0.05$), indicated that cost collaboration had a positive effect on the strength of B2B relationship. This means that as cost collaboration increases so does B2B relationship. This is an indication that the positive relationship between cost collaboration and strength of B2B relationship is significant at 95% confidence level. Therefore, change in cost collaboration will lead to significant change in the strength of B2B relationship. Mandal and Korasiga (2016) in their study on an integrated-empirical logistics perspective on supply chain innovation and firm performance.

4.11.4 Risk Management Collaboration and Strength of B2B Relationship

The results for simple regression analysis on risk management collaboration and strength of Business to business relationship are presented in Table 4.18.

Table 4.18: Regression Results on Risk Management Collaboration and Strength of B2B Relationship

Summary	R	R^2	Adjusted R^2	Std. Error		
1	.812a	0.659	0.655	0.42982		
ANOVA(b)		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	31.785	1	31.785	172.05	.000a
	Residual	16.442	89	0.185		
	Total	48.227	90			
Coefficients(a)		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	0.598	0.22		2.715	0.008
	RMC	0.872	0.067	0.812	13.117	0.000

a. Predictors: (Constant), Risk Management Collaboration (RMC)
b. Dependent Variable: B2B

Correlation coefficient obtained on risk management collaboration and strength of B2B relationship ($r= 0.812$, $p<0.05$), showed that risk management collaboration had a positive effect on the strength of B2B relationship. Subsequently, this implied that as risk management collaboration increases, the strength of B2B relationship also increases. It also implies that the effect of risk management collaboration on the strength of B2B relationship was significant at 95% confidence level. Thus, change in risk management collaboration leads to significant change in B2B relationship. Ralston (2014) findings showed that technological uncertainty would share a positive relationship with supply chain collaboration with path coefficient of positive and statistically significant at the ($p<.001$) level indicating technological uncertainty does have an impact on supply chain collaboration.

A correlation of above 0.95 is a strong indication that the independent variables may be measuring the same thing (Tabachnick & Fidell, 2013). The fact that all the correlations were less than 0.95 was an indication that the factors were sufficiently different measures of separate variables, and the study consequently utilized all the variables.

4.12 Multiple Regression Analysis on Study Variables

Multiple regression analysis was used to show the overall relationship between supply chain collaboration and strength of B2B relationship. The results are presented in Table 4.19.

Table 4.19: Regression Analysis Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.9318	0.8682	0.8621	0.2718

a. Predictors: (Constant), IC, PC,CC,RMC *b. Dependent Variable: B2B*

As indicated in Table 4.19, the coefficient of correlation obtained was (r=0.9318) and coefficient of determination 0.8682. The positive coefficient of correlation indicates that supply chain collaboration has a positive effect on the strength of B2B relationship. The coefficient of determination of 0.8682 implies that supply chain collaboration accounts for about 86.82% of changes in strength of B2B relationship. The independent variables accounts for almost 86.82% of changes in the dependent variable.

This finding corroborates that of Alrubaiee *et al.* (2012) where coefficient of determination (R^2) values showed that e-commerce benefits accounts for 90% of variance in e-marketplaces usage; e-commerce benefits and e-marketplaces usage, account for 93% of variance in supply chain management. While Yeng, Osman, Yusuf (2015), finding shows that R-Square indicates that 50.2% of the variance in the extent of E-commerce adoption can be predicted from the variables of organizational context, technological context as well as environmental context. Rapid developments in technology, globalization and competition have increased the interest and opportunities for inter-organizational relationships. This is because organizations seek productive efficiencies in production, sourcing, distribution and retail among other supply chain functions (Monczka *et al.*, 2008).

ANOVA was used to test the significance of the model obtained. The analysis of the variance results are presented in Table 4.20.

Table 4.20: Analysis of Variance (ANOVA)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	41.8719	4	10.4680	141.6511	0.0000
Residual	6.3554	86	0.0739		
Total	**48.2272**	**90**			

a. *Predictors: (Constant), RMC, CC, PC, IC*
b. Dependent Variable: B2B

The study obtained a p-value of 0.0000 indicating that the relationship between supply chain collaboration and strength of B2B relationship is statistically significant at 95% confidence level. Therefore, change in supply chain collaboration will lead to a significant change in strength of B2B relationship. Further, the model developed was significant and can be used for prediction. The F-value of 141.6511 in the ANOVA table tests whether the overall regression model is a good fit for the data. Table 4.21 further shows that the independent variables statistically and significantly predict the dependent variable at $P<0.05$, an indication that the regression model is a good fit of the data.

A study by Šerić *et al.* (2014) employed one-way analysis of variance in relation to the sort of business of the company, number of employees and legal form. Further, the ANOVA tests for the equivalency of all the means between two groups, hence, the overall test looked above and beyond the grand mean and compared the grand mean model to the full model. The model coefficients are shown in Table 4.21.

Table 4.21: Model Coefficients

	Unstandardized Coefficients	Std. Error	Beta	t	Sig.
(Constant)	0.4284	0.1687		2.5390	0.0129
Innovation Collaboration	0.3027	0.0960	0.2780	3.1522	0.0022
Planning Collaboration	0.1705	0.0436	0.1709	3.9124	0.0002
Cost Collaboration	0.2516	0.0908	0.2385	2.7725	0.0068
Risk M.Collaboration	0.4631	0.0555	0.4309	8.3452	0.0000

a. Dependent Variable: Strength of B2B relationship

In terms of the importance of the independent variables, the β values of the variables show that risk management collaboration is the most important variable that influences the strength of B2B relationship, followed by planning collaboration, innovation collaboration and cost collaboration. The positive coefficients on innovation collaboration, cost collaboration, planning collaboration and risk management collaboration imply that the variables have a positive effect on the strength of B2B relationship.

The p-values of less than 0.05 on innovation collaboration, planning collaboration, cost collaboration and risk management collaboration show that variables had significant effect on the strength of B2B relationship at 95% confidence level. The model developed by the study was $Y = 0.4284 + 0.3027X_1 + 0.1705X_2 + 0.2516X_3 + 0.4631X_4$ where Y is strength of B2B relationship, X_1 is innovation collaboration, X_2 is planning collaboration, X_3 is cost collaboration and X_4 is risk management collaboration. The overall p-value of 0.0001 implies that this model can be used for prediction. Barasa *et al.* (2015) used a similar model for Supply Chain collaboration practice, $Y = \beta0 + \beta1x1 + \varepsilon$ Where; Y = Performance of Steel Manufacturing Company in Kenya; β0, β1, ε = Coefficient of Performance of Steel manufacturing

company equation; X1 = Supply chain collaboration practice is Y = 2.423 + 0.329X1 + ε.

The value of goodness of fit varies from 0 to 1, where greater values indicate better predictive ability. Kumar and Banerjee (2014) in their model, the goodness of fit was computed as 0.618 which indicated a substantial model fit while Vieira, Paiva, Finger and Teixeira (2012) presented indices related to the goodness of fit, which are at satisfactory levels with all the loadings above 0.60. Moreover, Singh *et al*. (2011) observed that organizations would enhance customer satisfaction and other positive business outcomes if they remain engaged in collaborative relationships with both customers and suppliers.

4.13 Hypothesis Testing of the Study Variables

Hypothesis is a specific statement of prediction. It describes in concrete terms what researcher expects will happen in the study. The results of the tests are shown in table 4.22

4.13.1 Effect of Innovation Collaboration on strength of B2B Relationship

The study sought to determine the effect of innovation collaboration on the strength of B2B relationship. The results of the tests are shown in table 4.22. The null hypothesis (H_{01}) for the objective was that there was no significant relationship between innovation collaboration and strength of B2B relationship. To test this hypothesis, analysis of variance was used. Therefore this model was significant at 95% significance level (α-level 2.5% for a 2-tailed test) with t=14.435. According to Fisher (1926) popular α-levels are 10% (0.1), 5% (0.05), 1% (0.01), 0.5% (0.005), and 0.1% (0.001). The accuracy is lowered to capture the appropriate significance. This study found innovation collaboration to have a positive influence on the strength of B2B relationship.

This was confirmed by model coefficient results where the Pearson correlation coefficient obtained 0.837, t= 14.435 (threshold at 1.436) and the p-value obtained was 0.000. The positive relationship indicated that innovation collaboration had a positive relationship with B2B where increase in innovation collaboration leads to increase in strength of B2B relationship. The null hypothesis that there was no

significant relationship between innovation collaboration and strength of B2B relationship was therefore rejected. Soosay *et al*. (2008) in their study on Supply Chain Collaboration: Capabilities for Continuous Innovation, discovered that as globalization drives rapid change in all aspects of market and company operations, strategic supply chain relationships are seen as critical to high performance and developing innovation capacity to meet both supply and demand.

A study by Parida *et al*. (2012) pointed out that for SMEs, vertical collaboration is relevant for radical innovation and horizontal collaboration is appropriate for incremental innovation. Supply chain innovation brings about supply chain efficiency including reduced lead time, new operation strategies, and reduction in cost, provision of consistent quality and development of flexibility for dealing with rapid changes in the business environment (Stundza, 2009). Innovation or innovative capacity is a capability that enhances competitiveness and strength of B2B relationship (Lehrer *et al*., 2013; Love *et al.,* 2011; Arora *et al.,* 2016). Small and medium enterprises often utilize supplier relationships as a means to connect external and internal expertise and capabilities, thus improving their innovation (Hung, 2010). Supply chain innovation therefore improves supply chain performance and strength of B2B relationship.

4.13.2 Effect of Planning Collaboration on strength of B2B Relationship

The second objective was to identify the effect of planning collaboration on the strength of B2B relationship**.** The results of the tests are shown in table 4.22. Normality test on the factors produced Skewness values between -1 and +1. The outliers were tested for each of the observations. The null hypothesis (H_{02}) for the objective was that there is no significant relationship between planning collaboration and strength of B2B relationship. To test this hypothesis and analysis of variance was used. Therefore this model was significant at 95% significance level (α-level 2.5% for a 2-tailed test) with t=5.797.

The study found planning collaboration to have a positive influence on the strength of B2B relationship. This was confirmed by model coefficient results where the Pearson correlation coefficient obtained .524, t=5.797 (threshold at 1.436) and the p-value obtained was 0.000.

This positive correlation is an indication that as planning collaboration increases so does B2B relationship. The results showed that the positive relationship was strong since it was more than 0.5. The p-value of 0.000 which was less than 0.05 indicated that the relationship between planning collaboration and strength of B2B relationship was statistically significant at 95% confidence level. The null hypothesis that there was no significant relationship between planning collaboration and strength of B2B relationship was therefore rejected. Petersen *et al.* (2005) reported that where trust and the quality of information were found to be the antecedents to effective collaborative planning. Collaborative planning process and tools can reduce inventory and increase customer service levels by integrating supply chain planning and control which ultimately results in reducing the bull-whip effect (de Kok *et al.*, 2005). Supply chain planning collaboration can impact operational efficiency as well as strength of B2B relationship which subsequently leads to competitive advantage.

4.13.3 Effect of Cost Collaboration on strength of B2B Relationship

The third objective was to determine the effect of cost collaboration on the strength of B2B relationship. The results are presented in Table 4.22. Normality test on the factors produced Skewness values between -1 and +1. The outliers were tested for each of the observations. The null hypothesis (H_{03}) stated that there was no significant relationship between cost collaboration and strength of B2B relationships.

However, the study results indicated a positive (r= 0.823) relationship between cost collaboration and strength of B2B relationship. Thus, cost collaboration was found to have a positive effect on the strength of B2B relationship. Therefore, H_{03} was rejected. The model was statistically significant at 95% significance level (α-level 2.5% for a 2-tailed test) with t=13.648. The study found cost collaboration to have a positive influence on the strength of B2B relationship. The positive relationship was confirmed by model coefficient results where the Pearson correlation coefficient obtained t= 13.648 (threshold at 1.436) and the p-value obtained was 0.000.

The positive relationship indicated that cost collaboration had a positive relationship with B2B relationship where increase in cost collaboration practices lead to an increase in strength of B2B relationship. In their study on a multi-objective approach to supply chain risk management: Integrating visibility with supply and demand risk,

Nooraie and Parast (2015) posit that increased visibility in supply chain collaboration offers tremendous cost savings when supply chain disruption occurs. The outcomes showed that increased supply chain collaboration visibility increases efficiency and reduces both risks and costs.

While Bagchi and Chun (2005) found out that supply chain integration influences operational performance and the extent of integration also has a positive impact on cost and efficiency. Increase in cost collaborations leads to improved B2B relations and subsequently better performance. Supplier collaboration can reduce material costs, improve quality, reduce product development time (Ragatz *et al.*, 2002; Handfield *et al.*, 2015) and reduce manufacturing cost while improving functionality. Effective supply chain collaboration practices are essential and vital for attaining cost effective responsiveness and competitive advantage.

4.13.4 Effect of Risk Management Collaboration on strength of B2B Relationship

The fourth specific objective was to determine the effect of risk management collaboration on the strength of B2B relationships. The results are presented in Table 4.22. Normality test on the factors produced Skewness values between -1 and +1. The outliers were tested for each of the observations. There were no outliers detected. The values obtained in testing the model fit indices were within acceptable threshold. The null hypothesis (H_{04}) stated that there was no significant relationship between risk management collaboration and strength of B2B relationship.

The model was statistically significant at 95% significance level (α-level 2.5% for a 2-tailed test) with t=13.117. This study found risk management collaboration to have a positive influence on the strength of B2B relationship. This was confirmed by model coefficient results where the Pearson correlation coefficient obtained 0.812, t=13.117 (threshold at 1.436) and the p-value obtained was 0.000. The positive relationship indicated that an increase in risk management collaboration practices lead to an increase in B2B relationship. The null hypothesis that there was no significant relationship between risk management collaboration and strength of B2B relationships was rejected.

Therefore, adoption of risk management strategies will lead to increased B2B relationship among SMEs. With t=13.117, this study found the model statistically significant at 95% significance level. A study by Thun and Hoenig (2011) confirmed that organizations with a more mature level of supply chain risk management implementation degree yield a superior supply chain performance and those using the preventive supply chain risk management method show greater flexibility and are better at planning safety stocks. Christopher and Lee (2004) argued that one key factor in any strategy designed to manage and mitigate supply chain risk is to improve end to end information visibility which in turn can help to improve supply chain confidence for shareholders and increase supply chain visibility. Supply chain risk mitigation strategies could enhance company's performance and B2B relationship.

4.13.5 Combined effect of Innovation, Planning, Cost and Risk Management Collaborations on strength of B2B Relationship

The overall objective was to identify the combined effect of innovation collaboration, planning collaboration, cost collaboration and risk management collaboration on the strength of B2B relationship. Normality test on the factors produced Skewness values between -1 and +1. The outliers were tested for each of the observations and none was detected. The values obtained in testing the model fit indices were within acceptable threshold. The null hypothesis (H_{05}) was that innovation collaboration, planning collaboration, cost collaboration and risk management collaboration have no significant effect on the strength of B2B relationship.

The results were also confirmed by multiple regression results where the coefficient of correlation obtained was r=0.9318 and coefficient of determination of 0.8682. The positive coefficient of correlation indicated that supply chain collaboration has positive effect on the strength of B2B relationship. The coefficient of determination of 0.8682 implied that risk management collaboration, innovation collaboration, planning collaboration and cost collaboration accounted for 86.82% of changes in strength of B2B relationship. The p-value obtained by the study was 0.0000 which was less than 0.05 and hence null hypothesis was rejected (t=2.539).

This indicated that the relationship between supply chain collaboration and strength of B2B relationship was significant at 95% confidence level. This is consistent with the study by Koh *et al.* (2007) which found that supply chain management practices have significant direct positive impact on organizational performance even in small and medium enterprises. This implied that supply chain collaboration among ICT SMEs leads to better B2B relationship. Firm's competitive advantage is significantly associated with its ability to develop new products. Studies have shown that about 80% of product life cycle cost is assessed at the design stage (Ellram & Cooper, 2014; Hong, Kwon & Roh, 2009).

Carr and Pearson (1999) discovered that strategically managed long-term relationships with key suppliers have a positive impact on a firm's supplier performance. In terms of operations-based performance metrics, supplier innovativeness has also been positively linked to manufacturer cost improvement, quality, product development, flexibility and delivery speed. This is in line with the findings of Ntayi and Eyaa (2010) that there is a strong positive impact of collaborative relationships on supply chain performance of SMEs.

4.14 Summary of Hypothesis Testing Results

The results of hypothesis testing show that all the five hypothesized relationships were significant. This means that all the variables significantly contributed to the strength of B2B relationship. The hypothesized relationship on innovation collaboration, planning collaboration, cost collaboration, risk management collaboration and strength of B2B relationship were statistically significant at 5% α-level. Summary of the hypothesis testing results are shown in Table 4.22.

Table 4.22: Summary of Hypotheses Testing

Hypothesis	Std Error	t	P-value	Conclusion
H_{01}: There is no significant relationship between innovation collaboration and strength of B2B relationship	0.063	14.435	0.000	Reject H_{01}
H_{02}: There is no significant relationship between planning collaboration and strength of B2B relationship	0.09	5.797	0.000	Reject H_{02}
H_{03}: There is no significant relationship between cost collaboration and strength of B2B relationship	0.064	13.648	0.000	Reject H_{03}
H_{04}: There is no significant relationship between risk management collaboration and strength of B2B relationship	0.067	13.117	0.000	Reject H_{04}
H_{05}: Innovation collaboration, planning collaboration, cost collaboration and risk management collaboration have no significant effect on the strength of B2B relationship	0.2718	2.539	0.000	Reject H_{05}

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The summary of the study is presented in this chapter as guided by the specific objectives. This is followed by conclusion and recommendations. The chapter finally gives direction on areas of further research based on the findings.

5.2 Summary

The study sought to determine the effect of supply chain collaboration on strength of B2B relationship among small and medium ICT firms in` Nairobi City County. The study relied on theoretical and empirical studies on supply chain collaboration and consequently developed a conceptual framework of the relationship between the independent and the dependent variable. The hypothesized relationships were then tested empirically. Firms are building collaborative relationships with their supply chain partners in order to achieve efficiencies, flexibility, sustainable competitive advantage and B2B relationship (Nyaga *et al.,* 2010; Ghobakhloo *et al.*, 2011). SMEs can generate relational rents through relation specific resources, complementary resource endowments, knowledge-sharing routines and effective governance.

The study was informed by the fact that theoretical literature indicated that many SMEs that adopted supply chain collaboration performed better in B2B e-commerce as opposed to those that did not. Wisner, Tan and Leong (2016) posit that long term supply chain relationship results in value for both parties such as higher problem solving, mutual financial benefits, and high frequency of effective communication.
While Crook *et al.* (2008) suggested that when independent firms collaborate and share knowledge with others, they can achieve advantages beyond what could have been achieved in arm's length exchange. This mirrors the importance that coordinated work between suppliers' and buyers have on the competitiveness of SME's supply chain. Prior to carrying out empirical tests, some assumptions about the variables used in the analysis were tested given that most statistical tests rely on them. The study found no infringement of the assumptions of normality, heteroscedasticity, multicollinearity, linearity, outliers and non-response bias. Zhou

et al. (2016) in their study on E-Supply Chain Integration Adoption: Examination of Buyer–Supplier Relationships found skewness and kurtosis of dependent variable was between the range of −0.84 and 0.19; the condition for normality of the dependent variable was met.

5.2.1 The effect of Innovation Collaboration on Strength of B2B Relationship

Innovation collaboration was found to have a positive influence on the strength of B2B relationship. Innovation collaboration also had a statistically significant relationship with strength of B2B relationship of small and medium enterprise ICT firms in Nairobi City County. Accordingly, the null hypothesis was rejected. This finding supported the argument of Schiele (2010) that successful innovative firms organize their purchasing function distinguishing between advanced sourcing and life-cycle sourcing units in a way that leads to distinctive advantage. In another related study, Soosay *et al.* (2008) reported that having collaborative relationship is important in inculcating a culture of continuous innovation.

Out of the eleven factors of innovation collaboration, platform for receiving feedback, joint development of quality monitoring systems, joint product design, product development, joint research and development, new technologies, joint customization, tailored manufacturing process specifications with suppliers, transferred new ideas and new processes were found to have contributed significantly to SMEs B2B relationship in Nairobi City County. The findings were consistent with the results from other studies such as Paulraj (2011) that found collaboration as supporting innovations and enhancing the accumulation of valuable assets that are implicit, relationship-specific and are not easily replicated by competitors.

The success of supplier collaboration depends on an organization's ability to manage supplier involvement effectively, to capture both long and short-term benefits. Small and medium enterprises face resource gaps in terms of skills, financial, knowledge and technology (Mudambi *et al*., 2004). Therefore, they tend to depend on suppliers' capabilities and co-operative relationships to access the latest technologies, materials, process and other methods of innovations (Fawcett *et al*., 2008; Koh *et al*., 2007). This is consistent with Lipparini and Sobrero's (1994) findings in which they reported that SMEs often depend on the supplier relationship as a key ingredient to

connect internal and external capabilities and expertise, as well as improve their innovation.

Several studies have reported that supplier involvement in product design and development can help to reduce costs and development time, increase quality and provide innovation to increase market share (Oh *et al*., 2015; Handfield *et al*., 2015). Brown and Eisenhardt (1995) posit that product development is the essential process for success, survival and renewal of organizations, especially for firms in competitive markets. While Autry and Griffis (2008) using social network theory propounded structural capital, relational capital and supply chain knowledge development to be positively associated with innovation-oriented performance. Besides, Oh *et al.* (2015) maintained that supporting complicated new product development procedures is important for total production process and maintaining product quality.

A survey by Bengtsson, Lakemond and Dabhilkar (2013) shows that identifying and selecting suppliers for new product development collaborations is particularly important when aiming to improve the firm's innovation performance. SMEs that develop exciting products are likely to win in a competitive B2B e-commerce through proper selection of suppliers. The development of Internet-based solutions has driven SMEs to consolidate their participation in B2B e-commerce platforms. Scholten (2015) found that the jointly created knowledge contributes to more supply chain resilience.

5.2.2 The effect of Planning Collaboration on Strength of B2B Relationship

Planning collaboration had a positive influence on the strength of B2B relationship of ICT small and medium enterprise firms in Nairobi City County. The positive influence meant that planning collaboration improves the strength of B2B relationship. Consequently, the null hypothesis was rejected. Three factors namely, joint demand forecasting, inventory positioning strategy and minimization of forecast bias contributed to planning collaboration influence on strength of B2B relationship of ICT small and medium enterprise firms in Nairobi. Vanneste *et al*. (2014) in a study on Trust over time in exchange relationships: meta-analysis and theory, found that there is a positive relationship between the length of prior interactions and trust. If the partner firm does not fulfill positive expectations through its interactions, the

focal firm will not develop confidence in the partner, thereby affecting the continuation of the relationship (Vanneste *et al*., 2014). In support, Jain *et al*. (2008) found that collaborative planning and forecasting significantly lowers inventory costs and increases customer responsiveness and services.

Collaborative planning tools such as computers can reduce inventory and increase customer-service levels by integrating supply chain planning and control which ultimately results in reducing the bull-whip effect (De Kok *et al.,* 2005). While Clark and Hammond (1997) found out that collaborative planning, forecasting and replenishment had significant influence on inventory turnover by 50 to 100 per cent. Sharing of forecast information with supply chain partners reduces supply chain cost by 40 per cent (Babai *et al*., 2013).

Planning collaboration reduces the bullwhip effect, enhances customer satisfaction, and competitive advantage within supply chain (Masayasu *et al.,* 2015; Babai *et al*., 2013). Firms cannot effectively manage cost, offer high customer service, and become leaders in supply chain management without the incorporation of top of the line information technologies (Turner, 2014; Cheng *et al.,* 2010). Therefore, efficient information and knowledge integration technologies are key to handling complex networks especially when sharing information and can therefore reduce both costs and lead times (Trkman & McCormack, 2010; Lavbič *et al*., 2010).

5.2.3 The effect of Cost Collaboration on Strength of B2B Relationship

The third specific objective was to determine the effect of cost collaboration on strength of B2B relationship. Cost collaboration was found to have a positive effect on the strength of B2B relationship among SMEs. Consequently, the hypothesis that there is no relationship between cost collaboration and strength of B2B relationship among SMEs in Nairobi City County was rejected. Cost collaboration factors had a statistically significant influence on the strength of B2B relationship among ICT SMEs in Nairobi. Cost collaboration factors also explained a considerable variation in B2B relationships. All the nine factors contributed significantly to cost collaboration influence on SMEs B2B relationship.

Cost performance is considered a key part of SME success where the benefits of working collaboratively outweigh its costs (Terjesen *et al*., 2012), firms may seek to combine complementary capabilities to create value that they could not achieve independently (Hudnurkar *et al.,* 2014). In support of the findings Rai *et al.* (2006) report that physical process integration can bring tangible benefits such as improving productivity, increasing order frequency, cutting buffer inventory, reducing purchasing costs, as well as generate intangible benefits such as increasing responsiveness, improving customer relationships and service, improving long-term competitiveness.

While Ragatz *et al.* (2002) opine that supplier integration can reduce material costs, product development time and manufacturing cost while improving functionality. A long-term relationship with the supplier will have a lasting effect on the competitiveness of the entire supply chain. Cost reduction can lead to more innovative agreements on final pricing thus achieving price leadership in the market for competitive advantage (Dung, 2015).

Sharing data associated with total cost reduction and shortening of the cycle (Lin *et al.,* 2002). Stank, Keller and Closs (2001) in a study on the performance benefits of supply chain logistical integration, found that supply chain collaboration creates value through improved customer service levels and reduced costs. Increase in cost collaborations leads to increase in B2B relationship. Supplier collaboration can reduce material costs, improve quality, reduce product development time and cost (Ragatz *et al*., 2002; Handfield *et al.,* 2015) and reduce manufacturing cost while improving functionality. Effective supply chain collaboration practices are essential and vital for attaining cost effective responsiveness and competitive advantage.

5.2.4 The effect of Risk Management Collaboration on Strength of B2B Relationship

The fourth specific objective was to determine the effect of risk management collaboration on strength of B2B relationship. Risk management collaboration was found to have positive effect on strength of B2B relationship among SMEs. One factor, namely training in strategic risk management contributed highly to the risk management collaboration influence on the strength of B2B relationship of ICT

small and medium enterprises in Nairobi City County. Therefore, the hypothesis that there is no relationship between risk management collaboration and strength of B2B relationship was rejected.

Small and medium enterprises usually build deep suppliers relationships with hopes to increase the stability of supply and reduce supply shortage risk (Ellegaard, 2006). A study by Thun and Hoenig (2011) confirmed that organizations with a more mature level of supply chain risk management implementation degree yield a superior supply chain performance and those using the preventive supply chain risk management method show greater flexibility and are better at planning safety stocks.

Whereas Charles *et al.* (2010) points that volatility of demand, imbalance between supply and demand and disruptions are all factors that affect supply chains negatively and call for a high level of agility. Thus, it is important to adjust supply chain configuration and processes so as to react in a timely manner before occurring risks can materialize in decreasing the value of the supply chain for its respective customers (Ritchie *et al.,* 2008). In another study, Hoffmann *et al.* (2011) differentiated environmental risk affecting all actors, financial risk, operational risk such as quality problems of a supplier and strategic risk to enable firms to strategize on how to overcome such risks.

Supplier synergy allows firms to eliminate or lessen the recurrent technical and quality problems in production. Besides, effective synergistic collaboration also leads to the sharing of strategic and key explicit and tactic knowledge (Wu *et al.*, 2010). It is widely agreed that issues of risks and trust are considerably more important in supply chain relations because supply chain relationships often entail a higher level of interdependency amongst firms (Wu *et al.*, 2010; La Londe, 2002).

Christopher and Lee (2004) opine that key factor in any strategy designed to manage and mitigate supply chain risk is to improve end to end information sharing which in turn can help to improve supply chain confidence for investors and increase supply chain visibility. Sheu *et al.* (2006) in their seminal work on determinants of supplier-retailer collaboration: evidence from an international study, indicated that supplier collaboration reduces procurement risks and helps the firm achieve competitive

position by ensuring reduced transaction cost. Risk causes could bring a negative impact to organization's performance both on short or long-term.

5.2.5 The combined effect of Innovation, Planning, Cost and Risk Management Collaborations on strength of B2B Relationship

The final objective was to identify the combined effect of innovation collaboration, planning collaboration, cost collaboration and risk management collaboration on the strength of B2B relationship. The study found a positive combined effect of innovation collaboration, planning collaboration, cost collaboration and risk management collaboration on the strength of B2B relationship. The positive relationship indicated that there is a combined effect of innovation collaboration, planning collaboration, cost collaboration and risk management collaboration on the strength of B2B relationship. The coefficient of determination of 0.8682 implied that the combined effect accounted for 86.82% of changes to strength of B2B relationship.

Therefore, the null hypothesis that there was no combined effect of innovation collaboration, planning collaboration, cost collaboration and risk management collaboration on the strength of B2B relationship was rejected. Lv, Ye and Qiang (2010) endorse that a supply chain characterized by trust between supply chain members has a positive and significant influence on their abilities and capabilities to share key and strategic information and data. Therefore, the sharing of information between SMEs and their suppliers has an influence on supplier confidence and is thus a significant factor of supply chain collaboration.

By keeping a close relationship with suppliers, suppliers will be more than willing to assist when the demand is high (Fawcett *et al*., 2008). The findings of Ntayi and Eyaa (2010) suggest that there is a strong positive impact of collaborative relationships on supply chain performance of SMEs. In their study, Yeung *et al.* (2013) propose that sound collaboration enables businesses to obtain great benefits, such as improved quality of products and flexibility of operations. Thus, supplier synergy reduces unnecessary duplications responsible for possible inefficiencies within the supply chain. However, Hsu *et al.* (2008) found that information sharing contributes largely to improved relationships between suppliers by facilitating

efficient coordination and responsiveness as well as integration of partners' information systems.

While Barratt (2004) stated that information sharing plays a pivotal role in assisting supply chain partners to collaboratively plan, engage in mutual strategic activities and decision-making. This therefore may allow supply chain partners to effectively and efficiently work together and foster the value creation of each supply chain unit in a more collaborative manner. Product design alignment with supply chain partners increases customer responsiveness, firm competitiveness and performance (Khan *et al*., 2012). Supply chain capabilities enhance relationship between technological resources and product design value (José & Ortega, 2010).

Sharing of high quality information amongst the production and supporting functions produces higher internal visibility seen in the smooth production and material flow. By streamlining and automating customer-related transactional activities such as order entry and tracking, SMEs can reduce administrative costs and ultimately improves profitability.

5.3 Conclusion

Derived from the analyses, innovation collaboration was found to have a statistically significant influence on strength of B2B relationship amongst ICT small and medium enterprises in Nairobi. This is in line with network theory which states that network relations do create information sharing capabilities that enable buyers and sellers to have access to resources and knowledge beyond their abilities, leading to long-term relationships and innovation. The dynamic changes in technology demand that huge investments be made in innovation collaboration.

Essentially, innovation collaboration will hasten the implementation of supply chain collaboration initiative as well as align supply chain collaboration with the corporate strategies and objectives of SMEs, thereby leading to better B2B relationship. It is also consistent with existing literature. Hurtley and Hult (1998) found innovation or innovative capacity as a capability that enhances competitiveness and performance. Furthermore, when drastic innovations eventually become the new technological

paradigm, the trainee firms usually move ahead of former leading firms (Grawe, 2009; Stundza, 2009).

Flint *et al.* (2005) in their study on Logistics Innovation: A Customer Value-Oriented Social Process, focused on joint innovation that is more helpful to customers for such as a better and enhanced service that is new. While Flint *et al.* (2008) in their study on exploring processes for customer value insights, supply chain learning and innovation: an international study, surveyed extent of innovation management and extent of supply chain learning management as background for supply chain innovation. In any case, Autry and Griffis (2008) using network theory advocated relational capital and supply chain collaboration development to be positively associated with innovation oriented performance. SME management should embrace innovation collaboration so as to achieve strength of B2B relationship and sustainable competitive advantage. Thus it can be said that innovation collaboration can be used as a significant instrument for better B2B relationship amongst ICT SMEs.

Planning collaboration was also found to have a statistically significant influence on strength of B2B relationship amongst ICT SMEs in Nairobi City County. This is in line with the stakeholder theory which centers on the basic premise that internal and external groups will influence organizational practices; externalities may be internalized via stakeholder pressures between supply chain partners. The study emphasizes that mechanisms should be put in place to foster joint planning which refers to the process of supply chain partners synchronizing their planning decision making process in supply chain operations with the purpose of supply chain benefit optimization and improved strength of B2B relationship amongst SMEs.

Planning collaboration determines the way and extent of the material flow such as finished product from suppliers to end user and also the product return from the end user. Ramanathan and Gunasekaran (2012) in their supply chain collaboration model divided collaboration in three main components of collaborative planning, collaborative execution and collaborative decision making with the objective of finding their influence on the future and success of collaboration. While Sundarraj and Talluri (2003) in a study on a multi-period optimization model for the procurement of component-based enterprise information technologies stressed that

sharing and coordination of information across the supply chain at the right time are major factors to improving the performance of an organization.

While Fawcett *et al.* (2008) in a study on the Benefits, barriers, and bridges to effective supply chain management, identified four benefits of supply chain planning as; responsiveness to customer requests, on-time delivery, overall customer satisfaction and order fulfillment lead times which is critical to the implementation of B2B relationship. Lee and Rhee (2007) pointed out that the sharing of demand information in supply chains typically increases the performance of the supply chain by increasing availability and reducing inventory related costs. The management of SMEs should adopt collaborative planning tools because the current turbulent market requires real time sharing of demand and supply information so as to prevent bullwhip effect. Planning and information sharing is seen as the glue that strengthens the supply chain collaboration, leading to stronger B2B relationship amongst SMEs in Nairobi City County.

Cost collaboration also had a statistically significant influence on strength of B2B relationship amongst ICT small and medium enterprises. The finding was in line with Transaction cost economics which suggests that firms organize their cross-organizational activities to minimize production costs within the firm and transaction costs within markets. Organizations favor supply chain collaboration when transaction costs such as performance assessment and adaptation are greater than internal costs such as production and administration costs. Cost collaboration issues can therefore be used as a significant tool to improve strength of B2B relationship amongst SMEs. Supply chain collaboration reduces the costs of transacting with external parties relative to internal coordination costs.

Tang and Tomlin (2008) observe that firms strive to improve their financial performance by implementing various supply chain initiatives that are intended to increase revenue, reduce cost, and reduce assets. While, So and Sun (2011) found that strong supplier relationships along with lean practices can lead to reduced costs, shipment deliveries with shorter lead times, and improved throughput.

Risk management collaboration also had a statistically significant influence on strength of B2B relationship amongst ICT SMEs in Nairobi City County.

Yaakub and Mustafa (2015) in their study on Supply Chain Risk Management for the SME's, identified risk mitigation strategies as one of the success factors of supply chain collaboration. In line with this, risk management theory suggests that through organizational risk analysis and evaluation, the threats and vulnerabilities regarding information security could be estimated and assessed, and the evaluation results used for planning information security requirements and risk control measures, with the ultimate goal of reducing or minimizing information security risk to an acceptable level in an organization.

Chopra and Sodhi (2014) in their study on Reducing the Risk of Supply Chain disruptions, identified underestimation of likelihood of a disruptive event as far more expensive in the long run than overestimating the likelihood. While Kern, Moser, Hartmann and Moder (2012) in their study on Supply risk management: Model development and empirical analysis, found that superior risk identification supports the subsequent risk assessment and this in turn leads to better risk mitigation, hence, a better B2B relationship for SMEs. Through risk management collaboration, a small and medium enterprise could take appropriate measures to cushion its supply chain and business cost-effectively. This in turn will increase strength of B2B relationship. In light of this, it can be concluded that risk management collaboration is a basis of supply chain collaboration implementation that could lead to enhanced strength of B2B relationship amongst ICT SMEs.

5.4 Recommendations

Generally, the study results provide practitioners with important insights by highlighting the benefits that ICT small and medium enterprises can derive through an efficient implementation of supply chain collaboration. Particularly, small and medium enterprises with no experience in supply chain collaboration can gain an in-depth understanding of this process to better protect their supply chains. This is because the proposed model can serve as a guide for developing and implementing supply chain collaboration framework within an organization.

In particular, factors linked to risk management collaboration ought to be accorded special attention as they have shown to have the greatest influence on strength of B2B relationship amongst ICT small and medium enterprises.

Thus adoption of joint risk mitigation techniques, overestimation of risk among other factors should be strongly emphasized by owner/managers of SMEs. Investing in risk management collaboration will allow SMEs to benefit from pooling of knowledge in risk management from other supply chain partners. Risks such as piracy and terrorism are a major threat to supply chain worldwide and portends great lose if not mitigated. Therefore, this study strongly recommends that SMEs need to invest more in risks management collaboration since it also enhances strength of B2B relationship.

Planning collaboration should be accorded second priority since it constitutes the strategic aspect of supply chain collaboration which centers on a strategy, for managing all the resources that go into meeting customer demand. Certainly, poor planning collaboration would result in 'bullwhip effect' and ineffective supply chain collaboration or total failure of the relationship. Planning minimizes and reduces forecast error as well as coordinates all the activities within the supply chain and facilitates sharing of information. Failure by SME owners/managers to invest in planning tools especially IT to support the need for reliable market information could result in supply chain disruption. Small and medium-enterprise firms should therefore invest in planning collaboration and especially in IT tools for superior B2B relationship. Owners/managers should inculcate a planning culture within the firms since failure to plan is planning to fail.

Innovation collaboration comes in third in terms of significance. Thus adoption of joint product development, research and development, joint product design and development of new technologies should be strongly incubated by owners/managers of SMEs for better B2B relationship. Therefore, investing in innovation collaboration will allow SMEs to benefit from pooling of knowledge and resources so as to increase the strength of B2B relationship.

Development of an innovation collaboration policy will help incubate and promote innovative ideas which have been the major barrier to SMEs wishing to create new ideas. A policy on information sharing ought to be included in the overall innovation collaboration policy of organizations, as a way of enhancing open innovation. In fact the Kenya Government, in its quest to achieve Vision 2030, can develop an

innovation policy which will guide SMEs in implementing innovative thinking, regarded as an important function of supply chain collaboration.

Cost collaboration should also be given attention especially through the use of Information Technology (IT) to reduce transaction costs by eliminating geographical barriers in order process. Automation and control technologies supported by IT tools can improve SMEs profitability as well as competitiveness. Therefore, there is need for cost reduction policies to be included in the overall supply chain policy of SMEs, as a way of enhancing strength of B2B relationship.

Supply chain networks have become more complicated; hence, SME leaders should consider implementing supply chain strategies to increase revenue and reduce costs. In summary, risk management factors should be enhanced by incorporating them in the mission and vision statements of SMEs and making them part of their corporate culture as the study has shown a positive relationship between risk management collaboration and strength of B2B relationship amongst SMEs. Finally, ICT small and medium enterprise firms should be encouraged to increase their supply chain collaboration intensity levels so as to strengthen B2B relationship.

Developments in information technology present significant opportunities for cost reduction and B2B relationship improvements in supply chain collaboration since they provide the ability to reduce response times and align supply chain strategies to deal with product demand and uncertainties.

5.5 Contribution to Body of Knowledge

In terms of theoretical contributions, this study has developed a framework which can efficiently consider diverse types of supply chain collaboration effect such as cost collaboration, planning, risk management, innovation and resource utilization improvement. The output of the framework can be practically used as standards for the various operational issues such as cost allocation and planning problems within supply chain. Therefore, the proposed framework will effectively and efficiently increase SMEs supply chain collaboration and strength of B2B relationship while decreasing operational costs. Consequently, the proposed framework can make the supply chain collaboration more sustainable leading to sustainable collaborative

advantage. As discussed, the variables from the model are able to explain a high percentage of the variance of strength of B2B relationship.

Furthermore, this study contributes to the body of knowledge on supply chain risk management through development of a supply chain perspective. It investigates risks along a direct supply chain, including supply risk, inventory risk and demand risk, as well as the reputational risk within supply chain relationships. The study has therefore added knowledge in improving the understanding of a collaborative approach in risk management through providing an explanation of the approach based on the relationship between information and uncertainty as well as the relational view through the application of principal-agent theory. This study empirically tested the propositions of this theory through a survey study which is scant in the existing literature. This study also provides insights to supply chain practitioners to manage supply chain risks with a holistic and systems approach view of the supply chain.

5.6 Areas of Further Research

The study relied on descriptive research survey design where the respondents were asked to describe viewpoints on the item in the instrument. However, it is evident that some success factors of supply chain collaboration are strategic and dynamic in nature. Hence, a longitudinal study would be more ideal as it could provide a deeper insight and perspective of the effect of supply chain collaboration on strength of B2B relationship in Nairobi City County and Kenya at large. Besides, it will inform future policy frameworks for supply chain collaboration information.

Since this study was based on ICT SMEs, there is need for further research to determine the effect of supply chain collaboration on SMEs or firms in other sectors such as manufacturing and hospitality. This will ensure that the results obtained apply to firms in different sectors and determine whether supply chain collaboration applies to other sectors. This will confirm generalizability of the results. It will also determine whether the firms in other sectors are benefiting from supply chain collaborations in similar way like those SMEs in ICT sector.

Given that the dependent variable is qualitative in nature; future research should test the results with the dependent variable being quantitative i.e. firm or business performance. Finally, the findings presented in this study are based on evidence gathered from ICT SMEs from Nairobi City County. Future research should be extended to other parts of Kenya or regionally. The study findings indicated the importance of supply chain collaboration in strengthening B2B relationship amongst SMEs.

The study also highlighted the importance of B2B relationship among business and made recommendations to owners/management of the SMEs. It is expected that from the study, the firms will engage in more supply chain collaboration which will further improve the strength of B2B relationship. Considering the importance of supply chain collaboration to organizations, a repeat study is recommended to confirm these results since no any other research had been done in this area. A similar study coming up with comparable results would give confidence to the decision makers who would wish to use the findings of this study to make conclusions with implications to their organizations.

REFERENCES

Abereijo, I., O., Adegbite, S., A., Iiori, M., O. Adeniyi, A., & Aderemi, H., A. (2009).Technological innovation sources and institutional supports for manufacturing small and medium enterprises in Nigeria. *Journal of Technology Management & Innovation, 4*(2), 82-89.

Abdallah, A., B., Obeidat, B., Y., & Aqqad, N., O. (2014). The Impact of Supply Chain Management Practices on Supply Chain Performance in Jordan: The Moderating Effect of Competitive Intensity. *International Business Research, 7*(3), 13-27.

Abdallah, A., B., Anh, P., C., & Matsui, Y. (2016). Investigating the effects of managerial and technological innovations on operational performance and customer satisfaction of manufacturing companies. *International Journal of Business Innovation and Research, 10*(2/3), 153-183.

Abdallah, A., & Matsui, Y. (2008). *Customer Involvement, Modularization of Products, and Mass Customization: Their Relationship and Impact on Value to Customer and Competitiveness*. In Proceedings of the Third World Conference on Production and Operations Management. Tokyo, Japan. Retrieved from: http://dx.doi.org/10.13140/2.1.2632.2246.

Able, B., & Royez, A. (2004). How Innovations in Supply Chain Management are Transforming Businesses, *A chemical week custom publication, 10*.

Aboelmaged, M., G. (2010). Six Sigma quality: a structured review and implementation for future research, *International Journal of Quality & Reliability Management, 27*(3), 268-317.

Adams, F., Richey Jr., R., Autry, C., Morgan, T., & Gabler, C. (2014). Supply chain collaboration, integration, and relational technology: How complex operant resources increase performance outcomes. *Journal of Business Logistics, 35*(4), 299–317.

Ahmed, S., & Ullah, A. (2012). Building supply chain collaboration: different collaborative approaches. Integral Review; *A Journal of Management*, *5*(1), 8–21.

Al-Abdallah, G., M., Abdallah, A., B., & Bany, Hamdan, K. (2014). The Impact of Supplier Relationship Management on Competitive Performance of Manufacturing Firms. *International Journal of Business and Management*, *9*(2), 192-202.

Al-bayati, Y. (2011). *The Impact of E-Commerce on Supply Chain Management (SCM) and E-Marketplace Usage: An Analytical Study on Companies that Use E-Commerce in Amman City*. Unpublished PhD Thesis, Amman: Middle East University.

Al-Dmour, A. (2012). Factors affecting SMEs adoption of internet-based information systems in business-to-business (B2B) and the value-added on organization's performance. *Jordan Journal of applied science 'Humanities Series*, *14*(1).

Ali, M., M., Boylan, J., E., & Syntetos, A., A. (2012). Forecast errors and inventory performance under forecast information sharing. *International Journal of Forecasting, 28*(4), 830–841.

Alrubaiee, L., Alshaibi H., & Al-bayati, Y. (2012). Relationship between B2B E-Commerce Benefits, E-Market-place Usage and Supply Chain Management, *Global Journal of Management and Business Research, 12* (9).

Al-Zu'bi, Z.M.F., Tarawneh, E., Abdallah, A. B., & Fidawi, M. (2015). Investigating Supply Chain Integration Effects on Environmental Performance in the Jordanian Food Industry. *American Journal of Operations Research*, *5*(4), 247-257. http://dx.doi.org/10.4236/ajor.2015.54019.

Al-Zu'bi, Z.M.F. (2010). *Collaboration in Mass Customization: Exploring the impacts of suppliers and lead users*. Germany: VDM Verlag.

Al-Zu'bi, Z.M.F. (2016). Collaboration with Suppliers and Lead Users in New Product Development and Open Innovation: Empirical Evidence from Jordanian Companies, *Engineering Management Research, 5(*1). http://dx.doi.org/10.5539/emr.v5n1p32

Amentae, T.K., Tura, E.G., Gebresenbet, G., & Ljungberg, D. (2016). Exploring value chain and post-harvest losses of Teff in Bacho and Dawo districts of central Ethiopia. *Journal of Stored Products and Postharvest Research*, *7*(1), 11-28. DOI: 10.5897/JSPPR2015.0195

Amiti, M., Itskhoki, O. & Konings, J. (2012). Importers, Exporter, and Exchange Rate Disconnect, *CEPR Discussion Paper No. 9260*.

Ambrose, E., Marshall, D., & Lynch, D. (2010). Buyer supplier perspectives on supply chain relationships. *International Journal of Operations and Production Management, 30*, 1269.

Anbanandam, R., Banwet, D., K., & Shankar, R. (2011). Evaluation of supply chain collaboration: a case of apparel retail industry in India, *International Journal of Productivity and Performance Management, 60*(2), 82-98

Armstrong, J., S., & Overton, T., S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research, 14*, 396-402.

Asare, A. K., Brashear-Alejandro, T., & Kang, J. (2016). B2B technology adoption in customer driven supply chains. *Journal of Business and Industrial Marketing*, *31*, 1-12. doi:10.1108/JBIM-02-2015-0022.

Ashenafi, C., Tadesse, K. & Girma, G. (2016). Analysis of the Supply Chain and Logistics Practices of Warqe Food Products in Ethiopia, *Int. J. Food System Dynamics* , *7*(3), 213-228.

Autry, C., W., Grawe, S., J., Daugherty, P., J., & Richey, R., G. (2010). The Effects of Technological Turbulence and Breadth on Supply Chain Technology Acceptance and Adoption." *Journal of Operations Management, 28*(6), 522-536.

Autry, C., W., & Griffis, S.E. (2008). Supply chain capital: the impact of structural and relational linkages on firm execution and innovation. *Journal of Business Logistics*, *29*(1), 157-74.

Arora, A., Athreye, S., & Huang, C. (2016). The paradox of openness revisited: collaborative innovation and patenting by UK innovators. *Res. Policy*.

Azadegan, A., & Dooley, K.J., (2010). Supplier innovativeness, organizational learning styles and manufacturer performance: An empirical assessment, *Journal of Operations Management*, *28*, 488-505.

Babbie, E., (1990). *Survey research methods*. Belmont, CA: Wadsworth Publishing.

Babai, M.Z., Ali, M.M., Boylan, J., E., & Syntetos, A. (2013). Forecasting and inventory performance in a two-stage supply chain with ARIMA (0, 1, 1) demand: Theory and empirical analysis. *International Journal of Production Economics, 143*(2), 463-471.

Bagchi, P., K., & Chun, B. (2005). Supply chain integration: a European survey. *The International Journal of Logistics Management*, *16*(20), 275 – 294.

Balan, S., Vrat, P., & Kumar, P. (2007). Reducing the bullwhip effect in a supply chain with fuzzy logic approach. *International Journal of Integrated Supply Management*, *3*(3), 261 - 282.

Banerjee, P., & Ma, L. (2012). Routinisation of B2B E-commerce by small firms: A process perspective, *Information Systems Frontiers*, *14*(5), 1033-1046.

Banomyong, R., & Nucharee S. (2011). 'Developing a supply chain performance tool for SMEs in Thailand', *Supply Chain Management: An International Journal 16*(1), 20–31.

Barasa, P., W., Simiyu, G., W., & Iravo M., A. (2015). The impact of supply chain collaboration practice on the performance of steel manufacturing companies in Kenya, *European Journal of Logistics Purchasing and Supply Chain Management, 3*(2), 28-39,

Barratt, M. (2004). Understanding the meaning of collaboration in the supply chain', *Supply Chain Management: An International Journal, 9*(1), 30–42.

Barratt, M., & Oliveira, A. (2001). Exploring the experiences of collaborative planning initiatives. *International Journal of Physical Distribution and Logistics Management, 31*(4), 266-89.

Bartezzaghi, E. (2007). Quantitative versus qualitative: Putting the question in the right perspective, *Journal of Purchasing and Supply Management, 13*(3), 193–195. Retrieved from: URL:http://www.sciencedirect.com/science/article/pii.

Bayraktar, E., Demirbag, M., Koh, S., C., L., Tatoglu, E., & Zaim, H. (2009). A causal analysis of the impact of information systems and supply chain practices on operational performance: Evidence from manufacturing SMEs in Turkey, *International Journal of Production Economics, 122*(1), 133–149.

Bayraktar, E., Gunasekaran, A., Koh, S., L., Tatoglu, E., Demirbag, M., & Zaim, S. (2010). "An efficiency comparison of supply chain management and information systems practices: a study of Turkish and Bulgarian small and medium-sized enterprises in food products and beverages, *International Journal of Production Research, 48*(2), 425-451.

Begin, L., & Boisvert, H. (2002). The Internal Factors that Can make or Break E-commerce Implementation. (Special Focus on E-business Strategies). *CMA Management, 4*, 22-25.

Benavides, L., & Versa de Eskinazis, (2012). Six steps to successful supply chain collaboration'. Retrieved from URL:http://www.supplychainquarterly.com/topics/Strategy/20150622-six-steps-to-successfulsupply-chain-collaboration

Bengtsson, L., & Wang, W. (2014). Cost innovation in global supply chains. The case of Huawei Technologies, *International Journal of Logistic Systems and Management 12*(3).

Bengtsson, L., Lakemond, N., & Dabhilkar, M. (2013). Exploiting supplier innovation through knowledge integration. *International Journal of Technology Management, 61*(¾), 237-253.

Bergen, M., Dutta, S., & Walker, O., C., Jr. (1992). Agency relationships in marketing: a review of the implications and applications of agency and related theories, *The Journal of Marketing, 56*(3), 1-24.

Berman, N., P., Martin, & T., Mayer, (2012). How Do Different Exporters React to Exchange Rate Changes?, *Quarterly Journal of Economics*, *127*(1), 437-492.

Beske, P., & Seuring, S. (2014). Putting sustainability into supply chain management, *Supply Chain Management*: *An International Journal*, *19*(3), 322 – 331.

Bianchi, M., Campodall'Orto, S., Frattini, F., & Vercesi, P. (2010). Enabling open innovation in small-and medium-sized enterprises: How to find alternative applications for your technologies. *R&D Management*, *40*(4), 414-431. http://dx.doi.org/10.1111/j.1467-9310.2010.00613.x

Bianchi, C., C., & Saleh, M., A. (2011). Antecedents of importer relationship performance in Latin America, *Journal of Business Research*, *64*(3), 258-265.

Bigné, J., Enrique, Joaquín, A., & Luisa Andreu (2008). B2B services: Its adoption in travel agency supply chains', *Journal of Services Marketing 22*(6), 454–464.

Bigliardi, B., Colacino, P., & Dormio, A. J. (2011). Innovative characteristics of small and medium enterprises. *Journal of Technology Management and Innovation*, *6*(2).

Bolo, A., Z., & Wainana, G. (2011). An Empirical Investigation of Supply Chain Management Best Practices in Large Private Manufacturing Firms in Kenya. *Prime Journal of Business Administration and Management*, *1*(2), 2-3.

Boiral, O. (2012). ISO 9000 and Organizational Effectiveness: A Systematic Review. *Quality Management Journal, 19*(370), 16-37.

Bos-Brouwers, H., E., J. (2010). Corporate sustainability and innovation in SMEs: evidence of themes and activities in practice. *Business Strategy and the Environment, 19.*

Bhattacharyya, K., Datta, P., & Offodile, O. (2010). The contribution of third-party indices in assessing global operational risks. *Journal of Supply Chain Management, 46,* 25.

Bhutta, M., K., S., Rana, A., I., & Asad, U. (2007). SCM practices and the health of the SMEs in Pakistan. *Supply Chain Management: An International Journal, 12*(6), 412-422.

Björklund, M. (2010). "Influence from the business environment on environmental purchasing –Drivers and hinders of purchasing green transportation services", *Journal of Purchasing & Supply Management, 17*(1), 11-22.

Burstein, A., & Gopinath, G. (2013). *International prices and exchange rates*. Handbook of International Economics, (4th Ed.). London: Sage Publication.

Blome, C., Antony, Paulraj, & Kai, Schuetz, (2014). "Supply chain collaboration and sustainability: a profile deviation analysis", *International Journal of Operations & Production Management, 34*(5), 639 – 663. Retrieved from http://dx.doi.org/10.1108/IJOPM-11-20 2-0515

Brady, K.M., & Cronin, J.Jr. (2001). Customer Orientation: Effects on Customer Service Perceptions and Outcome Behaviors, *Journal of Service Research, 3,* 241-251.

Brahm, F., & Tarzijan, J. (2016). Relational Contracts and Collaboration in the Supply Chain: Impact of Expected Future Business Volume on the Make-or-Buy Decision," *Journal of Supply Chain Management, 52*(3).

Braunscheidel, M., & Suresh, N. (2009). The organizational antecedents of a firm's supply chain agility for risk mitigation and response. *Journal of Operations Management*, *27*(2), 119-140

Brennan, R., Canning, L., E., & McDowell, R. (2010). *Business-to-Business Marketing.* London: Sage Publications.

Brett, W., Ted, B., & Andrys, O. (2012). Exploratory Factor Analysis: A Five Step Guide for Novices. *Journal of Emerging Primary Health Care, 8*(3), 1-14.

Bryman, A., & Bell, E. (2011). *Business Research Methods*, (3rd ed), Oxford: Oxford University Press.

Briscoe, G., H., Dainty, A., R., Millet, S., J., & Neale, R., H. (2004). Client- led strategies for construction supply chain improvement. *Construction Management and Economics*, *22*(2), 193 – 201.

Brown, S., L., & Eisenhardt, K., M. (1995). *Core competence in product innovation: The art of managing in time*. Working paper, Department of Industrial Engineering and Engineering Management, Stanford University, Stanford, CA.

Business Daily (BD). (2012, October 28). SMEs play a crucial role in Kenyan economy. Retrieved from: http://www.businessdailyafrica.com.

Busch, A. (2011). *Collaborative supply chain management (CSCM), Fraunhofer ALB analysiert und vergleicht 19 Systeme zur synchronisierten Planung und Steuerung der Supply Chain*, Retrieved from http://www.competence-site. de/pps-systeme/Collaborative-Supply-Chain-Management-CSCM-Fraunhofer- ALB-analysiert-vergleicht-19-Systeme-zur-synchronisierten-Planung-Steuerung- Supply-Chain.

Byrne, R., & Power, D. (2014). Exploring agency, knowledge and power in an Australian bulk cereal supply chain: a case study, *Supply Chain Management: An International Journal*, *19*(4), 431-444.

Cao, M., Vonderembse, M. A., Zhang, Q., & Ragu-Nathan, T. S. (2010). Supply chain collaboration: conceptualization and instrument development, *International Journal of Production Research, 48*(22), 6613-6635.

Cao, M., & Zhang, Q. (2013). *Supply Chain Collaboration*. London: Springer Verlag.

Cao, M., & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management, 29*(2011), 163–180.

Cai, S., Jun, M., & Yang, Z. (2010). "Implementing supply chain information integration in China: The role of institutional forces and trust". *Journal of Operations Management, 28*(3), 257-268.

Canavan, J., E. (2001). *Fundamentals of Network Security*, Artech House Publishers; 1st Edition Proceedings of the 7th Australian Information Security Management Conference

Cannon, J., P., & Homburg, C. (2001). Buyers-supplier relationships and customer firm costs. *Journal of Marketing, 65* (1), 29 - 43.

Carter, C., Rogers, D., & Choi, T. (2015). Toward the theory of the supply chain. *Journal of Supply Chain Management, 51*(2), 1-25.

Cassivi, L., Hadaya, P., Lefebvre, E., & Lefebvre, L., A. (2008). The role of collaboration on process, relational, and product innovations in a supply chain. *International Journal of e-Collaboration (IJeC*), *4*(4), 11-32. Doi: 10.4018/ jec.2015100102.

Central Bureau of Statistics, (1999). African Centre for Economic Growth (ACEG) and KREP Holdings. *National micro and small enterprises baseline survey.* Nairobi*:* CBS.

Chaffey, D. (2009). *E-business and e-commerce management, (*3rd ed.), New Delhi: Pearson.

Chan, F., T., Chong, A., Y., L., & Zhou, L. (2012). An empirical investigation of factors affecting e-collaboration diffusion in SMEs. *International Journal of Production Economics*, *138*(2), 329-344. Retrieved from doi:10.1016/j.ijpe.2015.11.004

Chang, S., E., & Ho, C. B. (2006). Organizational factors to the effectiveness of implementing information security management. *Industrial Management and Data Systems, 106*(3), 345-361.

Chang, K., P., & Graham, G. (2012). E-business strategy in supply chain collaboration: An empirical study of B2B e-commerce project in Taiwan. *International Journal of Electronic Business Management, 10*(2), 101-112. Retrieved from http://ijebm.ie.nthu.edu.tw/IJEBM_Web/IJEBM_static/Paper-V10_N2/A02.pdf

Charles, A., Lauras, M., & Wassenhove, L., V. (2010). A model to define and assess the agility of supply chains: building on humanitarian experience", *International Journal of Physical Distribution and Logistics Management*, *40*(8/9), 722-41.

Chen, M., C., Yang, T., & Li, H., C. (2007). Evaluating the supply chain performance of IT-based inter-enterprise collaboration. *Information and Management, 44*, 524–534.

Chen, Jing, H.Z., & Ying, S., (2012). Implementing coordination contracts in a manufacturer stackelberg dual-channel supply chain, *Omega*, *40*(5), 571–583. Retrieved from: http://www.sciencedirect.com/science/article/pii/S0305048311001708

Chen, H., & Daugherty, P., J., & Roth, A. (2009). Defining and operationalizing supply chain process integration". *Journal of Business Logistics*, *30*(1), 63-81.

Chen, C., P. (2010). *Factors Affecting Business-to-Business Electronic Commerce Success: An Empirical Investigation*. Unpublished PhD Thesis, Florida, U.S: Nova Southeastern University.

Chen, C., J. (2007). Information technology, organizational structure, and new product development the mediating effect of cross-functional team interaction. *IEEE Transactions on Engineering Management*, *54*(4), 687.

Chen, J., Sohal, A., & Prajogo, D. (2013). Supply chain operational risk mitigation, *International Journal of Production Research*, *51*(2), 2186-2199.

Cheng, S.K., & Kam, B. H. (2008). A conceptual framework for analysing risk in supply networks, *Journal of Enterprise Information Management*, *22*(4), 345-60.

Cheng, H.C., Chen, M.C., & Mao, C.K. (2010). The evolutionary process and collaboration in supply chains. *Industrial Management and Data Systems*, *110*(3), 453-474.

Cheng, J., H. (2011). Inter-organizational relationships and information sharing in supply chains. *International Journal of Information Management*, *31*(4), 374–384.

Chesbrough, H., W. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard: Harvard Business School Press.

Chicksand, D., Glyn, W., Helen, W., Zoe, R., & Robert, J. (2012). Theoretical perspectives in purchasing and supply chain management: an analysis of the literature', Supply Chain Management: *An International Journal, 17*(4), 454–472.

Chinomona, R., & Pooe, R.I.D. (2013). The influence of logistics integration on information sharing and business performance: The case of small and medium enterprises in South Africa, *Journal of Transport and Supply Chain Management, 7*(1).

Choi, T., Y., & Krause, D.R., (2006). The supply base and its complexity: Implications for transaction costs, risks, responsiveness, and innovation, *Journal of Operations Management*, *24*, 637-652.

Chong, W., Shafaghi, M., Woollaston, C., & Lui, V. (2010). B2B e-marketplace: an e-marketing framework for B2B commerce, *Marketing Intelligence andPlanning, 28*(3), 310– 329.

Chopra, S., & Sodhi, M., S., (2014). Reducing the risk of supply chain disruptions. *MIT Sloan Management Review, 55*, 73–80.

Chopra, S., & Meindl, P. (2010). *Supply chain management: Strategy, planning, and operation* (4th ed.). Upper Saddle River, New Jersey: Pearson Education, Inc.

Christopher, M. (2011). *Logistics and supply chain management: creating value-adding networks, (*4th Ed.), New Delhi: Financial Times/Prentice Hall.

Christopher, M., & Lee, H. (2004). Mitigating Supply Chain Risk through Improved Confidence. *International Journal of Physical Distribution and Logistics Management, 34*(5), 388.396.

Cooper, D.R., & Schindler, P.S. (2014). *Business Research Methods*. (9th Ed.), New York: McGraw-Hill.

Collins, H. (2010). *Creative Research: The Theory and Practice of Research for the Creative Industries.* MA: AVA Publications

Clark, T., H., & Hammond, J., H. (1997). Re-engineering channel reordering processes to improve total supply-chain performance. *Production and Operations Management, 6*(3), 248-265.

Claypool, E.G., Norman, B.A., & Needy, K.L. (2015). Design for Supply Chain: An Analysis of Key Risk Factors. *Ind Eng Manage, 4*, 156.

Closs, D., J., Speier, C., & Meacham, N. (2011). Sustainability to support end-to-end value chains: the role of supply chain management, *Journal of the Academy of Marketing Science, 39*(1), 101–116.

Creswell, J., W. (2013). *Research design: Qualitative, Quantitative, and mixed methods Approaches,* (4th Ed.), London: Sage Publications

Crook, T. R., Giunipero, L., Reus, T.H., Handfield, R., & Williams, S.K. (2008). Antecedents and outcomes of supply chain effectiveness: an exploratory investigation. *Journal of Managerial Issues, 20*, 161-177.

Cronbach, L. J. (2004). My current thoughts on coefficient alpha and successor procedures. *Educational and Psychological Measurement, 64*, 391-418.

Cunningham, E. (2008). *Structural Equation Modeling using AMOS 6.0.* Melbourne: Swinburn University of Technology.

Danese, P., & Bortolotti, T. (2014). Supply chain integration patterns and operational performance: a plant-level survey-based analysis. *International Journal of Production Research, 52*(23), 7062-7083.

Daugherty, P.J. (2011). Review of Logistics and Supply chain Relationship Literature and Suggested Research Agenda. *International Journal of Physical Distribution & Logistics Management, 41*(1), 16-31.

Day, George, S. (2000). Managing Market Relationships, *Journal of the Academy of Marketing Science, 28*(1), 24-30.

Dabhilkar, M., Bengtsson, L., & Lakemond, N. (2015). Sustainable supply management as a purchasing capability: A power and dependence perspective. *International Journal of Production and Operations Management, 3*(4), 234- 260.

Delbufalo, E. (2012). Outcomes of inter-organizational trust in supply chain relationships: a systematic literature review and a meta-analysis of the empirical evidence, *Supply Chain Management: An International Journal, 17*(4), 377–402.

De Kok, T., Janssen, F., van Doremalen, J., van Wachem, E., Clerkx, M., & Peeters, W. (2005). Philips Electronics Synchronizes Its Supply Chain to End the Bullwhip Effect. *Interface, 35*(1), 37-48.

Deming, E.W. (2000). *The New Economics for Industry, Government, Education*. Boston: The MIT Press.

Didonet, S., R., & Diaz, G. (2012). Supply chain management practices as a support to innovation in SMEs. *Journal of technology management and innovation*, *7*(3), 91-109. doi:10.4067/s0718-27242012000300009

Ding, H., Guo, B., & Liu, Z. (2011). Information sharing and profit allotment based on supply chain cooperation. *Int. J. Production Economics, 133*(1), 70–79.

Dillman, (2000). *Mail and Internet Surveys: The Tailored Design Method*. New York, John Wiley and Sons, Inc.

DiMaggio, P., J. (1988). *Interest and Agency in Institutional Theory*. In L. G. Zucker (Ed.). *Institutional patterns and organizations: Culture and Environment*, Cambridge, MA: Ballinger.

Disney, S., M., Naim, M., M., & Potter, A. (2004). Assessing the impact of e-business on supply chain dynamics. *Int. J. Production Economics*, *89*(2), 109–118.

Doherty, N. F., & Fulford, H. (2006). Aligning the information security policy with the strategic information systems plan, *Computers & Security, 25*, 55 – 63.

Donk, D. P., Akkerman, R., & Vaart, T.V. (2008). Opportunities and realities of supply chain integration: the case of food manufacturers. *British Food Journal, 110*(2), 218 – 235.

Donaldson, T., & Preston, L. (1995). The stakeholder theory of the corporation Concepts, evidence, and implications. *Acad. Management Rev*., *20*(1), 65–91.

Drost, E., A. (2011). Validity and Reliability in Social Science Research. *Education Research and Perspectives*, *38*(1), 105-123.

Dung, L., T. (2015). Factors affecting the Collaboration in Supply Chain of Mechanical Enterprises in Vietnam. *International Journal of Managing Value and Supply Chains* (IJMVSC), *6*(4), DOI: 10.5121/ijmvsc.2015.6402

Eng, T. (2004). The role of e-marketplaces in supply chain management. *Industrial Marketing Management, 33*(2), 97.

Elkady, G., Moizer, J., & Liu, S. (2014). A decision support framework to assess grocery retail supply chain collaboration: a system dynamics modelling approach, *International Journal of Innovation, Management and Technology*, *5*(4), 232-238.

Ellegaard, C. (2006). Small company purchasing: A research agenda. *Journal of Purchasing and Supply Management*, *12*, 272 -283.

Ellram, L., & Martha, C., (2014). Supply Chain Management: It's All About the Journey, Not the Destination. *Journal of Supply Chain Management, 50*(1), 8–20.

Eksoz, C., Mansouri, S., A., & Bourlakis, M. (2014). Collaborative forecasting in the food supply chain: a conceptual framework, *International Journal of Production Economics, 158*(16), 120-135.

Eisenhardt, K. (1989). Agency theory: An assessment and review. *Academy of Management Review [AMR]*, *14*(1), 57-74.

European Commission, (2014). Small and medium-sized enterprises (SMEs). Retrieved from: http://ec.europa.eu/enterprise/policies/sme/sme definition/html

Fantazy, K. A., Vinod, K., & Uma, K. (2010). Supply management practices and performance in the Canadian hospitality industry', *International Journal of Hospitality Management, 29*(4), 685–693.

Faisal, M., N., Banwet, D., K., & Shankar, R. (2007). Supply chain risk management in SMEs: analysing the barriers. *International Journal of Management and Enterprise Development, 4*(5), 588–607.

Farouk, A., U. (2015). *The Impact of Supply Chain Logistics Performance Index on the Control of Neglected Tropical Diseases in Low- and Middle-Income Countries.* Unpublished PhD Thesis, Walden: Walden University.

Fawcett, S., E., Stephen, L., Jones, & Amydee, M., F. (2012). Supply chain trust: The catalyst for collaborative innovation', *Business Horizons, 55*(2), 163–178.

Fawcett, S., E., Magnan, G., M., & McCarter, M., W. (2008). Benefits, barriers, and bridges to effective supply chain management. Supply Chain Management: *An International Journal, 13*(1), 35– 48.

Fayezi, S., O'Loughlin, A., & Zutshi, A. (2012). Agency theory and supply chain management: A structured literature review', *Supply Chain Management: An International Journal, 17*(5), 556–570.

Feng, B., Fan, Z., P., & Ma, J. (2010). A method for partner selection of co-development alliances using individual and collaborative utilities. *International Journal of Production Economics*, *124*(1), 159-170. http://dx.doi.org/10.1016/j.ijpe.2009.10.019

Field, A. (2013). *Discovering statistics using SPSS*. (4th ed.), London: Sage.

Fisher, M., Hammond, J., Obermeyer, W., & Raman, A. (2009). Configuring a supply chain to reduce the cost of demand uncertainty. *Production and Operations Management, 6*(3), 211-225.

Fisher, R., A. (1926). The arrangement of field experiments. *Journal of the Ministry of Agriculture of Great Britain, 33*, 503-513.

Ford, D., & Mouzas, S. (2010). Networking under uncertainty: Concepts and research agenda. *Industrial Marketing Management, 39*, 956.

Flynn, B.B., Baofeng, H., & Xiande, Z. (2010). The impact of supply chain integration on performance: A contingency and configuration approach', *Journal of Operations Management, 28*(1), 58–71.

Flint, D., Larsson, J.E., & Gammelgaard, B. (2008). Exploring processes for customer value insights, supply chain learning and innovation: an international study. *Journal of Business Logistics, 29*(1), 257-281.

Flint, D., LarssonJ. E., Gammelgaard, B. & Mentzer, J.T., (2005).Logistics Innovation: A Customer Value-Oriented Social Process. *Journal of Business Logistics*, *26*(1), 113-147.

Freeman, R.E. (2010). *Strategic Management: A Stakeholder Approach*. Cambridge: Cambridge University Press.

Frohlich, M., T. (2002). E-integration in the supply chain: Barriers and performance. *Decision Sciences*, *33*(4), 537-556.

Frohlich, M. T., & Westbrook, R. (2001). Arcs of integration: An international study of supply chain strategies, *Journal of Operations Management*, *19*, 180-200.

Fynes, B., de Búrca, S., & Mangan, J. (2008). The effect of relationship characteristics on relationship quality and performance, *International Journal of Production Economics*, *111*, 56-69.

Gerwin, D. (2004). Coordinating new product development in strategic alliances, *Academy of Management Review*, *29*(2), 241-257.

Gold, S., & Seuring, S., (2010). Sustainable supply chain management and inter-organizational resources: a literature review. *Corporate Social Responsibility and Environmental Management*, *17*(4), 230-245.

Golicic, S., & Donna, F., D. (2012). Implementing mixed methods research in supply chain management, *International Journal of Physical Distribution and Logistics Management 42*(8),

Goyal, M. (2005). *Managing operational flexibility under demand uncertainty*. Unpublished Dissertation, University of Pennsylvania.

Giannakis, M., & Papadopoulos, T. (2016). Supply chain sustainability: a risk management approach, *International Journal of Production Economics, 171, 455–*470.

Gunasekaran, A., Lai, K., & Cheng, T., C. (2008).Responsive Supply Chain: A Competitive Strategy in a Networked Economy, *Omega, 36*(4), 549-564.

Ghobakhloo, M., Arias-Aranda, D., & Benitez-Amado, J. (2011). Adoption of e-commerce applications in SMEs. *Industrial Management and Data Systems, 111,* 1238-1269.

Glenn, R., R., Mert, T., & Vivek, D. (2010). Examining collaborative supply chain Service technologies: a study of intensity, relationships and resources, *Journal of the Academy of Marketing Science, 38*(1),71–89.

Grawe, S., J. (2009). Logistics innovation: a literature-based conceptual framework. *International Journal of Logistics Management, 20*(3), 360-377.

Green, S., B., & Salkind, N., J. (2011). *Using SPSS for Windows and Macintosh: Analyzing and Understanding Data* (6th Ed.). Boston, Massachusetts: Pearson Prentice Hall.

Green, K.W., Whitten, D., & Inman, A. R. (2008). The impact of logistics performance on organizational performance in a supply chain context. *Supply Chain Management*, *13*(4), 317-327.

Gregory, G., Karavdic, M., & Zou, S. (2007). The Effects of E-Commerce Drivers on Export Marketing Strategy, *Journal of International Marketing, 15*(2), 30–57.

Griffith, D.A., & Harvey, M.G., (2006). Social exchange in supply chain relationships: The resulting benefits of procedural and distributive justice." *Journal of Operations Management*, *24*(2), 85.

Haartman, R., & Bengtsson, L. (2015). The impact of global purchasing and supplier integration on product innovation. *International Journal of Production and Operations Management*, *35*(9), 1295-11311.

Ha, B., Yang-Kyu, P., & Sungbin, C. (2011). Suppliers affective trust and trust in competency in buyers: Its effect on collaboration and logistics efficiency', *International Journal of Operations & Production Management, 31*(1), 56–77.

Hadaya, P., & Cassivi, L. (2007). The role of joint collaboration planning actions in a demand-driven supply chain", *Industrial Management and Data Systems, 107*(7), 954-978.

Hadjikhani, A., & LaPlaca, P. (2013). Development of B2B marketing theory. *Industrial Marketing Management, 41*(3), 294-305.

Hafeez, K., Keoy, K.H.A., Zairi, M., Hanneman, R., & Koh, L. (2012). E-supply chain operational and behavioral perspectives: an empirical study of Malaysian SMEs. *International Journal of Production Research*, *48*(2), 525-546.

Hagedoorn, J., & Zober, A., K. (2015). The role of contracts and intellectual property rights in open innovation. *Technol. Anal. Strategic Management*. *27*(9), 1050–1067.

Haeussler, C., Patzelt, H., & Zahra, S. (2012). Strategic alliances and product development in high technology new firms: The moderating effect of technological capabilities. *Journal of Business Venturing, 27*(2), 217-233.

Handfield, R., B., Cousins, P. D., Lawson, B., & Petersen, K. J. (2015). How can supply management really improve performance? A knowledge-based model of alignment capabilities. *Journal of Supply Chain Management, 51*(3), 3-17.

Hakonsson, Dorthe, D., Richard, M., Burton, B., Obel, & J., T. Lauridsen. (2012). "Strategy Implementation Requires the Right Executive Style: Evidence from Danish SMEs. *Long Range Planning, 45*(2–3), 182–208.

Hair Jr, J., F., William, C., Black, Barry, J., Babin & Rolph, E., A. (2010). *Multivariate Data Analysis: International Version*, (7th ed.), London: Pearson.

Halldórsson, Á., Hsuan, J., & Kotzab, H. (2015). Complementary theories to supply chain management revisited from borrowing theories to theorizing, *Supply Chain Management: An International Journal*, *20*(6), 574-586.

Halldorsson, A., Kotzab, H., Mikkola, J.H., & Skjøtt-Larsen, T. (2007). "Complementary theories to supply chain management, *Supply Chain Management*, *12*(4), 284–296.

Harrison, A., & Van Hoek, R. (2005). *Logistics Management and Strategy*, (2nd ed.), London: Prentice Hall.

Hartley, J., L., Zirger, B., J., & Kamath, R. (1997). Managing the buyer-supplier interface for on-time performance in product development. *Journal of Operations Management*, *15*(1), 57-70.

Henry, Q., Rado, G., & Scarlett, S. (2012). *Critical Factors Affecting Supply Chain Management: A Case Study in the US Pallet Industry, Pathways to Supply Chain Excellence*, Dr. Ales Groznik (Ed.), Retrieved from:http://www.intechopen.com/books/pathways-tosupply-chain-excellence/critical-success-factors-for-supply-chain-management-in-wood-industry.

Hoegl, M., & Wagner, S., M. (2005). Buyer-supplier collaboration in product development projects, *Journal of Management, 31*(4), 530–548.

Hofmann, E., & Knébel, S. (2016). Supply Chain Differentiation: Background, Concept and Examples. *Journal of Service Science and Management*, *9*, 160-174. Retrieved from http://dx.doi.org/10.4236/jssm.2016.92020.

Hofmann, E. (2011). Natural hedging as a risk prophylaxis and supplier financing instrument in automotive supply chains. *Supply Chain Management: An International Journal*, *16*, 128–141.

Hoffmann, P., Schiele, H., Song, M., & Krabbendam, K. (2011). *Supply risk management from a transaction cost and social exchange theory perspective*. The paper was published at the 27th IMP-conference, Glasgow, Scotland.

Hong-Minh, S.M., Disney, S.M., & Naim, M.M. (2000). The dynamics of emergency transshipment supply chains. *International Journal of Distribution Logistics Management*. *30*, 788-816.

Hong, J. J.P., Kwon, H., & Roh, B. (2009). Implementation of strategic green orientation in supply chain," *European Journal Innovation Management, 12*, 512–532.

Horvath, L. (2001). Collaboration: the key to value creation in supply chain management .*Supply Chain Management: An International Journal*, *6*(5), 205 -207.

Huang, L., Lin, Y., Ieromonachou, P., Zhou, L., & Luo, J. (2015). Drivers and Patterns of Supply Chain Collaboration in the Pharmaceutical Industry: A Case Study on SMEs in China. *Open Journal of Social Sciences*, *3,* 23-29.

Hudnurkar, M., Jakhar, S., & Rathod, U. (2014). Factors affecting collaboration in supply chain: a literature review, *Procedia - Social and Behavioral Sciences*, *133*(1), 189-202.

Hui, Z., He-Cheng, W., & Min-Fei, Z. (2015). Partnership management, supply chain collaboration, and firm innovation performance: an empirical examination, *International Journal of Innovation Science, 7,* 127-138

Hung, H. (2010). Reconciling the paradox of supply-side and demand-side strategies in industrial innovation. *Industrial Marketing Management, 39*, 342.

Hurtley, R., F., & Hult, T. (1998). Innovation, market orientation, and organizational learning: An integration and empirical examination. *Journal of Marketing*, *62*(3), 42-54.

Hsu, C., C., Kannan, V., R., Tan, K., C., & Leong, K., C. (2008). Information sharing, buyer-supplier relationships and firm performance: a multi-region analysis. *International Journal of Physical Distribution and Logistics Management*, *38*(4), 296-310.

ICT Authority Kenya, (2016). *Transport Integrated Management Systems (TIMs)*. Retrieved from: http://www.icta.go.ke/transport-integrated-management-systems-tims

International Data Corporation Research, (2002). Internet Usage and Commerce in Western Europe 2001-2006. Retrieved from www.idc.com/getdoc.jhtml?containerId=fr20020419115126

Iyer, K., Srivastava, P., & Rawwas, M. (2014). Aligning supply chain relational strategy with the market environment, *Journal of Marketing Theory and Practice*, *22*(1), 53-72.

Jafar, R., Roland, O., & Paul, T., (2015). How SMEs can benefit from supply chain partnerships, *International Journal of Production Research*, *53*(5), 1527-1543, DOI: 10.1080/00207543.2014.952793

Jain, V., Benyoucef, L., Bennett, D., Poler, R., Hernandez, J., E., Mula, J., & Lario, F., C. (2008). Collaborative forecasting in networked manufacturing enterprises. *Journal of Manufacturing Technology Management, 19*(4), 514-528.

Jauhar, S., Tilasi, P., & Choudhary, R. (2012). Integrating Lean Six Sigma and supply chain practices for improving the supply chain performance, *Undergraduate Academic Research Journal*, *1*(1), 67-74.

Johnsen, T.E. (2009). Supplier involvement in new product development and innovation: Taking stock and looking to the future. *Journal of Purchasing and Supply Management*, *15*(3), 187-197. http://dx.doi.org/10.1016/j.pursup.2009.03.008

Johnsen, R.E., & Ford, D. (2006). Interaction capability development of smaller suppliers in relationships with larger customers. *Industrial Marketing Management, 35*, 1002-1015.

Johnson, A., R., & Nagarur, N. (2012). A discussion on supply chain robustness and resiliency. *Industrial and Systems Engineering Research Conference*

José, R.. & Ortega, M.(2010). Competitive strategies and firm performance: *Technological capabilities moderating roles*, *63*(12), 1273–1281.

Juttner, U., Christopher, M., & Godsell, J. (2010). A strategic framework for integrating marketing and supply chain strategies. *The International Journal of Logistics Management, 21*(1), 104-12.

Jüttner, U., Maklan, S. (2011). Supply chain resilience in the global financial crisis: An empirical study. *Supply Chain Management: An International Journal, 16,* 246–259.

Kaufman, A., Wood, C., H., & Theyel, G. (2000). Collaboration and technology linkages: A strategic supplier typology. *Strategic Management Journal, 21*(6), 649–663.

Ketchen, D., J., & Hult, G.T.M. (2007). Bridging organization theory and supply chain management: the case of best value supply chains, *Journal of Operations Management, 25*(2), 573-80.

Kern, D., Moser, R., Hartmann, E., & Moder, M. (2012). Supply risk management: Model development and empirical analysis. *International Journal of Physical Distribution & Logistics Management, 42,* 60–82.

Kim, D., & Lee, R. P. (2010). Systems collaboration and strategic collaboration: their impacts on supply chain responsiveness and market performance, *Decision Sciences, 41*(4), 955–981.

Kim, S., W. (2006). The effect of supply chain integration on the alignment between corporate competitive capability and supply chain operational capability. *International Journal of Operations Management*, *26*(10), 1084 – 1107.

Kim, S.W., & Narasimhan, R. (2002). Information system utilization in supply chain integration efforts. *International Journal of Production Research, 40*(18), 4585 - 4609.

Kim, S.W. (2009). An investigation on the direct and indirect effect of supply chain integration on firm performance. *International Journal of Production Economics, 119,* 328-346.

King, K., & McGrath, S. (2002). *Globalization, Enterprise and Knowledge*. Oxford: Symposium.

Kingoo, E., M. (2013). *Supply Chain Governance and Organizational Performance among Parastatals in Kenya* .Unpublished MBA project, Nairobi: University of Nairobi.

Koh, S.C.L., Demirbag, M., Bayraktar, E., Tatoglu, E., & Zaim, S. (2007). The impact of supply chain management practices on performance of SMEs, *Industrial Management and Data Systems*, *107*(1), 103-24.

Kohli, A., John, S., & Jensen, B., (2010). Assessing Effectiveness of Supply Chain Collaboration: An Empirical Study. *Supply Chain Forum An International Journal, 11*(2).

Koufteros, X.A., Rawski, G.E., & Rupak, R. (2010). Organizational integration for product development: The effects on glitches, on-time execution of engineering change orders, and market success, *Decision Sciences, 41*(1), 49-80.

Kothari, C., R. (2009). *Research methodology: Methods and Techniques.* (New edition), New Delhi: Willey Eastern Ltd.

Kumara, D., & Rahman, Z. (2015). Sustainability adoption through buyer supplier relationship across supply chain: A literature review and conceptual framework. *International strategic management review, 3,* 110–127.

Kumar, G., & Banerjee, R., N. (2014). Supply chain collaboration index: an instrument to measure the depth of collaboration, Benchmarking: *An International Journal, 21*(2), 184-204.

Kumar, G., & Banerjee, R.N. (2012). An implementation strategy for collaboration in supply chain: an investigation and suggestions, *International Journal of Services and Operations Management, 11*.

Kumar, S., Dakshinamoorthy, V., & Krishnan, M., S. (2007). SOA and Information Sharing in Supply Chain: 'How' Information is Shared Matters! *Economics and Business Value of Information Systems.*

Khan, A., Christopher, O. & Creazza, M., (2012). Aligning product design with the supply chain: a case study, *Supply Chain Management. An Int. J.*, *17*(3), 323–336.

Kleindorfer, P. R., & Saad, G.H. (2005). Managing disruption risks in supply chains. *Production and Operations Management, 14*(1), 53–68.

Kraljic, P. (1983). Purchasing must become supply management. *Harvard Business Review, 61*(5), 109-117.

Lado, A., A., Paulraj, A., & Chen, I. J. (2011). Customer focus, supply-chain relational capabilities and performance, *International Journal of Logistics Management, 22*, 202-221.

La Londe, B., (2002). Who can you trust these days? *Supply Chain Management Review*, 10.

Lai, F., Zhang, M., Lee, D., M., S., & Zhao, X. (2012). The Impact of Supply Chain Integration on Mass Customization Capability: An Extended Resource-Based View. *IEEE Transactions on Engineering Management, 59*(3), 443–456.

Lambert, D., M. (2006). *Supply Chain Management: Processes, Partnerships, Performance*, (2nd ed.), (Chapter 10, pp. 167-96). Sarasota, FL: Supply Chain Management Institute.

Laseter, T. M., & Nancy, G., (2012). 'Collaborating for a more sustainable supply chain', *Supply Chain Management Review 16*(5), 43–49.

Lau, A., K., W., Tang, E., & Yam, R. (2010). Effects of Supplier and Customer Integration on Product Innovation and Performance: Empirical Evidence in Hong Kong Manufacturers. *Journal of Product Innovation Management, 27*(5), 761-777.

Laursen, K., Salter, A. (2014). The paradox of openness: appropriability, external search and collaboration. *Res. Policy, 43*(5), 867–878.

Lavastre, O., Gunasekaran, A., & Spalanzani, A. (2014). Effect of firm characteristics, supplier relationships and techniques used on supply chain risk management (SCRM): an empirical investigation on French industrial firms. *Int. J. Prod. Res.*, *52*(11), 3381–3403.

Lavastre, O., Gunasekaran, A., & Spalanzani, A. (2012). Supply chain risk management in French companies. *Decision Support Systems, 52*, 828–838.

Lavassani, K.M., & Movahedi, B. (2010). *Critical analysis of the supply chain management theories: toward the stakeholder*. Vancouver, Canada: Carleton University.

Lavassani, K., Movahedi, B., & Kumar, V. (2008). Evolution of supply chain theories: A comprehensive literature review. *19th Annual Conference of the Production and Operations Management Society*, *9*-12 May, La Jolla, California, USA: POMA.

Lavbič, D., Vasilecas, O., & Rupnik, R. (2010). Ontology based multi-agent system to support business users and management. *Technological and Economic Development of Economy*, *16*(2), 327–347.

Leavy, B. (2010). Design thinking- a new mental model of value innovation. *Strategy and Leadership*, *38*, 5.

Lee, H.L., & Whang, S. (2004). *e-Business and Supply Chain Integration. The Practice of Supply Chain Management: Where Theory and Application Converge*. NY: Springer.

Lee, C., H., & Rhee, B.D. (2007). Channel coordination using product returns for a supply chain with stochastic salvage capacity. *Eur J Oper Re,s 177*(1), 214–238.

Lee, C., Ik-Whan, W., Kwon, G. & Severance, D, (2007). Relationship between supply chain performance and degree of linkage among supplier, internal integration, and customer. *Supply Chain Management: An International Journal, 12*(6), 444–452.

Lee, H., L. (2000). Creating value through supply chain integration, *Supply Chain Management Review, 4*(4), 30-6.

Lehrer, M., Ordanini, A., DeFillippi, R., & Miozzo, M. (2013). Challenging the orthodoxy of value co-creation theory: a contingent view of co-production in design-intensive business services. *Eur. Manage J., 30,* 499–509.

Leiponen, A., & Byma, J. (2009). If you cannot block, you better run: small firms, cooperative innovation and appropriation strategies. *Res. Policy, 38,* 1478–1488.

Lejeune, M., A., & Yakova, N. (2005). On characterizing the 4 C's in supply chain management. *Journal of Operational Management, 23*, 81-100.

Lofti, Z., Sahran, S., Mukhtar, M., & Zadeh, A.T. (2013). The relationship between supply chain integration and product quality, *Procedia Technology, 11,* 471-488.

Lothair, & Norbridge, (2002). *Supply Chain Teamwork-Nothing but Net (Profit),* Business week, May 6.

Lomas, L., M. (2016). *Business-to-Business Marketing Perceptions: Customer Knowledge Management and Customer Engagement,* Walden: Walden University Scholar Works.

Love, J., H., Roper, S., & Bryson, J., R. (2011). Openness, knowledge, innovation and growth in UK business services. *Res. Policy, 40*(10), 1438–1452.

Lim, S.J. (2010). *Risk Response Strategies in the Supply Chain: Examining Attributes of Stakeholders and Risk Attitude*. Dissertations and Theses Collection. Retrieved from http://ink.library.smu.edu.sg/etd_coll/65.

Lipparini, A., & Sobrero, M. (1994). The glue and the pieces: Entrepreneurship and innovation in small-firm networks. *Journal of Business Venturing, 9*(2), 125-140.

Li, X., & Chandra, C. (2007). A knowledge integration framework for complex network management. *Industrial Management and Data Systems*, *107*(8), 1089-1109.

Liu, H., Ke, W., Kee, K. & Hua, Z., (2013). The impact of IT capabilities on firm performance : The mediating roles of absorptive capacity and supply chain agility, *Decision Support System*, *54*(3), 1452–1462.

Liu, H., Ke, W., Wei, K., K., & Hua, Z. (2013). Effects of supply chain integration and market orientation on firm performance: Evidence from China, *International Journal of Operations and Production Management*, *33*(3), 322-346.

Lin, F., R., Huang, S., H., & Lin, S., C. (2002). Effects of information sharing on supply chain performance in electronic commerce. *IEEE Transactions on Engineering Management*, *49*(3), 258-268.

Lv, H., Ye, F., & Qiang, R. (2010). Impact of resource dependence, trust and relationship commitment among supply chain partners on information system alignment, *Industrial Engineering and Management*, *15*(6), 7–15.

Macdonald, J.R., & Thomas, M. C. (2013). Supply Chain Disruption Management: Severe Events, Recovery, and Performance. *Journal of Business Logistics*, *34*(4), 270–88.

Mandal, S. & Korasiga, V. R., (2016). An integrated-empirical logistics perspective on supply chain innovation and firm performance. Business: *Theory and Practice*, *17*(1), 32–45.

Mamad, M., & Chahdi, F., O. (2013). The Factors of the Collaboration between the Upstream Supply Chain Actors: Case of the Automotive Sector in Morocco, *International Business Research*, *6*(11). http://dx.doi.org/10.5539/ibr.v6n11p15

Matos, S., & Hall, J. (2007). Integrating sustainable development in the supply chain: The case of life cycle assessment in oil and gas and agricultural biotechnology. *Journal of Operations Management*, *25*(6), 1083-1102.

Marchildon, P., & Hadaya, P. (2011). The Strategic Alignment of Supply Chain and IT Resources. *The Third International Conference on Information, Process, and Knowledge Management*, *55*-61.

Maree, S., & Paul, H. (2009). Dynamic capabilities and Innovation in Supply Chains. *CINet,* 912-923.

Martz, E. (2013). *Enough is Enough!Handling Multicollinearity in Regression Analysis*. retrieved from: http://www.blog.minitab.com.

Masayasu, N., Frederick, T., Wehrle, L., & Kerbache M., L. (2015). Impacts of adaptive collaboration on demand forecasting accuracy of different product categories throughout the product life cycle, *Supply Chain Management: An International Journal*, *20*(4), 415 – 433.

Mason, C., H., & Perreault, W., D. (1991). Collinearity, Power, and Interpretation of Multiple Regression Analysis. *Journal of Marketing Research*, *28*(3), 268-280.

Melander, L. (2014). Buyer-Supplier Collaboration in New Product Development between Two Equally Powerful Firms: A Case Study of ABB and SKF. *Operations and Supply Chain Management*, *7*(3), 107-113.

Mentzer, J., T., & Gundlach, G. (2010). Exploring the relationship between marketing and supply chain Management: introduction to the special issue. *Journal of the Academy of Marketing Science*, *38*, 1-4.

Mentzer, J., T., Foggin, J., H., & Golicic, S., L. (2000). Collaboration: the enablers, impediments, and benefits, *Supply Chain Management Review*, *4*(4), 52-8.

Melnyk, S., A., Page, T., J., Wu, S., J., & Burns, L., A. (2012). Would you mind completing this survey: Assessing the state of survey research in supply chain management. *Journal of Purchasing and Supply Management, 18*(1), 35-45.

Mina, A., Bascavusoglu-Moreau, E., & Hughes, A. (2014). Open service innovation and the firm's search for external knowledge. *Res. Policy, 43*(5), 853–866.

Min, H., & Yu, W. (2008). Collaborative planning, forecasting, and replenishment: demand planning in supply chain management. *International Journal of Information Technology and Management*, *7*(1), 4 - 20.

Min, S., Roath, A.S., Daugherty, P.J., Genchev, S.E., Haozhe, C., Arndt, A.D., & Richey, R., G. (2005). Supply Chain Collaboration: What's Happening? *International Journal of Logistics Management, 16*(2), 237–56.

Mohamed, K.S, (2015). Supply Chain Risks Mitigation Strategies Adopted By Manufacturing Firms in Kenya: A Case of Coca Cola Company (K). *International Journal of Current Business and Social Sciences*, *1*(4), 1-29.

Mihm, J. (2010). Incentives in New Product Development Projects and the Role of Target Costing. *Management Science, 56*(8), 1324-1433.

Mitchell, R., K., Agle, B., R., & Wood, D., J. (1997). Toward a theory of stakeholder identification and salience: defining the principle of who and what really counts, *Academy of Management Review*, *22*(4), 853-886.

Miozzo, M., (2016). Innovation collaboration and appropriability by knowledge-intensive business services firms. *Res. Policy*, Retrieved from http://dx.doi.org/10.1016/j.respol.2016.03.018

Morgan, N., A., Vorhies, D., W., & Mason, C., H., (2009). Market orientation, marketing capabilities and firm performance. *Strategic Management Journal, 30*(8), 909-920.

Monczka, R., Handfield, R., Giunipero, L., & Patterson, J., (2008). *Purchasing and Supply Chain Management*, (4th ed), Boston, MA: Cengage Learning.

Mostafa, R. S., Mehdi, A., Shobeir, A. & Rohollah, G., (2016) .The Impact of Supply Chain Relationship Quality and Cooperative Strategy on Strategic Purchasing. *Journal of Logistics Management, 5*(1), 6-15.

Moutinho, L., & Graeme, D. H., (2011). *The SAGE Dictionary of Quantitative Management Research.* London: SAGE Publications.

Montoya-Torres, J., R., & Ortiz-Vargas, D. A. (2014). Collaboration and information sharing in dyadic supply chains: a literature review over the period 2000–2012, *Estudios Gerenciales 30*(133), 343-354.

Mooi, E., & Marko, S. (2011). A Concise Guide to Market Research: The Process, Data, and Methods Using IBM SPSS Statistics. London: Springer.

Mudambi, R., Schrunder, C., P., & Mongar, A. (2004). How co-operative is co-operative purchasing in smaller firms? Evidence from UK engineering SMEs. *Long Range Planning, 37,* 85 - 102.

Mugenda, A. (2008). *Social Science Research: Conception, Methodology and Analysis.* Nairobi: Kenya Applied Research and Training Services.

Mugenda, O., & Mugenda, A. (2003). *Research Methods: Qualitative and Quantitative Approaches*. Nairobi: Africa Centre for Technology Studies.

Mullei, A., & Bokea, C. (1999). *Micro and small enterprises in Kenya: an agenda for improving the policy environment.* Nairobi: International Centre for Economic Growth.

Munksgaard, K., B., Stentoft, J., & Paulraj, A. (2014). Value-based supply chain innovation, *Operations Management Research, 7*(3-4), 50-62.

Mureithi, F. (2013). *Top 100 SMEs search team casts its net wider.* Retrieved from BD: http://www.businessdailyafrica.com.

McGrath, G., M., & More, E. (2001). Data integration along the healthcare supply chain: The Pharmaceutical Extranet Gateway project. *Proceedings of the 34th Hawaii International Conference on System Sciences*.

McIvor, R., & Humphreys, P. (2004). The implications of electronic B2B intermediaries for the buyer-supplier interface, *International Journal of Operations and Production Management, 24*(3), 241-69.

Mlaker, K.S., Gorenak, I. & Potočan, V. (2015). Influence of Relationship Commitment and Trust on Collaborative Behaviour in Supply Chains, *Promet – Traffic and Transportation*, *27*(1), 77-84.

Napier, H., A., ,Judd, P., J., Rivers, O., N., & Wagner, S., W. (2001). *Creating a Winning E-Business, Course Technology*, Boston, MA: Springer.

Nair, A., Jayaram, J., & Das, A. (2015). Strategic purchasing participation, supplier selection, supplier evaluation and purchasing performance. *International Journal of Production Research, 1*-16.

Namusonge, S.O., Mukulu, E. & Kirima, N. (2015). Information Sharing, Cooperative Behaviour and Hotel Performance: A Survey of the Kenyan Hospitality Industry, *IJBSR* , *05*(09), 77-92.

Narasimhan, R., Swink, M., & Viswanathan, S. (2010). On Decisions for Integration Implementation: An Examination of Complementarities Between Product-Process Technology Integration and Supply Chain Integration. *Decision Sciences, 41*(2).

Nesheim, T. (2001). Externalization of the core: Antecedents of collaborative relationships with suppliers. *European Journal of Purchasing and Supply Management, 7*(4), 217–225.

Neven, Š., Ante, R. & Ante, L. (2014). Relationship between Business Intelligence and Supply Chain Management for Marketing Decisions. *Universal Journal of Industrial and Business Management, 2*(2), 31-35. DOI: 10.13189/ jibm.2014.020202.

Nooraie, S., V., & Parast, M., (2015). A multi-objective approach to supply chain risk management: Integrating visibility with supply and demand risk. *International Journal of Production Economics, 16,* 192-200.

Nour-Eddine, B., Oussama, S., & Houda, B. (2013). Supply chain collaboration in emerging economies in Moroccan food, textile, and leather industries. *China-USA Business Review, 12*(6), 571-582.

Nollet, J., & Beaulieu, M. (2005). Should an organization join purchasing group? *Supply Chain Management: An International Journal, 10*(1), 11-17.

Nunnally, J. (1978). *Psychometric theory*. New York: McGraw-Monte.

Ngai, E., W., T., Chau, D., C., K., & Chan, T., L., A. (2011). Information technology, operational, and management competencies for supply chain agility: Findings from case studies, *The Journal of Strategic Information System, 20*(3), 232-249.

Nyaga, G., Judith, N., Whipple, M., & Daniel, F. L. (2010). Examining supply chain relationships: Do buyer and supplier perspectives on collaborative relationships differ?' *Journal of Operations Management, 28*(2), 101–114.

Oh, J., Lee, S., & Yang J. (2015). A collaboration model for new product development through the integration of PLM and SCM in the electronics industry. *Computers in Industry, 73*, 82–92.

Ohno, T. (2009). *Das Toyota Productions system*. Verlag: Campus Verlag.

Ojala, M., & Hallikas, J. (2006). Investment decision-making in supplier networks: Management of risk. *International journal of production economics, 104*(1), 201-213.

Olorunniwo, F., O., & Li, X. (2010). Information sharing and collaborative practices in reverse logistics. *Supply Chain Management: An International Journal 15*(6), 454-462.

Oliva, R., & Watson, N. (2011). Cross-functional alignment in supply chain planning: a case study of sales and operations planning, *Journal of Operations Management, 29*(5), 434–448.

Oliveira, M., McCormack, K., Ladeira, M., Trkm, P., & Bergh, J. (2011). Supply Chain Process Collaboration and Internet Utilization: An International Perspective of Business-to-business Relationships. *Economic and Business Review, 13*(4), 203–226.

Ong'olo, D., & Odhiambo, S. (2013). *SMEs Development in the Devolved Governance System Policy Options for Institutional and Regulatory Reforms in Kenya*. Nairobi: CUTS.

Ombati, T., O., Kirochi, E., O., & Nyagari, F., N. (2015). Strategies for Sustainable Supply Chains among Supermarkets in Nairobi. *International Journal of African and Asian Studies, 7*.

Orodho, J., A. (2009). *Elements of education and social science research methods* (2nd ed.) Nairobi: Kanezja HP Enterprises.

Ou, C., S., Liu F., C., Hung Y., C., & Yen D., C. (2010). A structural model of supply chain management on firm performance. *International Journal of Operations & Production Management, 30*, 526.

Ouyang, Y. (2007). The effect of information sharing on supply chain stability and the bullwhip effect. *European Journal of Operational Research*, *182*(3), 1107–1121.

Parida, V., Westerberg, M., & Frishammar, J. (2012). Inbound Open Innovation Activities in High Tech SMEs: The Impact on Innovation Performance. *Journal of Small Business Management, 50*(2), 283–309.

Pagell, M. (2004). Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics. *Journal of Operations Management*, *22*(5), 459-487.

Pan, Z., X., & Pokharel, S. (2007). Logistics in hospitals: a case study of some Singapore hospitals. *Leadership in Health Services*, *20*(3), 195 – 207.

Parmar, B.L., Freeman, R. E., Jeffrey, H., Wicks, S., Andrew, C., Purnell, L. & de Colle, S. (2010). Stakeholder Theory: The State of the Art, *The Academy of Management Annals*, *4*(1), 403-445.

Park-Poaps, H., & Rees, K. (2010). Stakeholder forces of socially responsible supply chain management orientation, *Journal of Business Ethics*, *92*(2), 305-322.

Palmatier, G., & Crum, C. (2010). *Transitioning from S&OP to Integrated Business Planning.* Oliver Wight White Paper Series.

Pallant, J. (2013). *SPSS Survival Manual - A step by step guide to data analysis using IBM SPSS* (5th ed.). England, United Kingdom: McGraw Hill.

Pallant, J. (2010). *SPSS Survival Manual. A step by step guide to data analysis using SPSS* (4th ed.), Melbourne: Open University Press.

Paulraj, A. (2011). Understanding the relationships between internal resources and capabilities, sustainable supply chain management and organizational sustainability. *J. Supply Chain Manag*., *47*, 19–37.

Park, N., K., Mezias, J., M., & Song, J. (2004). A resource-based view of strategic alliances and firm value in the electronic marketplace. *Journal of Management, 30*(1), 7–27.

Pedro, O., & Aleda, R. (2012). The Influence of Service Orientation on B2B e-Service Capabilities: An Empirical Investigation, *Production and Operations Management, 21*(3), 423-443.

Pedhazur, E., J., & Schmelkin, L., P. (2013). *Measurement, design, and analysis: An integrated approach*. Boston: Psychology Press.

Petersen, K., J., Ragatz, G., L., & Monzca, R., M. (2005). An Examination of Collaborative Planning Effectiveness and Supply Chain Performance, *The Journal of Supply Chain Management, 41*(2), 14-25.

Pettit, T., J., Croxton, K., L., & Fiksel, J. (2013). Ensuring supply chain resilience: Development and implementation of an assessment tool. *Journal of Business Logistics 34*, 46–76.

Phan, A., C., Abdallah, A., B., & Matsui, Y. (2011). Quality Management Practices and Competitive Performance: Empirical Evidence from Japanese Manufacturing Companies. *International Journal of Production Economics, 133*(2), 518-529. Retrieved from http://dx.doi.org/10.1016/j.ijpe.2011.01.024.

Plambeck, L., & Gibson, P. (2010). *Application of agency theory to collaborative supply chains,* In Gupta, A (Eds), Oxford Business and Economics Conference (OBEC), p 2-12, Oxford: OBEC.

Porter, M. (1985). *Competitive Advantage, Creating and Sustaining Superior Performance.*, New York: The Free Press.

Prajogo, D. & Olhager, J. (2012). Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration, *International Journal of Production Economics 135*(6), 514–522.

Qiu, T. (2007). *Performance implications of multi-partner channel relationships.* Illinois: University of Illinois.

Quayle, M. (2003). A study of supply chain management practice in UK industrial SMEs. Supply Chain Management: *An International Journal*, *8*(1), 79-86.

Rai, A., Patnayakuni, R., & Seth, N. (2006). Firm performance impacts of digitally enabled supply chain integration capabilities. *MIS Quarterly, 30*(2), 225-246.

Ragatz, G., L., Handfield, R., B, & Petersen, K., J. (2002). Benefits Associated With Supplier Integration into New Product Development under Conditions of Technology Uncertainty. *Journal of Business Research*, *55*, 389-400.

Ramanathan, U. (2014). Performance of supply chain collaboration: A simulation study, *Expert Systems with Applications*, *41*(1), 210-220.

Ramanathan, U. & Angappa, G., (2012). Supply chain collaboration: Impact of Success in long-term partnerships, *International Journal of Production Economics in press.* Retrieved from *URL:http://www.sciencedirect.com/science/article/pii/S0925527312002290*

Ranganathan, C., Dhaliwal, J., S., & Teo, T., S., H. (2004). Assimilation and diffusion of web technologies in supply-chain management: An

examination of key drivers and performance impacts. *Int J Electron Comm, 9*(1), 127-161.

Rao, S., Truong, D., Senecal S., & Le T. (2007). How buyers' expected benefits, perceived risks, and e-business readiness influence their e-marketplace usage. *Industrial Marketing Management, 36*(8), 1035-1045.

Ralston, P. (2014). *Supply chain collaboration: A literature review and empirical analysis to investigate uncertainty and collaborative benefits in regards to their practical impact on collaboration and performance*". Graduate Theses and Dissertations. Paper 13798.

Republic of Kenya. (1992). *Sessional Paper No. 2 of 1992 on small enterprises and Jua Kali Development.* Nairobi: Ministry of Planning and National Development.

Reuter, C., Goebel, P., & Foerstl, K. (2012). The impact of stakeholder orientation on sustainability and cost prevalence in supplier selection decisions. *Journal of Purchasing and Supply Management, 18*(4), 270-281.

Rodah, Chemoiwo, & Karanja, George, W. (2016). Influence of Supplier Appraisal on Supply Chain Risk Management in Egerton University, Kenya, *The International Journal of Business and Management*, *4*(4).

Ritchie, B., Brindley, C., S., & Armstrong, N. (2008). Risk assessment and relationship management: practical approach to supply chain risk management, *International Journal of Agile Systems and Management*, *3*(3/4), 228-47.

Robinson, J.L. (2014).*Organizational Identification and Supply Chain Orientation: Examining a Supply Chain Integration Paradox*," Electronic Theses & Dissertations. Paper 1074.

Rosenzweig, E., D. (2009). A contingent view of e-collaboration and performance in manufacturing. *Journal of Operations Management*, *27*(6), 462-478.

Rubadiri, V. (2012). *Kenya Plans to Land 5th Undersea Cable.* Retrieved from: www.capitalfm.co.ke/business/2012/11/kenya-plans-to-land-5th-undersea-cable

Ryu, I., So., S., & Koo, C. (2009). The role of partnership in supply chain performance. *Industrial Management and Data Systems, 109*(4), 496-514.

Saeed, K., A., Malhotra, M., K., & Grover, V. (2011). Inter-organizational System Characteristics and Supply Chain Integration: An Empirical Assessment. *Decision Sciences, 42*(1), 7-42.

Sanders, Nada R., & Stephan M., W. (2011). Multidisciplinary and Multimethod Research for Addressing Contemporary Supply Chain Challenges. *Journal of Business Logistics, 32*(4), 317–23.

Sanders, N., R., & Premus, R. (2005). Modeling the relationship between firms capability, collaboration, and performance. *Journal of Business Logistics, 26*, 1–23.

Sanders, N. (2007). An empirical study of the impact of e-business technologies on organizational collaboration and performance. *Journal of Operations Management, 25*, 1332–1347.

Samel, H. (2012). *Upgrading Under Volatility in a Global Economy*, MIT Sloan School Working Paper, June 20. Cambridge, MA, Massachusetts Institute of Technology Sloan School. Retrieved from; http://ssrn.com/abstract=2102643

Sarah, E., & Joseph, M., N. (2010). Procurement Practices and Supply Chain Performance of SMEs in Kampala. *Asian Journal of Business Management*, *2*(4), 82-88.

Sarkis, J., Gonzalez-Torre, P., & Adenso-Diaz, B. (2010). Stakeholder pressure and the adoption of environmental practices: The mediating effect of training. *Journal of Operations Management, 28*(2), 163-176.

Seggie, S., H., Kim, D., & Cavusgil, S., T. (2006). Do supply chain IT alignment and supply chain inter-firm system integration impact upon brand equity and firm performance? *Journal of Business Research*, *59*, 887-895.

Senge, P., & Prokesch, S. (2010). The sustainable supply chain. *Harvard Business Review*, *88*(10), 70-72,

Sekaran, U., & Bougie, R. (2010). *Research methods for business*: *A skill building approach* (5th ed.). Somerset, NJ: John Wiley and Sons.

Seifert, D. (2003). *Collaborative Forecasting, Planning, and Replenishment. How to Create a Supply Chain Advantage.* New York: AMACOM.

Simatupang, T., M., & Sridharan, R. (2008). Design for supply chain collaborative. *Business Process Management Journal*, *14*(3), 401-418.

Simatupang, T., M., & Sridharan, R. (2005). The collaboration index: a measure for supply chain collaboration. *International Journal of Physical Distribution & Logistics Management*, *35*(1), 44.

Scholten, K., & Schilder, S. (2015). The role of collaboration in supply chain resilience, *Supply Chain Management: An International Journal*, *20*(4), 471-484.

Singh, P., J., Power, D., & Chuong, S., C. (2011). A resource dependence theory perspective of ISO 9000 in managing organizational environment. *Journal of Operations Management*, *29*(1-2), 49-64.

Soares-Aguiar, A., & Palma-dos-Reis, A. (2008). Why do firms adopt e-procurement systems? Using logistic regression to empirically test a conceptual model. *IEEE Transactions on Engineering Management*; *55*, 120–33.

Soosay, C., A., & Hyland, P. (2015). A decade of supply chain collaboration and directions for future research, *Supply Chain Management: An International Journal*, *20*(6), 613 – 630.

Soosay, C., A., Hyland, P., W., & Ferrer, M. (2008). Supply chain collaboration: capabilities for continuous innovation. *Supply Chain Management, 13***,** 160-169.

Soita, N., M. (2015). *Factors Affecting Supply Chain Collaboration in Government Ministries in Kenya*. Unpublished PhD Thesis, Nairobi: University of Nairobi

So, S., & Sun, H. (2011). An extension of IDT in examining the relationship between electronic-enabled supply chain integration and the adoption of lean production. *International Journal of Production Research, 49*, 447-466.

Subroto, R., & Sivakumar, K. (2010). Innovation generation in upstream and downstream business relationships, *Journal of Business Research*, *63* (12), 1356-1363.

Sundram, V., P., Ibrahim, A., R., & Govindaraju, V., G., R. (2011). Supply chain management practices in the electronics industry in Malaysia: Consequences for supply chain performance. Benchmarking: *An International Journal, 18*(6), 834-855.

Sundarraj, R., P., & Talluri, S. (2003). A multi-period optimization model for the procurement of component-based enterprise information technologies. *European Journal of Operations Research, 146*(2), 339 – 351.

Schilke, O., & Cook, K. (2015). Sources of alliance partner trustworthiness: Integrating calculative and relational perspectives. *Strategic Management Journal*, *36*(2), 276-297.

Schiele, H. (2010). Early supplier integration: the dual role of purchasing in new product development. *R&D Management,* 138-151.

Sharma, A., Iyer, G., R., Mehrotra, A., & Krishanan, R. (2010). Sustainability and business to business marketing: A framework and implications. *Industrial marketing management, 39*(2), 330-341.

Sheu, C., Yen, H., R., & Chae, D. (2006). Determinants of supplier-retailer collaboration: evidence from an international study. *International Journal of Operations and Production Management*, *26*(1), 24–49.

Spekman, R., kammuf, J., & Myhr, N. (1998). An empirical investigation into supply chain management: a perspective on partnerships, *Supply Chain Management: An International Journal*, *3*(2), 53-67.

Spithoven, A., Vanhaverbeke, W., & Roijakkers, N. (2013). Open innovation practices in SMEs and large enterprises. *Small Business Economics*, *41*(3), 537–562.

Spulick, S., R. (2015). *The Effect of Executive Style on Risk Management: A Healthcare Supply Chain Context*". Electronic Theses and Dissertations. Paper 1287.

Skipper, J., B., & Hanna, J., B. (2009). Minimizing supply chain disruption risk through enhanced flexibility. *International Journal of Physical Distribution and Logistics Management*, *39*(5), 404-27.

Sreejith, B., & Vinaya, S. (2017). Green supply chain management: an empirical investigation on the construction sector, *Supply Chain Management: An International Journal*, *22*(1), 58-81.

Sridharan, R., & Simatupang, T., M. (2013). Power and trust in supply chain collaboration, *International Journal of Value Chain Management*, *7*(1), 76-96.

Stank, T., P., Keller, S., B., & Closs, D., J. (2001). Performance benefits of supply chain logistical integration. *Transportation Journal*, *41*(2/3), 32-46.

Stank, T., P., Crum, M., R., & Arango, M. (1999). Benefits of inter-firm coordination in food industry in supply chains. *Journal of Business Logistics*, *20*(2), 21–41.

Stundza, T. (2009). Supply chain innovation is important. *Purchasing*, Retrieved from: www.purchasing.com/article/354518.

Stradford, D., & Tiura, D., (2003). *Keeping the Savings You Thought You Were Getting in Services Sourcing,* 88th Annual International Supply Management Conference Proceedings, the Institute for Supply Management, Tempe, AZ,

Swink, M., & Schoenherr, T. (2015). The effects of cross-functional integration on profitability, process efficiency, and asset productivity, *Journal of Business Logistics*, *36*(1), 69-87.

Tabachnick, B., G., & Fidell, L., S. (2013). *Using multivariate statistics*. (6th ed.) Boston: Pearson.

Tang, C., & Tomlin, B., (2008). The power of flexibility for mitigating supply chain risks, *International Journal of Production Economics*, 5(7), 56 -90.

Tang, O., Matsukawa, H., & Nakashima, K. (2012). Supply chain risk management, *International Journal of Production Economics*, *139*(1), 1–2.

Talavera, G., (2013). *Exploring the Relationship of Supply Chain Collaboration and Trust*. Bangkong Central Pilipinas and UP Professorial Chair paper: Virata School of Business, University of the Philippines

Teece, D., J. (2010). Business models, business strategy and innovation, *Long Range Planning, 43*(2-3), 172–194.

Terjesen, S., Patel, P., C., & Sanders, N., R. (2012). "Managing differentiation-integration duality in supply chain integration, *Decision Sciences, 43*(2), 303-339.

Tracey, M., & Neuhaus, R. (2013). Purchasing role in global new product-process development projects, *Journal of Purchasing and Supply Management*, *19*(2), 98–105.

Tracey, M., & Tan, C., L. (2001). Empirical analysis of supplier selection and involvement, customer satisfaction, and firm performance, *Supply Chain Management: An International Journal*, *6*(4), 174-188.

Thawatchai, J., & Sushil, S. (2012). Comparative Study of Supply Chain Relationships, Mass Customization, and Organizational Performance between SME(s) and LE(s), *Journal of Business Administration Research*. Retrieved from http://dx.doi.org/10.5430/jbar.v1n2p139

Thun, J.,-H., & Hoenig, D. (2011). An empirical analysis of supply chain risk management in the German automotive industry. *International Journal of Production Economics, 131*(1), 242–249.

Tim, F. (2007). Into the depths of the I-E-I framework: using the internet to create value in supply chain relationships. *Supply Chain Management, 12*, 96.

Turner, J. (2014). *The handbook of project-based management: Leading strategic change in organizations* (4th ed.). Aldershot: The McGraw-Hill Companies, Inc.

Torkkeli, L., Puumalainen, K., Saarenketo, S., & Kuivalainen, O. (2012). The effect of network competence and environmental hostility on the internationalization of SMEs. *Journal of International Entrepreneurship, 10*(1), 25-49.

Trkman, P., Marko, B., & Groznik, A. (2015). A business model approach to supply chain management, Supply Chain Management: *An International Journal, 20*(6), 587-602. Retrieved from http://dx.doi.org/10.1108/SCM-06-2015-0219.

Trkman, P., & McCormack, K. (2010). Estimating the benefits and risks of implementing e-procurement. *IEEE Transactions on Engineering Management, 57*(2), 338-349.

UNCTAD, (2004). *Electronic Commerce Development Report*: Geneva: United Nations.

Vachon, S., Halley, A., & Beaulieu, M. (2008). Aligning Competitive Priorities in the Supply Chain: The Role of Interactions with Suppliers, *International Journal of Operations and Production Management, 29*(4), 322-340.

Vanathi, R., & Swamynathan, R., (2014). Competitive Advantage Through Supply Chain Collaboration – An Empirical Study of the Indian Textile Industry, *Fibres and Textiles in Eastern Europe , 22*(4), 106.

Vanany, I., Zailani, S. & Pujawan, N. (2009). Supply chain risk management: literature review and future research, *International Journal of Information Systems and Supply Chain Management, 2*(1), 16–33.

Vanneste, B., S., Puranam, P., & Kretschmer, T. (2014). Trust over time in exchange relationships: meta-analysis and theory. *Strategic. Manage. J.*, http://dx.doi.org/10.1002/smj.2198

Vanovermeire, C., & Sörensen, K. (2014). Integration of the cost allocation in the optimization of collaborative bundling, *Transportation Research Part E: Logistics and Transportation Review, 72*, 125–143.

Varadarajan, R. (2010). Strategic marketing and marketing strategy: domain, definition, fundamental issues and foundational premises. *Academy of Marketing Science. Journal, 38*(119).

Veerendrakumar, M., & Narasalagi, Shivashankar, K. (2015). Exploratory Study on Achieving Sustainable Competitive Advantage through Supply Chain Innovation for Strengthening Organizational Performance. *Int. J. Econ and Manage Sci, 4*, 236. doi:10.4172/2162-6359.1000236

Verbeke, A., & Kano, L., (2012). The Transaction Cost Economics Theory of the Family Firm: Family-Based Human Asset Specificity and the Bifurcation Bias. *Entrepreneurship: Theory and Practice, 36*(6), 1183-1205.

Vieira, V., Afonso, P.R., Monteiro, R. & Ricardo, T.V. (2011). 'Relationship marketing in supply chain: an empirical analysis in the Brazilian service sector, *Journal of Business and Industrial Marketing 26*(7), 524–531.

Vieira, L., M., E., L., Paiva, A., B., & Finger, R., T. (2012). Trust and Supplier-buyer Relationships: an Empirical Analysis. *BAR.*

Vinodh, S., Ramiya, R., A., & Gautham, S. (2011). Application of fuzzy analytic network process for supplier selection in a manufacturing organization. *Expert Systems with Applications*, *38*(1), 272-280.

Vurro, C., Russo, A. & Costanzo, L. A. (2014). Sustainability along the Value Chain: Collaborative Approaches and their Impact on Firm Performance, *Symphonya. Emerging Issues in Management (symphonya.unimib.it)*, Retrieved from http://dx.doi.org/10.4468/2014.2.04.

Waters, D. (2011). *Supply Chain Risk Management: Vulnerability and Resilience in Logistics*. London: Kogan Page Publishers.

Waller, Matthew, A., & Stanley, E., F. (2012). The Impact of Supply Chain Management Research: You Can't Unring a Bell. *Journal of Business Logistics, 33*(4), 259–61.

Walter, A., Ritter, T., & Gemunden, H., G. (2001). Value creation in buyer-seller relationships: theoretical considerations and empirical results from a supplier's perspective, *Industrial Marketing Management, 30*(4), 365-77.

Wang, C., & Kafouros, M., I. (2009). What factors determine innovation performance in emerging economies? Evidence from China. *International Business Review, 18*.

Wang, S., & Archer, N. (2007). Business-to-Business collaboration through electronic marketplaces: An exploratory study. *Journal of Purchasing and Supply Management, 13*(2), 113-126.

Welker, G., A., Van der Vaart, T., & Van Donk, D.P. (2008). The influence of business conditions on supply chain information-sharing mechanisms: a study among supply chain links of SMEs. *International Journal of Production Economics, 113*,706-720.

Wever, M., Wongnum, P., Trienekens, J., & Omta, S. (2012). Supply chain-wide consequences of transaction risks and their contractual solutions: Towards an extended transaction cost economics framework. *Journal of Supply Chain Management*, *48*(1), 73–91.

Wieland, A., & Wallenburg, C., M. (2013). The influence of relational competencies on supply chain resilience: a relational view. *International Journal of Physical Distribution and Logistics Management, 43*(4), 300-320.

Wiehenbrauk, D. (2010). *Collaborative Promotions: Optimizing Retail Supply Chains with Upstream Information Sharing*, New York: Springer.

Wiengarten, F., & Pagell, M. (2012). The importance of quality management for the success of environmental management initiatives, *International Journal of Production Economics, 140*, 407–415.

Wieteska, G. (2015). *Responding to the disruptions effectively, research results on the supply chain flexibility*, 20th International Symposium on Logistics (ISL2015), Designing Responsible and Innovative Global Supply Chains, Bologna, Italy, 5-8th July.

Wieteska, G. (2016). Building resilient relationships with suppliers in the B2B market, *Management, 20*(2).

Williamson, O.E. (2008). Transaction cost economics: the precursors. *IEA Economic Affair*, *28*(3), 7-14.

Williamson, O., E. (2010). Transaction Cost Economics: The Natural Progression. *Journal of Retailing, 86*(3), 215-226.

Williams, B., D., Waller, M., A., Ahire, S., & Ferrier, G., D. (2014). Predicting retailer orders with pos and order data: The inventory balance effect, European. *Journal of Operational Research, 232*(3), 593–600.

Williams, B., Brown, T., & Onsman, A., (2010). Exploratory factor analysis: A five-step guide for novices. *Australian Journal of Paramedicine, 8*(3).

Wilhelm, M. (2011). Managing competition through horizontal supply chain relations: Linking dyadic and network levels of analysis, *Journal of Operations Management, 29*(7-8), 663–676.

Wilson, J. (2010). *Essentials of Business Research: A Guide to Doing Your Research Project.* New York: Sage Publications.

Whitten, G., D., Green, K., W., Jr., & Zelbst, P., J. (2012). Triple-A supply chain performance. *International Journal of Operations and Production Management, 32*(1), 28-48.

Wisner, J., L., Tan, K., C., & Leong, G., K. (2016). *Principles of supply chain management: A balanced approach,* Boston: Cengage Learning.

Wong, C., Skipworth, H., Godsell, J., & Achimugu, N. (2012). Towards a theory of supply chain alignment enablers: a systematic literature review, *Supply Chain Management, 17*(4), 419-437.

Wooldridge, M. (2011). *Modern econometrics.* New York: McGraw-Hill.

Wright, M. (1999). Third generation risk management practices. *Computers and Security*, (*2*), 9-12.

Wu, Z., Choi, T., Y., & Rungtusanatham, M., J. (2010). Supplier–supplier relationships in buyer–supplier–supplier triads: Implications for supplier performance', *Journal of Operations Management, 28,* 115–123.

Wu, L., Chuang, C., H., & Hsu, C., H. (2014). Information sharing and collaborative behaviors in enabling supply chain performance: A social exchange perspective. *International Journal of Production Economics, 148,* 122-132.

Yaakub, S., & Mustafa, H., K. (2015). Supply Chain Risk Management for the SME's. *Academic Journal of Interdisciplinary Studies, 4*(1 S2).

Yamane, T. (1967). *Statistics: An Introductory Analysis* (2nd ed.). New York: Harper and Row.

Yeng, S., Osman, K., Yusuf, A., & Haji-Othman, S.M. (2015). E-Commerce Adoption among Small and Medium Enterprises (SMEs) in Northern State of Malaysia, *Mediterranean Journal of Social Sciences, 6*(5).

Yeung, K., Lee, P., K., C., Yeung, A., C., L., & Cheng, T., C., E. (2013). Supplier partnership and cost performance: The moderating roles of specific

investments and environmental uncertainty, *International Journal of Production Economics, 144*, 546–559.

Zeng, S., X., Xie, X., M., & Tam, C., M. (2010). Relationship between cooperation networks and innovation performance of SMEs. *Technovation, 30,* 181-194.

Zhao, X., Huo, B., Selen, W., & Yeung, J., H., Y. (2011). The impact of internal integration and relationship commitment on external integration. *Journal of Operations Management, 29*(I), 17-32.

Zhou, W., Alain Y., Loong, C., Cao, Z., & Haijun, B. (2016). E-Supply Chain Integration Adoption: Examination of Buyer–Supplier Relationships, *Journal of Computer Information Systems.*

Zsidisin, G., A., & Stephan, M., W. (2010). "Do Perceptions Become Reality? The Moderating Role of Supply Chain Resiliency on Disruption Occurrence." *Journal of Business Logistics, 31*(2), 1–20.

Zsidisin, George, A., & Michael, E., S. (2005). 'Managing supply risk with early supplier involvement: A case study and research propositions*', Journal of Supply Chain Management 41*(4), 44–57.

APPENDICES

Appendix I: Letter of Introduction

Dear respondent,

RE: REQUEST FOR RESEARCH DATA

I am a postgraduate student at JKUAT, pursuing a Doctorate of Philosophy in Supply Chain Management. Currently, I am undertaking a research thesis entitled: Effect of Supply Chain Collaboration on the strength of B2B relationship among ICT SMEs in Kenya-in partial fulfillment of the requirement for the award of Doctorate Degree.

In respect to the above requirement, I kindly request your cooperation by filling out the questionnaire as truthful as possible. The data collected will be used purely for academic purposes and will be treated with utmost confidentiality.

Your kind response and cooperation will be highly appreciated.

Yours Sincerely,

Jack Gumboh

Appendix II: Structured Questionnaire

Instructions: Please respond to the following questions and where applicable, mark the relevant box with a tick (√).

Confidentiality: The responses you provide will be strictly confidential. No reference will be made to any individual(s) in the report of the study.

SECTION A: BACKGROUND INFORMATION

1. Name:_____

   Date:_____
2. Gender : □ Female □ Male
3. Please mark the highest level of school completed:

   □ Certificate □ Diploma □ Undergraduate □ Post Graduate
4. How many years have you worked in the B2B marketplace:

   □ Less than 5 year □ 5-10 years □ 10years and above
5. What is your designation:

   □ SME Owner □ IT Manager □ Other Manager
6. Approximately how many employees, in full time equivalents does your organization currently employ: □ Under 10 □ 10 to 50 □ Over 50 to 250

SECTION B: INNOVATION COLLABORATION

7. The statements listed below relate to the effect of innovation collaboration on business-to-business relationship in an organizational supply chain. To what extent do you integrate the activities across your organization's supply chain?

Innovation Collaboration	**Strongly Agree-5**	**Agree-4**	**Neutral-0**	**Disagree-2**	**Strongly disagree-1**
The organization is involved in joint product development with its business partners					
Joint research and development with suppliers within supply chain					
The organization continuously devices new processes to reduce cost within supply chain					
Suppliers and customers are engaged in the process of new product development					
The organization does joint product design with its suppliers					
The organization jointly develops and implements quality monitoring systems with its suppliers and customers					
There is a platform for receiving customers feedback on products through social media					
The organization has developed new technologies within the supply chain					
The organization has tailored its manufacturing process specifications with its suppliers					
The organization transfers, create, implement and transfer new ideas across supply chain relationships					
Joint customization of distribution and warehousing activities within supply chain					

PART C: PLANNING COLLABORATION

8. The following statements relate to the effect of planning collaboration on businesses-to-business relationship. To what extent do you agree with them in relation to how your organization integrates them across the supply chain?

Planning Collaboration	**Strongly Agree-5**	**Agree-4**	**Neutral-0**	**Disagree-2**	**Strongly disagree-1**
Joint demand forecasting across the extended supply chain					
There is collaborative determination of supply and inventory positioning strategy					
The organization involves suppliers in minimizing bias as part of reducing forecast error					
There is joint development of strategies for planning effectiveness within the supply chain					
The organization, in partnership with its suppliers has developed an integrated planning process					
The organization liaises with supply chain partners in focusing and prioritizing demand planning efforts					
The organization carries out joint future product development plans with its suppliers					

SECTION D: COST COLLABORATION

9. The following statements relate to the effect of cost collaboration on strength of businesses-to-business relationship. Please indicate your level of agreement with the following statements on supply chain cost collaboration within supply chain as pertains to B2B relationships.

Cost Collaboration	**Strongly Agree-5**	**Agree-4**	**Neutral-0**	**Disagree-2**	**Strongly disagree-1**
Supply chain partners jointly formulate cost reduction policies					
Purchase cost is an important part of consideration for procurement within the supply chain					
Use of information technology reduces transaction cost within the supply chain					
The eventual total cost is highly influenced by prevailing exchange rates which have a strong influence on supply chain collaboration					
The organization automatically replenishes customer's inventory to reduce sales cost.					
The organization shares product development costs with supply chain partners					
Collective bargaining for goods/services within the supply chain increases economy of scale and reduces costs					
The company shares product cost information with other supply chain partners in order to reduce non- value adding processes					
The organization collaborates with supply chain partners in price control					

SECTION E: RISK MANAGEMENT COLLABORATION

10. The statements listed below relate to the effect of risk management collaboration on business-to-business relationship in an organizational supply chain. To what extent does your organization integrate risk management activities across the supply chain?

Risk Management Collaboration	**Strongly Agree-5**	**Agree-4**	**Neutral-0**	**Disagree-2**	**Strongly disagree-1**
The organization and supply chain partners collaborate on training in strategic risk management initiatives					
The organization has segments its supply chains to improve profits and reduce supply chain fragility.					
The organization nudges trade-offs in favor of reducing risk by overestimating the likelihood of a disruption					
The organization and suppliers jointly monitor current changes, incidents, exceptions and disruptions within supply chain					
Jointly develop and implement document retention policies for ease of reference and business continuity in case of accidents such as fire					
The organization pools resources to reduce the supply chain cost incurred to mitigate recurrent risks;					
The organization mitigates risks across the supply chain to reduce the financial impact if an event occurs.					
A standardized process for prequalifying suppliers is used within the supply chain to minimize risks					
Personnel security reviews for systems login within the supply chain to eliminate risks					
Security risks associated to using IT are evaluated and managed within the supply chain					

SECTION F: STRENGTH OF B2B RELATIONSHIP

11. The following statements refer B2B relationship in an organizational supply chain. To what extent do you agree with the fact that your organization collaborates and organizationally integrates the following activities with your suppliers across the supply chain?

Strength of B2B Relationship	**Strongly Agree-5**	**Agree-4**	**Neutral-0**	**Disagree-2**	**Strongly disagree-1**
Most customers place orders for goods and services through the Internet					
My organization uses electronic resource planning system integrated with its supply chain partners					
Use of e-Collaboration in product design is high					
e-Procurement tools exist i.e. e-sourcing etc					
Supply chain partners have interactive websites					
Most supply chain partners use email for communication with organizations					
Most transactions are done online including supplier payments					
Use of e-Collaborative forecasting and production planning exist					
Use of information technology within the supply chain is high					

12. How else does supply chain collaboration affect the strength of B2B relationship among ICT firms in Kenya?……

Source: Oliveira *et al*. (2011)

Thank you

Appendix III: List of ICT SME Firms for the study

1. The copy ltd
2. Sharp electronics technology ltd
3. Redington kenya ltd
4. Mitsumi computer garage ltd
5. Imagetek
6. Machine technologies
7. Elite digital solutions
8. Pc world
9. Technology today ltd
10. Inspiron ltd
11. Kodak (k) ltd
12. Office technologies ltd
13. Heidelberg east africa ltd
14. Oswald overseas corporation
15. Total office solutions
16. Xerox kenya
17. Mfi office solutions
18. Coretec systems & solutions
19. Parity Information systems
20. Merrimack power system ltd
21. Abno softwares international limited
22. Typotec imaging systems
23. Dial Up Associates ltd
24. Kenyaweb.com
25. Dhanush infotech kenya
26. Greenbell communications
27. Technology associates
28. Computerways ltd
29. Avenue electronics
30. Copierforce (k) ltd
31. Kirvam international ltd
32. Next technologies
33. Master power system ltd
34. Power innovations ltd
35. Specialised powere systems ltd
36. Raerex ea ltd
37. Thames electricals ltd
38. Specicom technologies ltd
39. Spacewave Technologies
40. Sokoletu creative limited
41. Software technologies ltd

42. Softlink options
43. Simbanet (k) ltd
44. Sai office supplies limited
45. Sahannet
46. Data centre ltd
47. Comtec group
48. Computer technics ltd
49. Centurion systems
50. Bloomerg limited
51. Bewa computer systems
52. Bell atlantic communication limited
53. Amiran communications ltd
54. Alternative technology supplies
55. Aitec east africa
56. Africa online kenya limited
57. Adwest communications
58. Abacus computer systems ltd.
59. Chirema telecomunications
60. Symatec solutions company ltd
61. Tecbytes computer solutions
62. Zuku fibre services
63. Mobile solutions
64. Virtual media solutions
65. Altech technologies
66. Best telecom limited
67. Bytech
68. Blueweb technologies
69. Blueprint technologies
70. Blueline synergy limited
71. Invent technologies ltd
72. Jambo telkom limited
73. Kenya microcomputer systems ltd
74. Interactive technology limited
75. Integrated Networks and Data Sys Ltd.
76. Innovative computer solutions ltd
77. Ingenuity solutions
78. Icon computers
79. Hp kenya
80. Greenline technology ltd.
81. East africa data handlers ltd
82. Digital horizons ltd
83. Power innovations ltd
84. Pesapot Holdings Limited

85. Pergamon ltd
86. Pc world
87. Pc tech systems ltd
88. Passive software technologies limited
89. One world technology
90. Olive computer dealers
91. Nexus networx
92. Lino stationers ltd
93. Lime technologies limited
94. Alternative technology supplies
95. Gigabyte systems ltd
96. Fintech kenya ltd
97. Midcom Limited
98. Empire microsystems ltd
99. Computer planet kenya
100. Techbiz ltd
101. Tangible business solutions
102. Takamori computers
103. Systems kenya
104. Swift technologies limited
105. Doshi group of companies
106. Power protection ltd
107. Creative innovations ltd
108. Power technics
109. Seven seas technology
110. Dimension data
111. Access Kenya
112. Crimson technologies
113. Xtranet communications ltd
114. Mtn business
115. Jamii telkom
116. Liquid telcom
117. Angani ltd
118. Naisoft
119. Seacom
120. Simbanet
121. Comtech
122. East African data handlers
123. Sasa host
124. Dataposit
125. Virtualsat ltd
126. Tramigo
127. Techzone ltd

128. Rivotek kenya ltd
129. Specicom technologies limited
130. Passive software technologies
131. Blueprint technologies
132. Bitcomm technologies
133. Bewa computer systems
134. Linksoft communications systems

Source: CAK website

Appendix IV: Description of Factors of the Study Variables

Item	Descriptions	Construct (Informative & Reflective)
IC1	The organization is involved in joint product development with its business partners	Innovation Collaboration (IC)
IC2	Joint research and development with suppliers within supply chain	
IC3	The organization continuously devices new processes to reduce cost within supply chain	
IC4	Suppliers and customers are engaged in the process of new product development	
IC5	The organization does joint product design with its suppliers	
IC6	The organization jointly develops and implements quality monitoring systems with its suppliers and customers	
IC7	There is a platform for receiving customers feedback on products through social media	
IC8	The organization has developed new technologies within the supply chain	
IC9	The organization has tailored its manufacturing process specifications with its suppliers	
IC10	The organization transfers, create, implement and transfer new ideas across supply chain relationships	
IC11	Joint customization of distribution and warehousing activities within supply chain	
PC1	Joint demand forecasting across the extended supply chain	Planning Collaboration (PC)
PC2	There is collaborative determination of supply and inventory positioning strategy	
PC3	The organization involves suppliers in minimizing bias as part of reducing forecast error	
PC4	There is joint development of strategies for planning effectiveness within the supply chain	
PC5	The organization, in partnership with its suppliers has developed an integrated planning process	
PC6	The organization liaises with supply chain partners in focusing and prioritizing demand planning efforts	
PC7	The organization carries out joint future product development plans with its suppliers	
CC1	Supply chain partners jointly formulate cost reduction	Cost

Item	Descriptions	Construct (Informative & Reflective)
	policies	Collaboration (CC)
CC2	Purchase cost is an important part of consideration for procurement within the supply chain	
CC3	Use of information technology reduces transaction cost within the supply chain	
CC4	The eventual total cost is highly influenced by prevailing exchange rates which have a strong influence on supply chain collaboration	
CC5	The organization automatically replenishes customer's inventory to reduce sales cost.	
CC6	The organization shares product development costs with supply chain partners	
CC7	Collective bargaining for goods/services within the supply chain increases economy of scale and reduces costs	
CC8	The company shares product cost information with other supply chain partners in order to reduce non-value adding processes	
CC9	The organization collaborates with supply chain partners in price control	
RM1	The organization and supply chain partners collaborate on training in strategic risk management initiatives	Risk Management Collaboration (RM)
RM2	The organization has segments its supply chains to improve profits and reduce supply chain fragility.	
RM3	The organization nudges trade-offs in favor of reducing risk by overestimating the likelihood of a disruption-	
RM4	The organization and suppliers jointly monitor current changes, incidents, exceptions and disruptions within supply chain	
RM5	Jointly develop and implement document retention policies for ease of reference and business continuity in case of accidents such as fire	
RM6	The organization pools resources to reduce the supply chain cost incurred to mitigate recurrent risks;	
RM7	The organization mitigates risks across the supply chain to reduce the financial impact if an event occurs.	
RM8	A standardized process for prequalifying suppliers is used within the supply chain to minimize risks	
RM9	Personnel security reviews for systems login within the supply chain to eliminate risks	

Item	Descriptions	Construct (Informative & Reflective)
RM10	Security risks associated to using IT are evaluated and managed within the supply chain	
BB1	Most customers place orders for goods and services through the Internet	Business-to-business (BB)
BB2	My organization uses electronic resource planning system integrated with its supply chain partners	
BB3	Use of e-Collaboration in product design is high	
BB4	e-Procurement tools exist i.e. e-sourcing etc	
BB5	Supply chain partners have interactive websites	
BB6	Most supply chain partners use email for communication with organizations	
BB7	Most transactions are done online including supplier payments	
BB8	Use of e-Collaborative forecasting and production planning exist	
BB9	Use of information technology within the supply chain is high	

Appendix V: Test of Normality on Study Constructs

Construct	Factors	Min	Max	Mean	Std. Dev	Skewness	Kurtosis
Innovation Collaboration (IC)	IC1	3	5	4.11	0.482	0.303	1.116
	IC2	3	5	4.03	0.924	-0.066	-1.848
	IC3	3	5	4.2	0.453	0.778	0.436
	IC4	3	5	4.31	0.51	0.323	-0.768
	IC5	4	5	4.4	0.492	0.434	-1.853
	IC6	3	5	4.26	0.574	-0.069	-0.438
	IC7	2	5	4.04	0.515	-0.93	5.319
	IC8	4	5	4.74	0.443	-1.09	-0.83
	IC9	3	5	4.22	0.467	0.683	0.085
	IC10	2	5	4.67	0.597	-2.291	6.91
	IC11	3	5	4.12	0.513	0.19	0.643
Planning Collaboration (PC)	PC1	3	5	4.65	0.503	-0.898	-0.574
	PC2	3	5	4.65	0.503	-0.898	-0.574
	PC3	1	5	4.6	0.665	-2.367	8.682
	PC4	1	5	3.63	0.95	-0.69	0.132
	PC5	1	5	3.55	0.969	-0.33	-0.562
	PC6	1	5	3.46	1.007	-0.415	-0.303
	PC7	1	5	3.52	1.004	-0.316	-0.468
	CC1	2	5	3.79	0.707	-0.256	0.047
	CC2	2	5	3.68	0.697	0.127	-0.379
	CC3	2	5	3.84	0.671	-0.021	-0.293
	CC4	2	5	3.68	0.801	-0.151	-0.387
	CC5	2	5	3.73	0.831	-0.275	-0.385
	CC6	1	5	4.24	0.75	-1.077	2.465
	CC7	2	5	4.19	0.733	-0.487	-0.383
	CC8	2	5	4.22	0.696	-0.529	-0.018
	CC9	2	5	3.78	0.892	-0.317	-0.596
Risk Management Collaboration (RM)	RM1	2	5	3.82	0.783	-0.672	0.426
	RM2	1	5	2.84	1.352	0.086	-1.281
	RM3	1	5	3.36	0.863	-0.146	-0.265
	RM4	2	5	3.63	0.725	-0.007	-0.253
	RM5	2	5	3.59	0.745	0.001	-0.287
	RM6	2	5	3.69	0.799	-0.187	-0.348
	RM7	2	5	3.65	0.736	-0.189	-0.142
	RM8	2	5	3.57	0.858	-0.442	-0.46
	RM9	2	5	3.53	0.861	-0.194	-0.58
	RM10	2	5	3.95	0.821	-0.143	-0.954
Business-to-business (BB)	BB1	2	5	4.69	0.571	-2.084	5.184
	BB2	3	5	4.15	0.42	0.977	1.414
	BB3	3	5	4.45	0.671	-0.831	-0.425
	BB4	3	5	4.19	0.576	-0.018	-0.196
	BB5	3	5	4.04	0.698	-0.06	-0.908
	BB6	1	5	4.56	0.67	-2.151	7.708
	BB7	2	5	4.16	0.671	-0.43	0.17
	BB8	2	5	4.33	0.716	-0.77	0.049
	BB9	2	5	4.3	0.796	-0.994	0.527

Appendix VI: Factor Analysis

Variable		Communalities Items	Extraction
	Innovation Collaboration	IC1	0.73
		IC2	0.613
		IC3	0.684
		IC4	0.885
		IC5	0.918
		IC6	0.892
		IC7	0.901
		IC8	0.909
		IC9	0.89
		IC10	0.781
		IC11	0.856
	Planning Collaboration	PC1	0.85
		PC2	0.759
		PC3	0.772
		PC4	0.728
		PC5	0.867
		PC6	0.863
		PC7	0.735
	Cost Collaborations	CC1	0.741
		CC2	0.761
		CC3	0.708
		CC4	0.695
		CC5	0.602
		CC6	0.874
		CC7	0.87
		CC8	0.767
		CC9	0.667
	Risk Management Collaboration	RM1	0.708
		RM2	0.776
		RM3	0.822
		RM4	0.777
		RM5	0.795
		RM6	0.797
		RM7	0.7
		RM8	0.796
		RM9	0.759
		RM10	0.692
	Business to Business	BB1	0.828
		BB2	0.723
		BB3	0.705
		BB4	0.681
		BB5	0.675
		BB6	0.7
		BB7	0.783
		BB8P	0.784
		BB9	0.852

Extraction Method: Principal Component Analysis.

Appendix VII: Extracted Components Obtained by Constraining Factors

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.311	11.547	11.547	5.311	11.547	11.547
2	4.176	9.078	20.624	4.176	9.078	20.624
3	3.575	7.772	28.396	3.575	7.772	28.396
4	3.367	7.319	35.715	3.367	7.319	35.715
5	2.991	6.503	42.218	2.991	6.503	42.218
6	2.478	5.387	47.605	2.478	5.387	47.605
7	2.264	4.922	52.526	2.264	4.922	52.526
8	1.774	3.857	56.383	1.774	3.857	56.383
9	1.734	3.77	60.154	1.734	3.77	60.154
10	1.528	3.323	63.476	1.528	3.323	63.476
11	1.513	3.289	66.765	1.513	3.289	66.765
12	1.395	3.032	69.797	1.395	3.032	69.797
13	1.275	2.772	72.569	1.275	2.772	72.569
14	1.157	2.515	75.085	1.157	2.515	75.085
15	1.033	2.246	77.331	1.033	2.246	77.331
16	0.977	2.124	79.455			
17	0.811	1.764	81.219			
18	0.756	1.644	82.862			
19	0.701	1.524	84.386			
20	0.667	1.45	85.836			
21	0.629	1.368	87.204			
22	0.579	1.259	88.463			
23	0.553	1.202	89.665			
24	0.502	1.092	90.756			
25	0.466	1.014	91.77			
26	0.413	0.899	92.669			
27	0.392	0.852	93.521			
28	0.363	0.788	94.31			
29	0.291	0.633	94.943			
30	0.268	0.583	95.526			
31	0.26	0.565	96.091			
32	0.24	0.521	96.612			
33	0.229	0.499	97.111			
34	0.201	0.437	97.548			
35	0.191	0.415	97.963			
36	0.162	0.353	98.316			
37	0.153	0.333	98.649			
38	0.13	0.282	98.93			
39	0.119	0.258	99.189			
40	0.092	0.2	99.388			
41	0.079	0.171	99.56			
42	0.06	0.13	99.689			
43	0.053	0.115	99.805			
44	0.044	0.096	99.901			
45	0.03	0.066	99.967			
46	0.015	0.033	100			

Appendix VIII: Reliability Test

Retained Factors	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	Overall
IC1	42.99	8.033	-0.276	0.325	0.874	
IC2	43.07	5.151	0.359	0.394	0.777	
IC3	42.9	6.201	0.491	0.588	0.737	
IC4	42.79	6.011	0.496	0.822	0.727	
IC5	42.7	5.655	0.691	0.881	0.788	
IC6	42.84	5.361	0.685	0.88	0.779	
IC7	43.05	6.541	0.268	0.833	0.777	
IC8	42.36	7.389	-0.03	0.95	0.828	
IC9	42.88	7.063	0.093	0.923	0.807	
IC10	42.43	6.692	0.15	0.912	0.802	
IC11	42.98	6.933	0.117	0.793	0.707	0.799
PC1	23.46	14.161	0.269	0.559	0.818	
PC2	23.46	13.869	0.35	0.518	0.808	
PC3	23.5	13.174	0.375	0.554	0.807	
PC4	24.47	10.521	0.659	0.592	0.777	
PC5	24.54	9.824	0.777	0.751	0.729	
PC6	24.66	10.138	0.666	0.708	0.777	
PC7	24.59	10.222	0.649	0.584	0.778	0.805
CC1	31.31	11.475	0.466	0.506	0.881	
CC2	31.43	11.956	0.378	0.445	0.897	
CC3	31.27	11.366	0.529	0.527	0.872	
CC4	31.43	11.731	0.343	0.477	0.703	
CC5	31.39	11.207	0.424	0.361	0.888	
CC6	30.86	11.338	0.457	0.669	0.882	
CC7	30.91	11.453	0.451	0.738	0.883	
CC8	30.88	12.019	0.354	0.556	0.701	
CC9	31.32	12.176	0.199	0.22	0.738	0.718
RM1	31.8	20.538	0.375	0.26	0.772	
RM2	32.79	18.989	0.254	0.37	0.783	
RM3	32.26	19.174	0.515	0.5	0.723	
RM4	32	19.578	0.578	0.514	0.719	
RM5	32.03	19.988	0.491	0.393	0.729	
RM6	31.93	18.662	0.654	0.558	0.707	
RM7	31.98	20.044	0.49	0.456	0.729	
RM8	32.05	19.053	0.537	0.509	0.720	
RM9	32.1	20.446	0.338	0.443	0.778	
RM10	31.68	21.642	0.196	0.102	0.787	0.757
BB1	34.19	7.754	0.057	0.112	0.828	
BB2	34.73	7.335	0.331	0.278	0.778	
BB3	34.43	6.581	0.358	0.188	0.778	
BB4	34.69	7.238	0.224	0.202	0.793	
BB5	34.84	6.428	0.381	0.305	0.771	
BB6	34.32	7.175	0.178	0.092	0.807	
BB7	34.71	6.14	0.503	0.406	0.718	
BB8	34.55	6.606	0.311	0.24	0.771	
BB9	34.58	6.401	0.305	0.258	0.797	0.705