RELATIONSHIP BETWEEN SUPPLY CHAIN RISKS,SUPPLY CHAIN STRATEGIESAND PERFORMANCE OF LARGE SCALE MANUFACTURING FIRMS IN KENYA

BY

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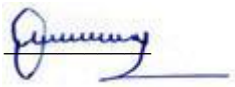
DECLARATION

I declare that this thesisis my original work and has not been previously presented for a degree in Maseno University or in any other University.

Signature  Date 29/01/2021

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DEDICATION

I dedicate this doctoral thesis to my wife Maureen Atieno, son's Jayden John and KolMikaelson, my parents Elphas Odhiambo and BetriceAwuor, Grandfather Mr. Albert Washington Ochung Okumu and Grandmother Rachel Ochung.

ABSTRACT

Supply chain risks is a growing global threat to manybusinesses.A survey done by Business Continuity Institute established that 85% of firms experienced at least three supply chain disruptions annually resulting in less revenues, declining customers and damaged reputations. The manufacturing sector is one of the big four plans through which the government of Kenya aims at making Kenya a newly industrializing, middle income country providing high quality life for all its citizen by the year 2030 by raising its share of GDP to 15 percent by 2022. The sector's contribution to GDP over the last five years has taken a dip. In 2013, the sector contributed 10.7 percent of GDP but this has declined progressively to 8.4 percent as at 2017. The sector's real value added rose by a paltry 0.2 percent in 2017 compared to a growth of 5.6 per cent in 2013.Manufacturing value addition lags at approximately USD 5 billion and there is very minimal growth and this has been associated with among other thingssupply chain disruptionsthat have led to closure and downsizing of some firms and ultimately loss of jobs stagnating its contribution to the economy between 2011 and 2017 to averagely 10% of the Country's GDP each year instead of the expected 15%.Empirical studies reviewedonly focused on the dimension of supply demand risksignoringdemand variability risk. Consequently,information on the application of the two variables together islacking.Moreover, reviewed studies reveal lack of information on the application of the sixteen-supply chain strategies applicable to supply chain managementas most studies only considered general business strategies. Supply chain strategies, supply chain risks and performance practically exist together, since supply chain strategies preclude supply chain risks and subsequentlyconstitute performance. However, based on reviewed literature,there is no information of the three variables studied together.The purpose of the study wasto establish the relationship between supply chain strategies, supply chain risks and performance of large scale manufacturing firms in Kenya. Specifically, it sought to:determine effect of supply chain riskson performance;establish effect of supply chain strategies onperformance;and establish confounding effect of supply chain strategies on the relationship betweensupply chain risks and performance of large-scale manufacturing firms in Kenya. It was guided by Resource Based View theory and adopted acorrelationalsurvey design.The study targeted473 large scale manufacturing firms in Nairobiout of which a sample of 403 firms wereobtained through saturated sampling378 responding giving the study a response rate of 94%. From the target population Seventy (70) firms which did not take part in the final study were randomly selected to participate in the in a pilot study.Pilot results revealed 34 item instrument reliability of 0.8999.Experts review, Barlett'sSphericity test of $p = 0.000$ for all the subscales and factor scores correlation matrix of 0.586(SC Risk),0.388(SC Strategies, and 0.191(Performance)all <0.7 ascertained validity.The study establisheda significant effect of SC Risks on performance ($F=42.471$). Moreover, the study established a significant effect of SC Strategies on Performance ($F=33.200$).An adjustment of SC Strategies in the relationship between SC Risk and Performance revealed a significant confounding effect of SC Strategies on the relationship between SC Risk and Performance($F=39.440$)and 10.4% change in adjusted R^2indicating the confounding effect.The findings abetthe theoretical position that firms should avert all SC Risks as they can potential jeopardize their operations. Managers should also recognize the need for SC Strategiesto not only improve the overallfirm performance but toalso avert the SC Risk.The study recommends that all SC Risks be avertedand in particular product quality failure,physical products flow disruption and profit margin erosion, SC Strategiesrole in enhancing organizations performanceand averting the SC Risk should also be recognized.These findings would act as a preamble for further research in Supply Chain. The findings wouldalso be helpful topractitioners in understanding the role each of the sixteen SCStrategiesplays in averting SC Risk and elevating organizations performance.

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DEFINATION OF OPERATIONAL TERMS

Performance	Refersto the accomplishment, execution, carrying out, and working out of anything ordered or undertaken in the result chain. Performance is a composite variable entailing Supply Chain Performance (Range of products and services, order lead time, information, processing cost,productivity ratio, Total cycle time, Total cash flow time and product development cycletime. Also referred to as supply chain outcome) and Firms performance (customer perception, internal operations, financial and stewardship, employee and organization innovation)
Supply Chain Strategies	Supply chain strategies construct is operationalized and is basedon the dimensions of Gottarna's, (2007) dichotomy of sixteen supply chain strategiesnamely: Mid-range supply chain strategies which are operational in nature and will affectmidterm firm performance and long-range supply chain strategies that affect the long-term firm performance.
Supply Chain Risks	Refers to any event within the supply chain that negatively affect the operations of the manufacturing firms directly and thus affecting its ability to meet customer demand or its reputation. Has also been referred to in the study as supply chain disruptions and has been broken down into supply demand risks and demand variability risks.
Supply Demand Risks	Refers to Supply Chain Risks mainly caused by delivery failures
Demand Variability Risks	Refers to SC Risks mainly caused by demand instability.

Large Scale Manufacturing Firms	Large scale manufacturing firms are manufacturing firms having more than 100 workers.
Confounding	A confounding variable is a variable that is related to an explanatory variable and at the same time has an effect on a response variable that is entangled with a possible effect of the explanatory variable

ABREVIATIONS AND ACRONYMS

BSC	Balance Score Card
DVR	Demand Variability Risks
FP	Firm's Performance
GDP	Gross Domestic Product
KAM	Kenya Association of Manufactures
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KEMSA	Kenya Medical Supplies Agency
LRSCS	Long-Range Supply Chain Strategies
MRSCS	Mid-Range Supply Chain Strategies
PwC	PricewaterhouseCoopers
PMBOK	Project management body of knowledge
RBV	Resource Based View
SBU	Strategic Business Unit
SC	Supply Chain
SCM	Supply Chain Management
SCS's	Supply Chain Strategies
SCR's	Supply Chain Risks
SCP	Supply Chain Performance
SDR's	Supply Delivery Risks
SMEs	Small and Medium Enterprises
TQM	Total Quality Management
USA	United States of America
VRIO	Valuable, Rare, Imitable and Organized

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CHAPTER ONE

INTRODUCTION

This chapter presents an overview of the background of the study introducing the main concepts; supply chain risks, supply chain strategies and firm's performance, statement of the problem, objectives of the study, research hypothesis, scope of the study, justification of the study and the conceptual framework. It also highlights the context of the study which is the manufacturing firms in Kenya.

1.1 Background of the Study

A supply chain conceptually covers all the processes from making of an order, obtaining the raw materials through all the processes until the finished product reaches the final end consumer. Parties in the supply chain are varied and are involved either directly or indirectly, in fulfilling a customer's request. These include not just the manufactures and the suppliers but also the transporters, warehouses, retailers and even customers themselves(Chopra, Meindl&Kalra, 2013).

The objective of every supply chain is to maximize the overall value generated(Chopra *et al*., 2013). To realize this the supply chain managers, have tocreate an integrated approach to a company's end-to-end supply chain, from the furthest upstream suppliers to its end customers, with participants working in concert toward common goals. Practices such as lean manufacturing, outsourcing, and supplier consolidation, companies have made it possible (Deloitte Consulting LLP, 2013) and as a result these efforts have led to lower costs, higher quality, shorter time to market, and increased business agility. Assuch most supply chains have become interconnected and globally resulting into firms becoming more vulnerable, with more potential points of failure and less margin of error for absorbing delays and disruptions.With this increase in operations and venture in to the global market supply chain risks exposure has become inevitable and has imminently increased. A 2011 survey by the Business Continuity Institute found that 85 percent of companies with global supply chains had experienced at least five supply chain disruption in the previous 12 months(Bhamra, Dani & Burnard, 2011). The costs of such disruptions can be high, leading to fewer revenues, increased downtime, delays in delivery, lost customers, and even damaged reputations. One study found that companies have experienced 30% lower shareholder returns

compared to their peers in the wake of a publicly announced disruption(Hendrick & Singhal, 2005).

Many companies are working to address what is clearly a growing threat to their supply chains, but they do notalways know how best to proceed and with the multifaceted nature of today's risks, piecemeal solutions and one-offinitiatives are no longer sufficient. Companies should aim to take a more holistic approach to managingsupply chain risks and achieve greater visibility, flexibility, and controlHarps, 2000). In the long run, the key will be to build a"resilient" supply chain that not only seeks to reduce risks but is also prepared to quickly adjust and recover from anyunanticipated supply chain disruptions that occur. Such supply chain resilience is quickly becoming a fundamentalrequirement. However, with today's complex, global supply chains where risks cannot be eliminated, having the ability toquickly bounce back from problems and continue business operations as efficiently as possible will likely be integral toremaining competitive although not sufficiently.Firms are therefore currently crafting adaptive supply chain strategies at the business and operations levels for them to be competitive in the globalization arena. Supply chainrisks, supply chain strategy and firms' performance are therefore inseparable in any efficient business operations(Stonebraker& Afifi, 2004).

Defining risks and uncertainty has always been a tough call(Zsidsin, Ellram, Carter &Cavinato, 2004).This is because risks is an elusive construct and has been defined in many different ways depending on the field of research (Wagner & Bode, 2008).According to the Oxford Englishdictionary 2005risks is defined as being vulnerable and itsdefinition is as follows: "a situation involvingexposure to danger." Such a danger can resultfrom known or unknown causes (Deep & Dani,2009). Thereafter, a number of authors attemptedto define risks in other ways, including (Jaffee, Siegel and Andrews, 2008) who defined risks as the possibility that anevent will occur that will potentially have anegative impact on the achievement of a farm orfirm's performance objectives, and/or successfulfunctioning of the overall supply chain.

In theirresearch, Khan and Burnes (2007) defined risks as - the likelihood for an uncommon event to happen,and the negative effects this event will have on theorganization. Ritchie & Brindley(2007) further provide a feasible definition that "risks is perceived to exist when there is a relatively high likelihood that a detrimental 2

event can occur and that event has a significant associated impact or cost of the item.Sharma and Chrisman (1999) on the other hand defined risks in supply chains as a variation in the distribution of possible supply chain outcomes, their likelihood, and their subjective value. Therefore, risksare dependent on theprobability of the event, the number of possibleconsequences, the significance of suchconsequences (Mitchell, 1995; Khan & Burnes,2007) as well as route that leads to the event(Ritchie & Brindley, 2007). Therefore from the foregoing variety of definitions risk can be defined as a detrimental event whose occurrence cause a variation in the distribution of possible supply chain outcomes, their likelihood, and their subjective value.

Risks in the supply chain contexthas received a growing attention in SCM research e.g. (Zsidsin, 2003; Peck, 2005; Ellis *et al*.,2010; Tummala& Schoenherr, 2011).Sitkin and Pablo (1992), defined supply chain risks as the extent to which there is hesitation whether potentially desired or insignificant /unwanted outcomes of decision will be realised. In 2002, Sitkin and Pablo further described supply chain risks as uncertainty about potential outcome, whether it is momentous and/or insignificant in the decision that occurred. On the other hand, Faisal, Banwet and Shankar *(*2006) defined supply chain risks as consumer's perceptions of the insecurity and undesirable consequences for buying products or services. In a related development Mitchell (1999) described supply chain risks as the likelihood of loss and the implication of that loss for the individual or organisation. He formulated a principle of risks to assess the probability of loss (P) and the significance (l) of that loss as; Risks = P (loss) X l (loss).There are however no consistently accepted dimensions of SCRs and several different classifications are reported in the literature. For example, Tang (2006) classified SCRs into two dimensions: disruption risks and operational risks. Other SCRs include supply risks, process risks, demand risks, and technology riskse.g. (Bogataj&Bogataj, 2007; Tang & Tomlin, 2008).

Firms are exposed to numerous risks associated with the upstream side of their supply chains supply demand risks (SDR and Downstream side of the supply chain (DVR). SDRreside in purchasing, suppliers, supplier relationships, and supply networks and include supplier business risks,production capacity constraints on the supply market, quality problems, and changes in technology and productdesign (Zsidsin, Panelli, & Upton, 2000). DVR include disruptions in the physical distribution of products to the

end customer, usually intransportation operations (e.g., a truck driver strike) (McKinnon, 2006) and the distribution network (e.g., a delay ina distribution centre) and originates from the uncertainty caused by customers'unforeseeable demands (Nagurney, Cruz, Dong& Zhang, 2005).Trkman and McCormack (2009)in agreement asserts that risks from continuous changes due to turbulent environments, such as changes in customer demands or supplier priorities, have been relatively ignored. Thus, this study seeks to examine supply chain risks from the dichotomy of SDR and DVR.

The concept of supply chain strategy views the entire flow of materials, information, finished goods and services from the suppliers, factories, warehouses and the end customer as a single working system managed to minimise costs and maximize the supply chain bonus (Chopra *et al.*,2013). In essence, research (Gottorna, 2007), indicates that there are sixteen supply chain strategies in use today. Namely: synergistic; information networks; project logistics; innovation; nano-chain; market dominance; value chain; extended; efficient; risks-hedging; micro-chain; cash-to-cash cycle; speed to market; tie down; none existent; and demand supply chain strategies. This has led to the categorization of the sixteen supply chain strategies into a dichotomy of strategic and tacticalsupply chain strategies (Gattorna, 2007). There are some benefits, challenges, and relative complexity for each of these sixteen supply chain strategies.

The sixteen-supply chain strategy dichotomy by (Gattorna, 2007 &Gadde, 2001) has presented several useful insights for today's supply chain manager as they engage in planning processes. In order to identify the output performance resulting from the supply chain strategies, they need to start with looking at how their company actually competes. According to Gattorna's (2007) sixteen-supply chain strategy dichotomy to provide a convenient way of identifying how the choice among the above sixteen supply chain strategies will moderate the relationship between supply chain risks and performance of manufacturing firms in Kenya.

Firm performance has become an elusive term in the business and education environment. There is no precise definition for firm performance and hence most scholars and experts limit themselves to their areas of specialization. Few academicians cross their functional boundaries to make reference to the research of other experts outside their functional areas (Neely, Bourne&Kennerley, 2000). This lack of a precise definition has presented organizations in today's business environment with a big

challenge on how to remain competitive in the marketplace through firm performance especially the organization-wide performance (Collins, Worthington, Reyes& Romero, 2010). However, performance not only refers to accomplishment of results within the budget limits (Fapper, Fortan& Stoop, 1996; Mwita, 2000; Scotti, 2004) rather it could refer to how well things are done i.e. how efficient, effective and productive the outcome is. Ordinarily and according to Gunasekaran, Patel &McGaughey (2004) SC performance (outcomes) on its own is an outcome, while the firm performance is the impact.The main focus today for largest scale firms is on becoming efficient and flexible in their manufacturing methods (Spekman, Salmond, &Kamauff, 1994; Fearne, 1998; Prasad &Sounderpandian, 2003; Awino&Gituro, 2011). However, the ultimate judge of supply chain performance is the customer in terms of effective and timely responses to their ever- changing tastes and preferences. To achieve this firms are required to formulate different right strategies to efficiently and effectively manage the flow of goods from the point of production to the end user in order to handle uncertainty in the business environment (Awino&Gituro, 2011). According to Gunasekaran *et al.* (2001) to make the SC performance more effectual and operative, it is required to assess the performance of SC. Measurement of SC performance should offer the business an outline of how their SCs are economical and sustainable. Thus the study will employ the measure used by previous researchers(Gunasekaran *et al*., 2001; Cumbo, Kline & Bumgardner, 2006;Holweg, 2007) to enable exploitation of a broad view of supply chain performance i.e. sales volume, distribution, inventory cost, inventory flow rate, inventory turnover, order lead time, range of product, reduction in unit cost and total average inventory.

Performance evaluation should utilize both financial and non-financial measures and for this reason this study does not consider supply chain measures adequate for measuring performance of the manufacturing firms. Most organizations have not made us of the balanced framework for financial and non-financial indicators as the challenge exist on how to balance the financial measures which are generally well developed and only examined by external stakeholders against the operational measures which are ad hoc and lack formal structure. During performance evaluation and measurement, considerations should be made to avoid disparate and incompatible measures. This measurement system was proposed to evaluate corporate performance evaluation from

four different perspectives: the financial, the internal business process, the customer, and the learning and growth by (Kaplan & Norton, 1992).

There is no theory that directly links supply chain risk, strategies and performance. However, resource based view acknowledges the existence of an environment full of uncertainties that negatively impacts on the organizations competitive advantage, that is, its ability to operate efficiently and effectively. The theory suggests that even though the risks are eminent in the organization micro and macro environment, strategies can be used to preclude their effects thus reducing their negative effect on the organizations performance. It was therefore Resource Based View theory that guided the explanation of the interplay between SC Risk, SC Strategies and Performance.

In this study, a firm is considered to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors and when these other firms are unable to duplicate the benefits of this strategy (Barney, 1991). Barney (1991) further argued that to have the potential to generate competitive advantage, a firm resource must have four attributes: be valuable, in the sense that it exploits opportunities and/or neutralizes threats in a firm's environment; be rare among a firm's current and potential competition; be imperfectly imitable; and have no strategically equivalent substitutes. Supply chain strategies are valuable and rare amongst firms, imperfectly imitable and heterogeneous as they are developed within the firm. They cannot equivalently be substituted and can be used to neutralize threats (supply chain risks) from the firm's environment and exploit opportunities to enhance the firm's performance. A firm employing SC strategies to confound the effect of SC risks on the firms' performance is expected to benefits from increased sales volume, lower inventory cost, reduction in unit cost, increased range of products, increased inventory turnover rate and increased total average inventory which in turn improved the supply chain performance. Such a firm is also expected to benefit of a positive customers' perspective, smooth business operations, improved financial performance, and organization innovativeness.

However, Neely, Adams &Kennerley (2003) argue the framework contains a serious failure in theirconstruction. It focuses management strictly on a set of pre-defined indicators and measuresmaking them not able to respond to simple and fundamental questions, such as "what ourcompetitors are doing?" The BSC does not monitor

competition or technological developments.This implies that it does not take into account the uncertainty inherent risks involved in theevents that can threaten this strategy. The effect of this control model can lead to seriousdysfunctional behaviour and loss of control over the implementation of the strategy (Norreklit,2003). Due to problems in the implementation of the strategy it is difficult to achieve a balance between financial and non-financial measures as suggested in the framework (Anand, Sahay,&Saha, 2005). Richardson (2004) also notes that organizations over concentrate in the task ofgenerating indicators and give less time to the definition of strategy resulting into indicators thatare not aligned with the strategic objectives.

To solve the BSC problem of not considering the uncertainty inherent risks involved in theevents that can threaten strategy implementation and the inadequate supply chain measures, the current study will combine the measures of both supply chain outcome and firm's performance. A determination of performance using this comprehensive set of questions, the study believes will provide performance data that is efficient (provide information on accomplishment of results within the budget limits) effective (provide information on how well things are well done) and Productive (provide information on the results of the efficiency and effectiveness in term of the outcome).

There is abundant evidencethat disruptions can have a material and negative impact on company performance (Hendricks& Singhal, 2003, Sheffi, 2005, Hendricks & Singhal, 2005). Wagner and Bode (2008) confirms the potential negative effect of risks on the supply chain by allaying that firms that are exposed to risks in supply chainscan expect lower performances as compared to those who are exposed to lower levels ofrisks. Higher level of risks according to them means more disruptions and negative consequences such asquality problems, customers' complaints, delays and mismatch of supply and demand. Consequently, Lonsdale and Cox (1998); Knight (1921);Wagner and Bode (2008) all concur on the negative effect supply chain risks has on performance.

Related past studies reviewed have attempted to establish the effect of supply chain risks on firm's performance. For instance, Avelar-Sosa, García-Alcaraz &Castrellón-Torres (2013) assessing the effects of some risks factors in the supply chain performance by employing demand risks measure and supply chain performance measures rated on a scale focused only on demand variability risk. Okonjo (2014)

seeking to establish the relationship between procurement risks management practices and supply chain performance of mobile phone serviceproviders in Kenya using a descriptive study design focused on supply demand risk. Ritchie & Brindley (2007) focusing on supply demand risks examined the effect of supply chain risks management on performancethrough the development of a framework by matching the constructs of performance and risks. Venter and Nagy (2010) aiming to construct and test a model summarizing that besides the tools adapted to manage information flow, materials flow and costs and performance in supply chains to achieve high overall performance, managing risks is also ineviTable focused on supply demand risks.

Zhao, Hao, Sun and Zhao (2012) coming close to this study also empirically explored the relationships among supply chain risks (SCRs), supply chain integration (SCI), and company performance, however they focused on supply demand risks. Most previous studies reviewed only focused on the dimension of supply chain demand risks and did not consider demand variability risks relatively ignoring demand side risks as confirmed by Trkman and McCormack (2009). Only one study examined demand variability risks and it too ignored the supply aspect of supply chain risks.

The measures employed by the previous researchers were therefore limited and could not therefore produce valid measures of supply chain risks. Consequently, previous researchers in an attempt to measure performance to determine the effect of supply chain risks on it employed uncomprehensive measures of supply chain performance focusing only on the impact of supply chain functions to the customer and not on the overall firm's performance which is the core reason for the organization existence. In an attempt to solve this most studies have considered using the BSC, however the BSC is criticized by Neely, Adams &Kennerley (2003) who argue the framework contains a serious failure in its construction as it focuses management strictly on a set of pre-defined indicators and measures making them not able to respond to inevitable and unforeseen factors such as supply chain risks. Despite the numerous attempts to carry out studies to establish the effect of supply chain risks on performance, information if adequate measures of supply chain risks and robust measures of performance are used to establish the effect of supply chain risks on performance is still lacking.

Reviewed past studies on the relationship between supply chain strategies and performance are scarce. This studysimilar to the studies done before looked to establish

the effect of strategy on performance. Previous reviewed studies for instance, Torres, Sharma, & Garcia-Mprales. (2008) investigated the effect of environmental strategy and performance in small firms in a study of more than 108 SMEs in the automotive repair sector in Southern Spain focused on general organizational strategy.Kumlu (2014) seeking to investigate the relationship between intangible resources and competitive export strategies and performance of 1415 companies from Metal, Textile, Chemical and Furniture industry from Turkey focused on general organizational strategy. John (2010) investigating the link between business strategy and performance giving special attention to the composition of combination of strategies using survey assessed 277 retail business in the USA likewise focused on general business strategy. Nyaoga, Magutu and Aduda (2015) came very close to the current study when they investigated if there is a link between supply chain strategiesand firm performance evidence from large-scalemanufacturing firms in Kenya, they however employed the BSC in measuring the firm's performance. The above presented studies on the effect of supply chain strategy on performance were generally focusing on overall organizations strategies and not supply chain strategies. They were therefore unable to identify how and which strategies affected the performance of the organizations they were studying. Consequently, in an attempt to establish the effect of strategy on performance they employed uncomprehensive measures of performance focusing only on the impact of supply chain functions to the customer and not on the overall firm's performance which is the core reason for the organization existence.

To solve this most studies have considered using the BSC, however the BSC is criticized by Neely, Adams &Kennerley (2003) who argue the framework contains a serious failure in its construction as it focuses management strictly on a set of pre-defined indicators and measures making them not able to respond to inevitable and unforeseen factors such as supply chain risks. This implies that it does not take into account the uncertainty inherent risks involved in theevents that can threaten strategy development and implementation. The effect of this control model can lead to seriousdysfunctional behaviour and loss of control over the implementation of the strategy implemented (Norreklit,2003). Due to problems in the implementation of the strategy it is therefore difficult to achieve a balance between financial and non-financial measures (Anand *et al.*, 2005).

Despite the attempts to establish the effect of supply chain strategies on performance, there is still lack of information if expanded measures of supply chain strategy that presents several useful insights for today's supply chain managers as they engage in planning processes by providing a convenient way of identifying how the choice among the sixteen supply chain strategies will additionally effect the performance and robust performance measure combining the BSC and Supply chain performance measure adopted from various scholars are taken into account and this warrants investigation.

According to Onghena, &Noortgate(2005) a confounding variable is a variable that is related to an explanatory variable and at the same time has an effect on a response variable that is entangled with a possible effect of the explanatory variable, possibly leading to wrong conclusions about the latter. Confounding may also occur in situations involving more than one explanatory or response variable, and more than one confounding variable may be present. Observational studies, quasi- experiments, as well as randomized experiments might be affected by confounding. If confounding variables cannot be avoided or ruled out by design, a final option is to model them as covariates.

Confounding is a distortion of the association between an exposure and an outcome that occurs when the study groups differ with respect to other factors that influence the outcome (Wunsch, 2007). Unlike selection and information bias, which can be introduced by the investigator or by the subjects, confounding is a type of bias that can be adjusted for in the analysis, provided that the investigators have information on the status of study subjects with respect to potential confounding factors.In order for confounding to occur, the extraneous factor must be associated with both the primary exposure of interest and the outcome of interest. Hence according Onghena&Noortgate (2005) there are three conditions that must be present for confounding to occur. The confounding factor must be associated with both the risk factor of interest and the outcome, the confounding factor must be distributed unequally among the groups being compared and lastly a confounder cannot be an intermediary step in the causal pathway from the exposure of interest to the outcome of interest.

Supply chain strategies constitutes performance as posited by (Zhao, Hao & Zhao, 2012; Ardianto&Natsir, 2014; Nayoga, Magutu&Aduda,2015; Mburu, Ngugi &Ogollah, 2015; Bolo, 2011) and precludes supply chain risks (Wagner & Bode, 2008,

Florian &Constangioara, 2014; Soegomo, Alhabsyi&Arif, 2014). Supply chain disruptions are inevitably an integral part of the supply chain environment as allayed by (Deloitte Consulting LLP, 2013; Ellegard, 2008) and comes in various forms (Tang, 2006; Trman& McCormack, 2009; Zsidisin, 2003). At the same time supply chain operations have to continue for the benefit of the organization's internal(employees) and external stakeholders (shareholders, financiers, the government) through improved customer service, quality products, reduced lead times, products availability and the manufacturing firms through increased sales volumes, reduction in unit cost, high inventory turnover and availability of a wide range of products. As posited by the above literatures the three variables practically exist together, however no study has been done to establish the relationship between the three practically existing variables. Thus this current study seeks to empirically establish what will be the effect on the negative relationship between supply chain risks and performance if a second independent variable supply chain strategy which obstruct risks and amplifies performance is introduced into the relationship.

Based on the reviewed literature there is no study that has directly examined the confounding effect of supply chain strategies on the relationship between supply chain risks and performance. There are though studies done that hints at a possible relationship between supply chain strategy, supply chain risks and performance having established supply chain strategies as a precluder of supply chain risks and a constitutor performance.For instance, Mburu, Ngugi &Ogollah, (2015) conducting a study to assess the effect of risks identificationmanagement strategy on supply chainperformance in manufacturingcompanies in Kenya only focused on risk and performance, Mentzer (2008) employing grounded theory to explore the phenomenon of risksmanagement and risks management strategies in global supply chains only focused on risks and performance only focused on strategies and performance. Florian and Constangioara (2014) focusing on risks and performance used a national sample of 64 Romanian companies fromvarious industries to document the relationship between organizational performances andrisks. Not so far from this Soegomo, Alhabsyi, and Arif (2014) focusing on general company strategy and enterprise risk management used explanatory research investigated the effects of Company Strategy on Enterprise Risks Management, Organizational Culture, Supply Chain Management and Company

Performance of Coal Mining Companies at East and South Kalimantan. Zhao, Hao, Sun

and Zhao (2012) employing supply chain integration as a moderator variable empirically explored the relationships among supply chain risks (SCRs), supply chain integration (SCI), and company performance. Bolo (2011) in almost a similar study to the present focusing on selected strategy and performance explored strategic management focusing on the joint effect of selected strategy variables on performance. Also close to this was the work of Ardianto&Natsir (2014) who examined using quantitative (positivist) research methodology and multivariate statistical method (Structural Equation Modelling the practice of TQM and SCM in improving the performance. This is not far apart from the work of Nyaoga, Magutu and Aduda (2015) who investigated the link between supply chain strategiesand firm performance.

Based on the reviewed literature, despite theoretical suggestions and empirical attempts, no study has attempted to establish the confounding effect of supply chain strategy on the relationship between supply chain risks and performance. There is therefore lack of empirical information on the confounding effect of supply chain strategy on the relationship between supply chain risks and performance. Manufacturing firms can benefit from the inclusion of the third variable supply chain strategies to preclude the never ending negative effects of the inevitable supply chain risks and constitute their ever dwindling performance.

The Big Four Agenda sits in very well within the global, continental and national development context. At the global level, the Big Four Agenda is effectively aligned to the 2030 Agenda for sustainable Development, upon which the seventeen sustainable Development Goals are anchored. At the continental level, the Big Four Agenda aligns well with Africa's Agenda 2063 themed "The Africa We Want". This agenda sets out Africa's aspirations for development by 2063 ad is founded on the desire for shared prosperity and well-being, for unity and aspirations, for inclusive growth and people-driven sustainable development. In the national context, the Big Four are rightly pegged on the Kenya vision 2013 and well mainstreamed in the third medium Term Plan (2018 – 2022) of the vision (Wamalwa, 2019).

The Manufacturing sector is crucial for the achievement of vision 2030 and is arguably the most important for job creation because of its strong forward and backward linkages with

othersectorsintheeconomy(ParliamentaryBudgetOffice,2018).AccordingtotheKIPPRA

report (2013), manufacturing sector is a major contributor to the Kenyan economy as it currently employs 277,900 people, which represents 13% of the labour force in the formal sector with an additional 1.6 million people employed in the informal side of the industry.

Nearly50%ofmanufacturingfirmsinKenyaemploy50ormoreworkers.Thesectormainly produces agro-processing products, textiles, leather, construction materials and machinery. It is largely dominated by Micro and Small Enterprises (MSE) that are characterized by low skilled jobs. The sector comprises of about 3,700 manufacturing units and is divided into several broad sub-sectors. KAM has classified manufacturing sector into categories

identifiedas:Building,Construction&Mining,Chemical&Allied,Electrical&Electronics, Food Beverages & Tobacco, Leather & Footwear, Metal & Allied, Motor Vehicle & Accessories, Paper & Board, Pharmaceutical & Medical Equipment, Plastics & Rubber, Textiles&Apparels,Timber,WoodProducts&Furniture,Consultancy&IndustrialServices and SME Focal Point and service sector (KAM, 2015). The top three manufacturing subsectors account for 50% of the sector GDP, 50% of exports, and 60% of formal employment. The sector's contribution to GDP over the last five years has been on a downward trend. In 2013, the sector contributed 10.7 percent of GDP but this has declined progressivelyto8.4percentasat2017.Thesector'srealvalueaddedrosebyapaltry0.2 percent in 2017 compared to a growth of 5.6 per cent in 2013 (Parliamentary BudgetOffice, 2018).

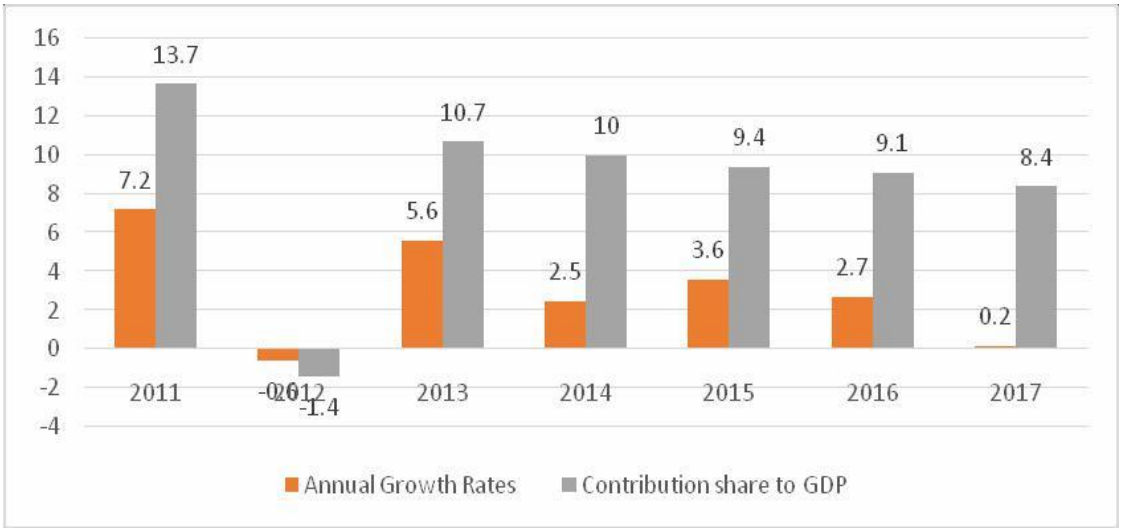

Figure 1. 1: Manufacturing sector contribution to GDP and its annual percentage growth 13

Source: (Economic Survey, 2018)

Valueadditionformanufacturingsectorhasstagnatedformorethanadecade. Asillustrated in figure 1.1, manufacturing value addition lags at approximately USD 5 billion and there is very minimal growth. This could explain why Kenya is losing its competitiveness in the international trade. Indeed, the country appears to be losing its market share within the East African Community. Kenya has occupied a dominant position in supplying the region with manufactured goods with Uganda as the largest trade partner. Lately, that seems to have changed as Kenya's manufactured exports to the region have shrunk considerably. In 2017 exports to Uganda and Tanzania dropped by 5.4 percent and 29.5 percent respectively as compared to 2013. This drop is attributed to affordable imports from the FarEast.

According to PwC (2010) Kenya's manufacturing subsector has a challenging history in terms of performance attributed to high cost of inputs such as labour and electricity, unstructuredsupplychainstrategyandsupplychainrisks.Thishascausedintherecentpast, manymanufacturingsubsectorcompaniesinKenyaparticularlytheprivateandmultinational manufacturingfirmstocollapse,relocatetoothercountries,shutdown,downsizeoperations and even retrench staff due to stiff competition from imports. For instance Manufacturing companiessuchasProcterandGambleandReckittBenckiserhaverelocatedfromKenyato other regions citing high cost of doing business. These problems facing the manufacturing sector hurts the entire economy and despite this no study has been found practicable enough to help solve the problem.

Supply chain strategies has been mentioned by various scholars as a paramount solution to the disruptions in the supply chain and an enhancer of performance and can therefore work to solve the problem facing the manufacturing firms in Kenya. However, no empiricalstudy hasbeendonetotexttheassertionsoftheresearchers.Thisstudythereforebetterservesasa starting point in providing a strategic map in formulating supply chain strategies to manage the various particular supply chain risks that deter substantial productivity and improving performance to overcome the challenges and replace external suppliers gradually as envisioned in Kenya's Vision 2030 aimed at making Kenya a newly industrializing, middle incomecountryprovidinghighqualitylifeforall itscitizenbytheyear2030. It isinlightof

thisthatthestudyseekstocontextuallytesttheeffectofsupplychain risksandsupplychain strategies on performance of large scale manufacturing firms inNairobi.

1.2 Statement of the Problem

Many companies are working to address what is clearly a growing threat to their supply chains, but they do not always know how best to proceed.Business Continuity Institute carrying out a survey in 2011 established that 85% of companies with global supply chains experienced at least three supply chain disruption annually resulting to fewer revenues, late deliveries, lost customers, and damaged reputations. The manufacturing industry one of Kenya's big four agenda initiatives alongside food security, affordable housing and affordable healthcare and which employs13% of the country's labour force and is regarded as one of the country's economy driver to global competitiveness by 2030 is considered to be a crucial driver of the Kenyan economy to global competitiveness by 2030 as it is arguably the most important for job creation because of its strong forward and backward linkages with other sectors in the economy.The manufacturing sector is one of the big four plans through which the government aims at making Kenya a newly industrializing, middle income country providing high quality life for all its citizen by the year 2030 by raising its share of GDP to 15 percent by 2022. The sector's contribution to GDP over the last five years has been on a downward trend. In 2013, the sector contributed 10.7 percent of GDP but this has declined progressively to 8.4 percent as at 2017. The sector's real value added rose by a paltry 0.2 percent in 2017 compared to a growth of 5.6 per cent in 2013.Manufacturing value addition lags at approximately USD 5 billion and there is very minimal growth and this has been associated with among other things supply chain disruptions that have led to closure and downsizing of some firms and ultimately loss of jobs stagnating its contribution to the economy between 2011 and 2017 to averagely 10% of the Country's GDP each year instead of the expected 15%. This could explain why Kenya is losing its competitiveness in the international trade. Indeed, the country appears to be losing its market share within the East African Community. Indeed, the country appears to be losing its market share within the East African Community. Kenya has occupied a dominant position in supplying the region with manufactured goods with Uganda as the largest trade partner. Lately, that seems to have changed as Kenya's manufactured exports to the region have shrunk considerably. In 2017 exports to Uganda and

Tanzania dropped by 5.4 percent and 29.5 percent respectively as compared to 2013. In

the recent past, many Manufacturing companies such as Procter and Gamble and Reckitt Benckiser have relocated from Kenya to other regions citing high cost of doing business.The situation of the sector is precarious and with no definitive and explicit solution. Studies have been done before to establish the influence of supply chain risks on performance, however previous studies reviewed only focused on the dimension of SDR'sand relatively ignored DVR'swhich isthehighest ranked risk factors affecting performance, information if SDR's and DVR's are used together to establish the effect of supply chain risk on performance is not known.Studies have been done to establish the effect of SCS's on performance, however they only focused on general organizationstrategies and not the sixteen-supply chain strategy that provides a convenient way of identifying how the choice among the sixteen supply chain strategies will additionally influencethe relationship between SCR's and performance. Information if the sixteen-SCS's are used to establish the effect of supply chain strategies on performance is not known.SCS, SCR and performance practically exist together, supply chain strategies precluding supply chain risks and at the same time constituting to performance. However, based on the reviewed literature there is no study that considered studying the three together and information if the three are studied together is lacking and warrants investigation.Thus, thisstudy seeks to determine the effect of supply chain risks on performance, to establish the effect of supply chain strategies on performance and to establish the confounding effect of supply chain strategies on the relationship between supply chain risk and performance of large scale manufacturing firms in Nairobi employing comprehensive supply chain risks measures, expanded supply chain strategies measures and robust performance measures.Manufacturing firms can benefit from the inclusion of the third variable supply chain strategies to preclude the never ending negative effects of the inevitable supply chain risks and constitute their ever-dwindling performance.

1.3 Research Objectives

The general objective of the study was to establish the relationship between supply chain strategies, supply chain risks and performance of large scale manufacturing firms in Kenya.

The specific objectives of the study were:

i. To establish the effect of supply chain risks on performance of large scale manufacturing firms in Kenya.
ii. To determine the effect of supply chain strategies on performance of large scale manufacturing firms in Kenya.
iii. To establish the confounding effect of supply chain strategies on the relationship between supply chain risksand performance of large scale manufacturing firms in Kenya.

1.4 Research Hypotheses

The following null hypotheses were formulated for testing:

The first hypothesis $H_{01}$of the study is generated from the first direct relationship between supply chain risk and performance where the study examines supply chain risk that consist of supply demand risk and demand variability risk and their effect on performance of large scale manufacturing firms in Kenya. Hence the followingnull hypothesis was tested.

$H0_1$: Supply chain risks have no significant effect onperformance of large scale manufacturing firms in Kenya.

The second hypothesis H_{02} of the study is generated from the second direct relationship between supply chain strategies and performance where the study examines supply chain strategies that consist of long range and mid-range strategies and their effect on performance of large scale manufacturing firms in Kenya. Hence the following hypothesis null hypothesis was tested.

$H0_2$: Supply chain strategieshave nosignificant effect on performance of large scale manufacturing firms in Kenya.

The third hypothesis H_{03} of the study is generated from the confounding relationship based on objective three of the study which aimed to establishing the confounding effect of supply chain strategies on the relationship between supply chain risk and performance. Therefore the following null hypothesis was tested.

$H0_3$: Supply chain strategies havenoconfounding effect onthe relationship between supply chain risks and performance of large scale manufacturing firms in Kenya.

1.5 Scope of the Study

The study specifically gathered data to establish theeffect of SC Strategies on the relationship between SC Risks and performance of large scale manufacturing firms in Nairobi. The SC Strategies comprised of the sixteen SC Strategies namely (synergistic; information networks; project logistics; innovation; nano-chain; market dominance; value chain; extended; efficient; risks-hedging; micro-chain; cash-to-cash cycle; speed to market; tie down; none existent; and demand supply chain strategies). The SC Risk comprised of supply demand risk and demand variability risk while performance entailed Supply Chain Performance comprising (Range of products and services, order lead time, information, processing cost,productivity ratio, Total cycle time, Total cash flow time and product development cycletime. Also referred to as supply chain outcome) and Firms performance comprising (customer perception, internal operations, financial and stewardship, employee andorganization innovation. The study considered data for a time period of five years from the year 2012 to 2017 because the normal planning cycle at strategiclevel is five years. The study was undertaken in the large-scalemanufacturing firms registered with KAM.Large scale enterprises have more than 100 workers, mediumenterprises have from 51 to 100 workers, small enterprises have from 11 to 50 workers,and micro enterprises are those with 10 or fewer workers. Although the categorizations of manufacturing firms according to size was based onthe number of employees, the type and level of technology used, size of capitalinvestment and capacity utilization was used to justify the choice of large scalemanufacturing firms. The main reason for this choice wasbecause these firms are likely toexhibit an elaborate SCM philosophy, exhibit high activity levels and have enough resourceto be employed in supply chain strategy implementation. The number of employees was also good indicator of size becausebeing profit making, employees can be taken as a proxy for supply chain performance,profits, technology utilization and firm performance. The respondents to the study weresupply chain managers of the sampled firms.

1.6Contributions of the Study

This study is expected to make several contributions to theory, to academicians, to practitioners in large-scale manufacturing firms, policy makers and governments asfollows:

Toacademiansthefindingsofthisstudywillactasapreambleforfurtherresearchstudies fromwhichtheycandrawideasinthefieldofsupplychain.Thisconcurrenttreatmentofthe variablesisalsolikelytobenefitotherresearchersintheireffortstowardstheclеardefinition of the supply chain construct on the firm's operations improvementinitiatives.

To the practitioners in manufacturing firms and allied industries these findings will help in understanding the role that supply chain strategies plays in precluding the effect of supply chain risks and at the same time constituting to performance of the firms. This is very important as the manufacturing sectors one of the big four agenda are expected to strategically reengineer the uncompetitive local industries to implement three key strategies of restructuring key that use local raw materials in order to increase the value added to local produce and intermediate imports as towards Kenya's Vision 2030 that is anchoring the Big Four plan through which the government targets to support value addition and raise the manufacturing sector's share of GDP to 15 percent by 2022; focus on initiatives that guarantee food security and nutrition to all Kenyans by 2022; provide Universal Health Coverage and guarantee quality and affordable health care to all Kenyans; and provide at least five hundred thousand (500,000) affordable new houses to Kenyans by 2022.

To policy makers it should provide a policy framework where the role of supply chain strategies in the relationship between supply chain risks and performance of manufacturing firms in Kenya as opposed to the isolated effects of the same variables is made clear. This will therefore enable the country choose the best outfit for continuous performance
managementstrategytodeliveritseconomicvisionofaddingvaluetothelocalproduceand intermediate imports and also in turn create more jobs for the citizens. This with no doubt have a great impact on the well-being of the citizens of thecountry.

1.7 Conceptual Framework of the Relationship Between SC Risks, SC Strategies and Performance

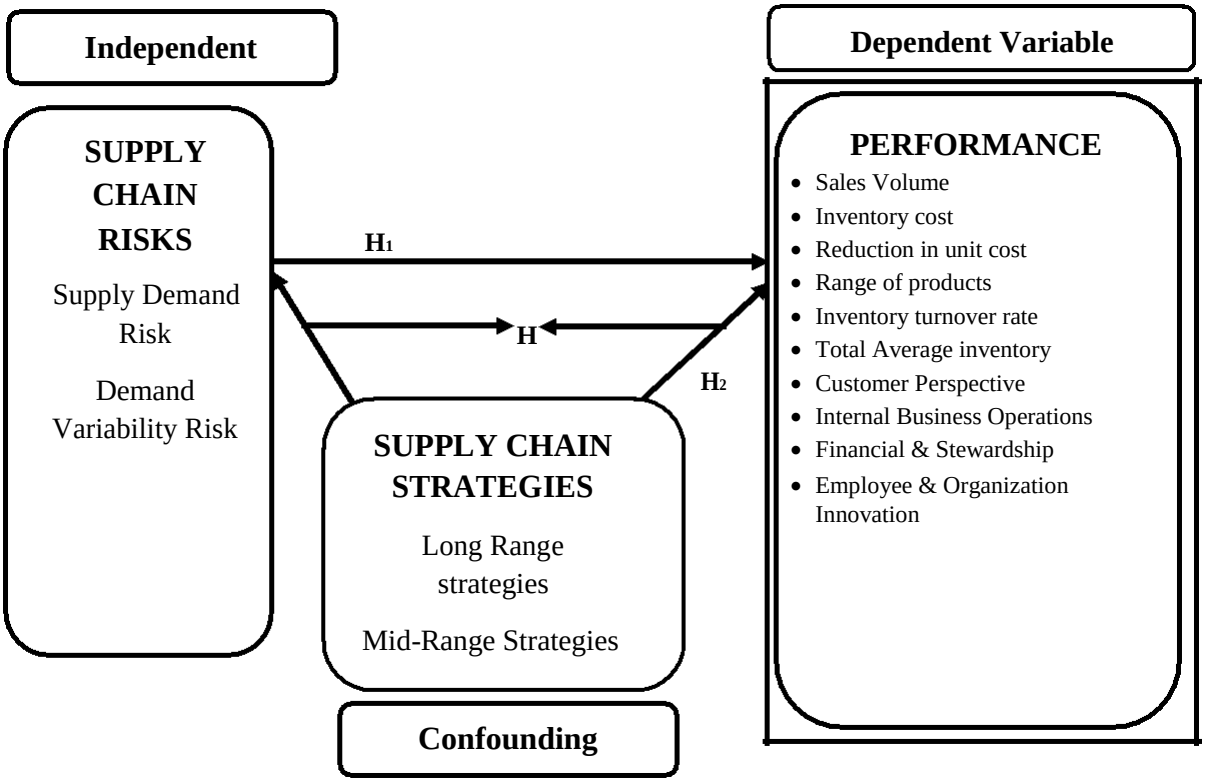

Figure 1. 2: Effect of Supply chain strategies on Supply Chain risk and Performance

Source: Adapted from (Wagner & Bode, 2008; Florian &Constangioara, 2014;Gattorna, 2010; Gunasekaran *et al*., 2001; Cumbo, Kline and Bumgardner, 2006;Holweg, 2007; Kaplan & Norton, 1992)

This study covered SCR (supply demand risks and demand variability risks) and SCS the sixteen-supply chain strategy dichotomy (Mid-range SC strategies and Long-range SC strategies) as the confoundingvariable and performance (overall firm performance and supply chain performance) as the dependent variable. According to Florian &Constangioara (2014) organizational performances are determined by the extent of risks inthe context of a supply chain. The existence of adequate SCRM strategies mitigate thenegative consequences of risks on organizational performances. The study identified supply chain risks management strategies as being able to mitigate the effects of risksin the supply chain among other factors. The current study modifies their framework of the impacts of risks in supply chain on organizational performance by introducing supply chain strategies as a confounding variableprecludingsupply chain

risks and at the same time constituting the performance. SC strategies measures are basedon Gattorna's (2010) dichotomy of short-range and long-range SC strategies. The SCR focus in this study will be the SDR and DVR that are believed to impede performance of the firms, supply chain risksmetrics will be based on those developed by (Wagner & Bode, 2008; Florian &Constangioara, 2014). Performance will be measured from supply chain outcome and firm's performance dimensionsbased on the balance score card metrics developed by (Kaplan & Norton, 1992) and SCperformance dimensions based on the works of (Gunasekaran *et al*., 2001; Cumbo, Kline &Bumgardner, 2006); Holweg, 2007). Figure 1.1 is emphasizing the interplay between the SCR,SCS and performance which are believed to practically exist together in one comprehensiveframework intended to aid the researcher in developing thorough understanding of the linkagesbetween the three concepts.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents the theoretical foundation on which the study is anchored, the discussion of the study concepts and the empirical literature review.

2.1 Theoretical literature Review

2.1.1 Resource Based View Theory

The SCM theories have been categorized into three: the economic theories, which includes transaction cost theory and agency theory; secondly, the strategic management theories of resource-based view of the firm and the theory of competitive advantage; and lastly, thepsychological and sociological theories of organizational learning theory and theinterorganizational networks theory.There is no theory that directly links supply chain risk, strategies and performance.However, Resource Based View acknowledges the existence of an environment full of uncertainties that negatively impact on the organizations competitive advantage that is its ability to operate efficiently and effectively. The theory suggests that even though the risksare eminent in the organization environment, strategies can be used to preclude their effect thus reducing their negative effect on the organizations performance. It is the assertions of Resource Based View that guided the development of the conceptual framework involving the three variables.

The study has been anchored on Resource based theory. Resource based view (RBV) is an approach to achieving competitive advantage that emerged in 1980s and 1990s, after the major works published by Wernerfelt (1984) “The Resource-Based View of the Firm,”, Prahald and Hamel(1990) “The Core Competence of the Corporation”, Barney(1991)“Firm resources and sustained competitive advantage,” and others. The supporters of this view argue that organizations should look inside the company to find the sources of competitive advantage instead of looking at competitive environment for it.The resource-based view stipulates that in strategic management the fundamental sources and drivers to firms’ competitive advantage and superior performance are mainly associated with the attributes of their resources and capabilities which are

valuable and costly-to-copy (Barney, 1991; Conner, 1991; Mills, Platts & Bourne, 2003; Peteraf& Bergen, 2003).

In RBV model, resources are given the major role in helping companies to achieve higher organizational performance and this premise appears to be supported by logistics and SCM researchers such as (Lynch, Keller, &Ozment, 2000). According to Barney(1991), there are two types of resources namely tangible and intangible assets.Tangible assets are physical things such as land, buildings, machinery, equipment and capital. Physical resources can easily be bought in the market so they confer little advantage to the companies in the long run because rivals can soon acquire the identical assets.Intangible assets are everything else that has no physical presence but can still be owned by the company. Brand reputation, trademarks, intellectual property are all intangible assets. Unlike physical resources, brand reputation is built over a long time and is something that other companies cannot buy from the market. Intangible resources usually stay within a company and are the main source of sustainable competitive advantage.

RBV is built on two critical assumptions that resources must also be heterogeneous and immobile. The first assumption is that skills, capabilities and other resources that organizations possess differ from one company to another. If organizations would have the same amount and mix of resources, they could not employ different strategies to outcompete each other. What one company would do, the other could simply follow and no competitive advantage could be achieved. This is the scenario of perfect competition, yet real world markets are far from perfectly competitive and some companies, which are exposed to the same external and competitive forces (same external conditions), are able to implement different strategies and outperform each other. Therefore, RBV assumes that companies achieve competitive advantage by using their different bundles of resources. The second assumption of RBV is that resources are not mobile and do not move from company to company, at least in short-run. Due to this immobility, companies cannot replicate rivals' resources and implement the same strategies. Intangible resources, such as brand equity, processes, knowledge or intellectual property are usually immobile(Barney,1991).

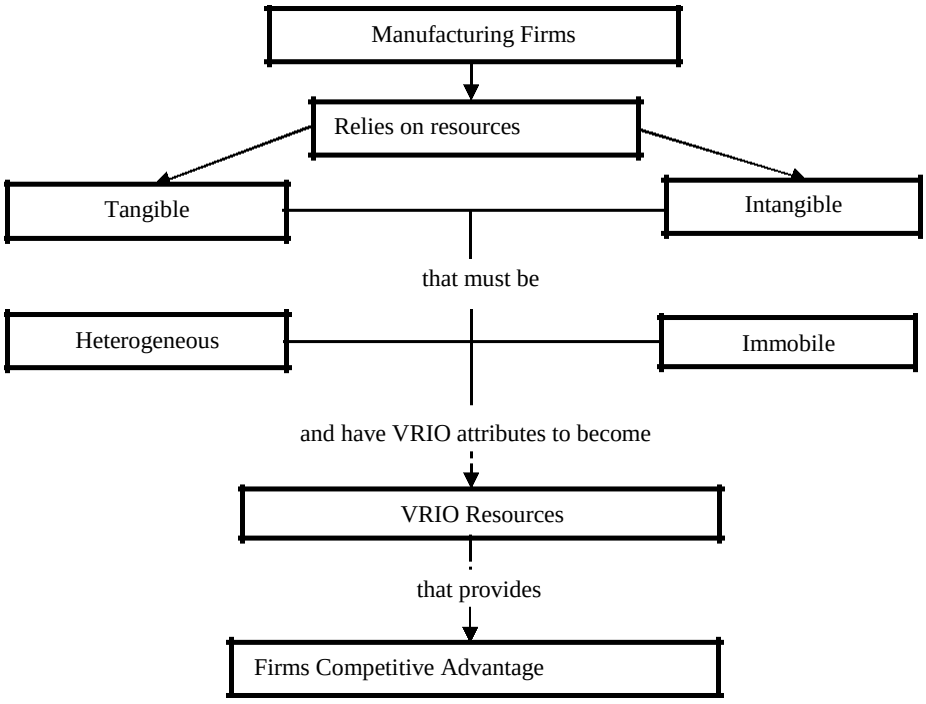

Figure 2. 1: Resource based view model

Adapted from Jurevicius **(**2013)

Building on the two assumptions that strategic resources are heterogeneously distributed across firms and that these differences are stable overtime, Barney (1991) examines the link between firm resources and sustained competitive advantage. Four empirical indicators of the potential of firm resources to generate sustained competitive advantage can be value, rareness, inimitability, and non-substitutability. In Barney (1991) firm resources include all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive and implement strategies that improve its efficiency and effectiveness.

In this study, a firm is considered to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors and when these other firms are unable to duplicate the benefits of this strategy (Barney, 1991). Barney (1991) further argued that to have the potential to generate competitive advantage, a firm resource must have four attributes:

be valuable, in the sense that it exploits opportunities and/or neutralizes threats in a firm's environment; be rare among a firm's current and potential competition; be imperfectly imitable; and have no strategically equivalent substitutes.Supply chain strategies are valuable and rare amongst firms, imperfectly imitableand heterogeneous as they are developed within the firm. They cannot equivalently be substituted and can be used to neutralizethreats (supply chain risks) from the firm's environment and exploit opportunities to enhance the firm'sperformance.A firm employing SC strategies to confound the effect of SC risks on the firms' performance is expected to benefits from increased sales volume, lower inventory cost, reduction in unit cost, increased range of products, increased inventory turnover rate and increased total average inventory which in turn improves the supply chain performance. Such a firm is also expected to benefit from positive customers' perspective, smooth business operations, improved financial performance, and organization innovativeness.

2.1.2The Concept of Supply Chain Risks

Risks has been a subject of many studies inbusiness, science as well asengineering (Sitkin& Pablo, 1992; Khanand Burnes, 2007; Zsidsin, 2003; Stone, Yates, Caruthers, 2002;Chopra & Sodhi, 2004; Ritchie and Brindley,2007). To understand well the constituent'srisks in the supply chain it is therefore imperative to present definition of the term.Defining risks and uncertainty has always been a tough call, Zsidsin, Ellram, Carter, Cavinato (2004), this is because risks is an elusive construct and has been defined in many different ways depending on the field of research (Wagner and Bode, 2008).According to the Oxford Englishdictionary 2005risks is defined as being vulnerable and itsdefinition is as follows: "a situation involvingexposure to danger." Such a danger can resultfrom known or unknown causes (Deep and Dani,2009). Thereafter, a number of authors attemptedto define risks in other ways, including Jaffee, Siegel, & Andrews(2008) who defined risks as "the possibility that anevent will occur that will potentially have anegative impact on the achievement of a farm orfirm's performance objectives, and/or successfulfunctioning of the overall supply chain". In theirresearch, Khan and Burnes (2007) defined risks as - the likelihood for an uncommon event to happen,and the negative effects this event will have on theorganization.Ritchie & Brindley, 2007) further provide a feasible definition that "risks is perceived to exist when there is a relatively high likelihood that a detrimental event can occur and that event has a significant associated impact or cost of the

item.Sharma and Chrisman (1999) on the other hand defined risks in supply chains as a "variation in the distribution of possible supply chain outcomes, their likelihood, and their subjective value." Therefore, risksdepend on theprobability of the event, the number of possibleconsequences, the significance of suchconsequences (Mitchell, 1995; Khan and Burnes,2007) as well as route that leads to the event(Ritchie and Brindley, 2007).

Risks in the supply chain context is therefore receiving growing attention in SCM research (e.g. Zsidsin, 2003; Peck, 2005; Ellis *et al*. 2010; Tummala& Schoenherr, 2011).Sitkinand Pablo (1992), defined supply chain risks as "the extent to which there is hesitation whether potentially desired or insignificant /unwanted outcomes of decision will be realised". In 2002,Sitkin and Pablo further described supply chain risks as uncertainty about potential outcome, whether it is momentous and/or insignificant in the decision that occurred. On the other hand, Faisal, Banwet& Shankar *(*2006) defined supply chain risks as consumer's perceptions of the insecurity and undesirable consequences for buying products or services. In a related development, Mitchell (1999) described supply chain risks as "the likelihood of loss and the implication of that loss for the individual or organisation". He formulated a principle of risks to assess the probability of loss (P) and the significance (l) of that loss as; Risks = P (loss) X l (loss).

However, this concept has been overtaken by further studies. For example,Zsidsin (2003), suggested that supply chain riskscontain three dimensions which are outcome uncertainty, outcome expectations, and outcome potential. Moreover, Rithie and Brindley (2007) cited that there are three dimensions of supply chain risks:likelihood /probability of occurrence of certain outcomes; consequences/severity from the occurrence of particular events and causal pathways leading to the events. Similar to Ritchie and Brindley (2007) defined supply chain risks as the multiplication oflikelihood of risks event, the severity of a risks event, and the ability to detect the risks (PMBOK, 2000).On this basis we can state that supply chain risks is a potential occurrence of an incident or failure to seize opportunities of supplying the customer in which its outcomes result in financial loss for the whole supply chain or as (Delloite, 2015) puts it is any event that may occur within the macro, extended value chain, operations, or functional areas that directly affect the ability of a corporation to meet customer demand or that has the capability for negatively affecting the reputation of the

company. These disruptions can take any form from price volatility, poor perceived quality of the product or service, or any event damaging the reputation of the firm.This has made supply chain risks (SCR) become a serious problem as turbulent environments, uncertain supply and demand, and unpredicTable disruptions are more common nowadays. Understanding where such vulnerabilities occur within the supply chain is a key requirement for reducing risks before it damages operational efficiency or disrupts the supply chain to the extent that customer demand cannot be met. However, supply chain risks might result not only in negative outcomes but also on positive ones. This this study is nevertheless rooted on the decision theory approach which underlines the negative consequences of risks. Various trends, such as increasing outsourcing activities, global competition, increased demand for on-time delivery, rapid technological change, and short product lifecycles, indicate the importance of SCR management (SCRM) (Zsidsin*et al.*, 2000; Trkman& McCormack, 2009; Olson & Wu, 2011).

There are however no consistently accepted dimensions of SCRs and several different classifications are reported in the literature. For example, Tang (2006) classified SCRs into two dimensions: disruption risks and operational risks. Other SCRs include supply risks, process risks, demand risks, and technology risks (e.g. Bogataj&Bogataj, 2007; Tang and Tomlin, 2008). However, as summarized by Trkman and McCormack (2009), risks from continuous changes due to turbulent environments, such as changes in customer demands or supplier priorities, are relatively ignored.Firms are exposed to numerous risks associated with the upstream side of their supply chains. Supply demand risks(SDR)reside in purchasing, suppliers, supplier relationships, and supply networks and include supplier business risks,production capacity constraints on the supply market, quality problems, and changes in technology and productdesign (Zsidsin, Panelli, & Upton, 2000). Kraljic (1983) was among the first who emphasized that firms shouldproactively assess and manage the uncertainties in their supplier portfolio in order to guard against costly supplydisruptions.

Demand variability (DVR)risks result from disruptions emerging from downstream supply chain operations (Jüttner, 2005).These include disruptions in the physical distribution of products to the end customer, usually intransportation operations (e.g., a truck driver strike) (McKinnon, 2006) and the distribution network (e.g., a delay ina

distribution centre). On the other hand, demand side risks can originate from the uncertainty caused by customers'unforeseeable demands (Nagurney, Cruz, Dong & Zhang, 2005). Disruptions occur here from a mismatch betweena company's projections and actual demand as well as from poor supply chain coordination. The consequences ofsuch disruptions are costly shortages, obsolescence, and inefficient capacity utilization. An important issue in thiscontext, affecting forecast quality and therefore demand side disruptions is the bullwhip effect, characterized by anamplification of demand volatility in the upstream direction of the supply chain.Risks reduction efforts should have a focus on the supply chain, due to the inherent levels of complexity and potential effect on corporate reputation. There should also be a focus on creating an environment within the corporation, using strategies and tactics to create resilience across supply chains from end-to-end. This is particularly true for corporations that operate globally with supply chains that cross continents, as this brings increased levels of risks to many different areas.However, as summarized by Trkman and McCormack (2009), risks from continuous changes due to turbulent environments, such as changes in customer demands or supplier priorities, have been relatively ignored. This study informed by the presented literature will be establish effect of supply chain risks on performance employing the constituents of SDR and DVR as the dimensions of measuring supply chain risks.

2.1.3The Concept of Supply Chain Strategies

According to Wagner and Bode (2008), coping with supply chain risks necessitates adequate strategies. Indicators of supply chain risks management are: Firms can start reducing the negative effects of risks by placing priority on developing adequate SCRM strategies. Effective communication of organizational priorities and approach meant to cope with risks in the context of supply chains is paramount to organizational performances giving today's volatile business environment (Wagner and Bode, 2008).Strategy has been defined in many different ways-and, as we will see, the range of definitions reflects significant differences in the way the process of strategy-making is understood. While Johnson, Scholes and Whittington (2008) defines strategy as thedirection and scope of an organization over the long term: ideally, which matches its resources to its changing environment and in particular its markets, customers or clients so as to meet stakeholder expectations. On the other hand,Grant (2007) defines strategy as the overall plan for Deploying resources to establish a favourable position, Strategic

decisions are long-term, important and not easily reversible, as they involve a significant commitment of resources. These characteristics distinguish strategic decisions from “tactical” decisions, which Grant defines as schemes for specific action: the most efficient deployment of resources to achieve a given strategy.This definition of strategy as a “level” of decision-making (important, long-term, broad-horizon), allows the concept of strategic thinking to be applied to functional areas of businesses such as purchasing or supply chain management. Definitions which focus on content and purpose are generally applicable only to businesses as a whole.

Kenichi(1982) argued that: “What business strategy is all about is, in a word, competitive advantage. The sole purpose of strategic planning is to enable a company to gain, as efficiently as possible, a sustainable edge over its competitors. Corporate strategy thus implies an attempt to alter a company’s strength relative to that of its competitors in the most efficient way.” Kenichi (1982) developed the “strategic triangle” or Three Cs model, suggesting that in developing strategy, three key players must be taken into account: the Corporation itself, the Customer, and the Competition. The strategist “must be sure that his strategy matches the strengths of the corporation with the needs of a clearly defined market (customers)’ in such a way as to “achieve superior performance, relative to the competition, in the key factors for success in the business.”Mintzberg(1994), who has written extensively on strategy, points out that strategy is not a one-off decision, but rather a “pattern in a stream of decisions.” He argues that it can be seen from a number of different perspectives helpfully classified as Five Ps namely Plan, Ploy, Pattern, Position and Perspective.

According to Hines, 2013supply chain strategiesare, how they work and why firms invest in them asfollows: Supply chain strategies require a total systemview of the linkages in the chain that work together efficiently to create customer satisfactionat the end point of delivery to the consumer. As aconsequence, costs must be lowered throughoutthe chain by driving out unnecessary costs andfocusing attention on adding value. Throughout efficiency must be increased, bottlenecksremoved and performance measurement mustfocus on total systems efficiency and equitablereward distribution to those in the supply chainadding value. The supply chain system must beresponsive to customer requirements.” In essence, research indicates that there are 16 supply chain strategies in use today. Namely: synergistic; information networks; project logistics;

innovation; nano-chain; market dominance; value chain; extended; efficient; risks-hedging; micro-chain; cash-to-cash cycle; speed to market; tie down; none existent; and demand supply chain strategies(Gattorna, 2007). This has led to the categorization of the sixteen supply chain strategies into a dichotomy of long range supply chain strategies and mid-range supply chain strategies. The first four supply chain strategies are categorized and explored as Mid-range SC Strategies; while the supply chain strategies number 5 through 16 are known as Long-range SC Strategies.Mid-range range supply chain strategies are operational and will affect midterm firm performance. They include the need for SC strategy, third-party SC strategy, tie down the firm SC strategy, and the internal system that efficiently feeds production SC strategy.

The sixteen-supply chain strategy dichotomy by Gattorna, (2007) and Gadde, (2001) has presented several useful insights for today's supply chain manager as they engage in planning processes. In order to identify the output performance resulting from the supply chain strategies, they need to start with looking at how their company actually competes. Gattorna's, (2007) sixteen-supply chain strategy dichotomy to provide a convenient way of identifying how the choice among the above sixteen supply chain strategies will additionally effect the relationship between supply chain risks and performance of manufacturing firms in Kenya.

2.1.4The Concept of Performance

Performance not only refers to accomplishment of results within the budget limits (Fapper, Fortan and Stoop, 1996; Mwita, 2000; Scotti, 2004) rather it could refer to how well things are done i.e how efficient, effective and productive the outcome is. Ordinarily and according to Gunasekaran, Patel &McGaughey (2004) SC performance (outcomes) on its own is an outcome, while the firm performance is the impact. However,in this study the two are looked in a dichotomy of two variables all contributing to the overall firms' performance.The main focus today for largest scale firms is on becoming efficient and flexible in their manufacturing methods (Spekman, Salmond, &Kamauff, 1994; Fearne, 1998; Prasad and Sounderpandian, 2003; Awino and Gituro, 2011). However, the ultimate judge of supply chain performance is the customer in terms of effective and timely responses to their ever- changing tastes and preferences. To achieve this firms are required to formulate different right strategies to efficiently and effectively manage the flow of goods from the point of production to the

end user in order to handle uncertainty in the business environment (Awino&Gituro, 2011).

To make the SC performance more effectual and operative, it is required to assess the performance of SC. Measurement of SC performance should offer the business an outline of how their SCs are economical and sustainable (Gunasekaran *et al.,* 2001). Gunasekaran *et al*., 2001) considered that SC performance should be evaluated from a tactical level, strategic level and operational level as well as from a commercial and non-commercialperspective. Bearing in mind this approach of thought, some measures offered by these researchers are: accuracy in forecasting methods/demand predictability; lead time of delivery; flexibility in meeting particular customer requirements;proper capacity utilization;total time of cycle as well as amount of buyers\suppliers partnerships; inquiry time for customer; amount of collaboration to improve quality; total cost of transportation; cost of carrying inventory; cycle time for product-development; cost of manufacturing;investment rate of return; cost of carrying information; and total time of cash-flow. Above mentioned measures try toquantify the SC performance in relations to suppliers, delivery, order planning, strategic planning andproduction. Cash to cash metric is anadditional important measure; in the meantime, it ties inbound activities related to material with the suppliers, doing it through operations of manufacturing as well as outbound activities with the clients (Farris II & Hutchison, 2002).

Cumbo, Kline and Bumgardner, (2006) suggested following measures for supply chain performance: order till delivery lead-time; changeover or setup times; the skill to when it is actually needed; timely shipments; and reduction in inventory. Schroer(2004) used performance measures as following: time of delivery; customer satisfaction; quality; productivity; and costs. Moreover, Browning and Heath(2009) and (Holweg, 2007) endorsed that cost is the best method to measure the impacts of lean paradigm on the manufacturing organizations performance.According to Bolo (2011) the concept of firm performance and its measurement has not been extended beyond the firm’s inbound operations. This has resulted to limited visibility of measures tends to exclude SC performance measures for this reason this study wishes to employ the measure used by previous researchers (Gunasekaran *et al*., 2001;Cumbo, Kline & Bumgardner, 2006&Holweg, 2007) to enable exploitation of a broad view of supply chain

performance i.e.sales volume, distribution, inventory cost, inventory flow rate, inventory turnover, order lead time, range of product, reduction in unit cost and total average inventory.

Performance evaluation should utilize both financial and non-financial measures and for this reason this study does not consider supply chain measures adequate for measuring performance of the manufacturing firms. Most organizations have not made use of a balanced framework for financial and non-financial indicators as the challenge exist on how to balance the financial measures which are generally well developed and only examined by external stakeholders against the operational measures which are ad hoc and lack formal structure. During performance evaluation and measurement, considerations should be made to avoid disparate and incompatible measures. This measurement system was proposed to evaluate corporate performance evaluation from four different perspectives: the financial, the internal business process, the customer, and the learning and growth by (Kaplan & Norton, 1992). According to Kleijnen and Smits (2003) the main intent of BSC is to keep score of a set of items that maintain a balance between short term and long-term objectives, between financial and nonfinancial measures, between lagging and leading indicators, and between internal and external performance perspectives. In addition, Kleijnen and Smits, 2003; Bhagwat and Sharma, 2007) states that it can also be used to align businesses to new strategies and reduce cost. In the BSC, the customer metric is crucial since in a SC, one company's customer may be another company's supplier.

However,Neely, Adams &Kennerley (2003) argue the framework contains a serious failure in theirconstruction. It focuses management strictly on a set of pre-defined indicators and measuresmaking them not able to respond to simple and fundamental questions, such as "what ourcompetitors are doing?" The BSC does not monitor competition or technological developments.This implies that it does not consider the uncertainty inherent risks involved in theevents that can threaten this strategy. The effect of this control model can lead to seriousdysfunctional behaviour and loss of control over the implementation of the strategy (Norreklit,2003). Due to problems in the implementation of the strategy it is difficult to achieve a balancebetween financial and non-financial measures as suggested in the framework (Anand *et al.*,2005). Richardson (2004) also notes that organizations over concentrate in the task ofgenerating indicators

and give less time to the definition of strategy resulting into indicators thatare not aligned with the strategic objectives.

To solve the BSC problem of not considering the uncertainty inherent risks involved in theevents that can threaten strategy implementation and the inadequate supply chain measures, the current study will combine the measures of both supply chain outcome and firm's performance. No study previously has considered employing an integration of comprehensive supply chain performance measures adopted from the works of (Gunasekaran *et al*., 2001;Cumbo, Kline & Bumgardner, 2006);Holweg, 2007) and BSC measures developed by (Kaplan & Norton, 1992) that measure firm's performance in measuring the overall performance of a firm. A determination of performance using this comprehensive set of questions, the study believes will provide performance data that is efficient (provide information on accomplishment of results within the budget limits) effective (provide information on how well things are well done) and Productive (provide information on the results of the efficiency and effectiveness in term of the outcome).

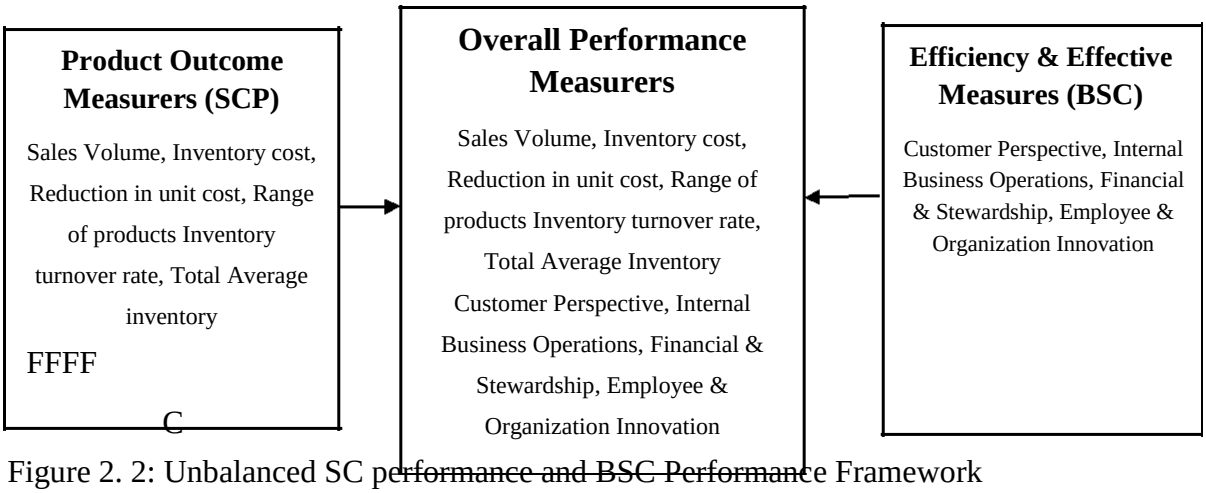

Figure 2. 2: Unbalanced SC performance and BSC Performance Framework

Source:Adapted from (Gunasekaran *et al*., 2001;Cumbo, Kline & Bumgardner, 2006; Holweg, 2007; Kaplan & Norton, 1992)

2.2Empirical Literature Review

2.1.2 Supply Chain RisksandPerformance

Performance and risks are interconnected and require deliberateand robust implementation of supplier management tools and controls to maximise performance whilst controlling the consequential risks Lonsdale & Cox, 1998. Thus, the decisions

relating to changes in the supply chain structure and relationships ought to involve the analysis and evaluation of the associated potential outcomes in terms of benefits, costs and risks. Conventional wisdom Knight (1921) suggests that risks and performance are directly related, such that higher risks taking will typically generate higher potential returns. This relationship, although initiated within the context of financial markets relating to equity transactions, is generally held to apply more widely within business decision-making.

There is abundant evidencethat disruptions can have a material and negative impact on company performance (Hendricks& Singhal, 2003, Sheffi, 2005; Hendricks & Singhal, 2005). Wagner and Bode (2008) confirms the potential negative effect of risks on the supply chain by allaying that firms that are exposed to risks in supply chainscan expect lower performances as compared to those who are exposed to lower levels ofrisks. Higher level of risks according to them means more disruptions and negative consequences such asquality problems, customers' complaints, delays and mismatch of supply and demand. Consequently, Lonsdale and Cox (1998); Knight (1921);Wagner and Bode (2008) all concur on that supply chain risk has negative effects on organizations performance. Wagner and Bode (2008) Associates risks in the supply chain with danger, loss, damage or any undesired consequence. There is counTable empirical evidence of the relationship between supply chain risks and performance with all establishing a negative relationship between supply chain risks and performance. Chopra and Sodhi (2004) identified the widerconsequences of a failure to manage risks effectively. These include not just only financiallosses but also reduction in product quality, damage to property and equipment, loss ofreputation in the eyes of customers, suppliers and the wider public, and delivery delays.Wright and Datskovska (2012) depicted the impact that changes in business environment haveon operations and supply chains management. They accede that while globalization mighthave increased the performances in supply chains through facilitating access to markets,resources and factors it has on the other hand increased the disruptionimpact of local events, increased the complexity of products and networks, inducedreliance on multiple parts and players which made quality monitoring more difficult. Theoretical reviews all comport to the fact that there is a negative relationship between supply chain risks and supply chain performance. Several empirical studies have been conducted to establish the effect of

supply chain risks on performance with all finding a negative relationship between supply chain risks and performance.

Avelar-Sosa, García-Alcaraz &Castrellón-Torres (2013) proposing a structural equation model to assess the effects of some risks factors in the supply chain performance a case study ofCiudad Juarez, Chihuahua, Mexico from January 20th to April 12th, 2013. The model, assessed following a structural equation modelling methodology (using AMOS 16.0), indicated that the demand (considered as an independent factor) has a direct positive relationship with suppliers, politics, and manufacturing factors. As a consequence, the suppliers have an effect on the flexibility factor. The flexibility has a direct positive relationship with the customer service factor. The results also indicated that the infrastructure factor does not have any relationship with the others assessed factors.

Okonjo (2014), using a descriptive study design conducted a study seeking to establish the relationship between procurement risks management practices and supply chain performance of mobile phone serviceproviders in Kenya. The study established that there was a clear significant relationship between procurement risks management practices and supply chain performance represented by adjusted R2 value of 0.646 which translated to 64.6% variance explained by the ten independent practices of Procurement Risks Management that she studied.

In a study of more than 800 manufacturing companies that announced a supply chain disruption between year 1989 and 2000 globally, Singhal & Hendricks (2005) found that during a three-year span, regardless of industry, disruption cause or time period, affected companies experienced poor performance of 33-40% lower stock of returns related to their industry peers. Likewise, share price volatility in the year after the disruption was 13.5% higher compared with volatility in the year before the disruption. From their study it is evident that companies with well-run supply chain continue to outperform other companies.

Ritchie & Brindley (2007) examining the effect of supply chain risks management on performance. Investigated the constructs underpinning risks managementand explored its application in the supply chain context through the development of a framework by matching the constructs of performance and risks to provide new perspectives

forresearchers and practitioners. The study presented a new framework that helps to integrate the dimensions of risks andperformance in supply chains and provide a categorisation of risks drivers that if identified and managed the organization stands a chance of improving its performance.

Venter and Nagy (2010), aiming to construct and test a model which summarises that besides the tools adapted to manage information flow, materials flow and costs and performance in supply chains to achieve high overall performance, managing risks is also ineviTable. They formulated a model which indicated that there are tools in supply chains which are used to support information flow, materials flow, and cost and performance assessment which can also support risks management, considering that there are many other specific tools as well which are applied directly in supply chain risks management. Based on this supply chain and risks management tool-concept, they assumed that the variety of tools adopted has an effect on supply chain performance.

Zhao, Hao, Sun and Zhao (2012) empirically exploring the relationships among supply chain risks (SCRs), supply chain integration (SCI), and company performance in a global context established that SCRs, especially supply delivery risks (SDR), are negatively related to SCI which has a contingent relationship with performance.

Similar to the previous studies presented the current study proposes to establish the effect of supply chain risks on firm's performance.Previous studies forinstanceAvelar-Sosa, García-Alcaraz &Castrellón-Torres (2013)assessing the effects of some risks factors in the supply chain performance by employing demand risks measure and supply chain performance measures rated on a scale focused only on demand variability risk.Okonjo (2014) seekingto establish the relationship between procurement risks management practices and supply chain performance of mobile phone serviceproviders in Kenya using a descriptive study design focused on supply demand risk. Ritchie & Brindley (2007) focusing on supply demand risksexamined the effect of supply chain risks management on performancethrough the development of a framework by matching the constructs of performance and risks.Venter and Nagy (2010) aiming to construct and test a model summarizing that besides the tools adapted to manage information flow, materials flow and costs and performance in supply chains to achieve high overall performance, managing risks is also ineviTable focused on supply demand

risks.Zhao, Hao, Sun and Zhao (2012) coming close to this study also empirically explored the relationships among supply chain risks (SCRs), supply chain integration (SCI), and company performance, however they focused on supply demand risks.

Most previous studies reviewed only focused on the dimension of supply chain demand risks and did not consider demand variability risksrelatively ignoring demand side risks as confirmed by Trkman& McCormack (2009). Only one study examined demand variability risks and it too ignored the supply aspect of supply chain risks. The measures employed by the previous researchers were therefore limited and could not produce valid measures of supply chain risks. Consequently, Previous researchers in an attempt to measure performanceto determine the effect of supply chain risks on it employed uncomprehensive measures of supply chain performance focusing only on the impact of supply chain functions to the customer and not on the overall firm's performance which is the core reason for the organization existence. In an attempt to solve this most studies have considered using the BSC, however the BSC is criticized by (Neely, Adams &Kennerley, 2003) who argue the framework contains a serious failure in its construction as it focuses management strictly on a set of pre-defined indicators and measures making them not able to respond to ineviTable and unforeseen factors such as supply chain risks. However, despite the numerous attempts to carry out studies to establish the effect of supply chain riskson performance, information if adequate measures of supply chain risks and robust measures of performance areused to establish the effect of supply chain risks on performance is still lacking.

2.2.2Supply Chain Strategies and Performance

There is paucity of empirical evidence on the relationship between supply chain strategy and performanceas most studies focus on overall strategy and performance. Albert Aragon-Correa, Hurtado-Torres, Sharma,&Garcia-Mprales (2008) investigating the effect of environmental strategy and performance in small firms in a study of more than 108 SMEs in the automotive repair sector in Southern Spain. Found that SMEs undertake a range of environmental strategies and the most proactive strategies exhibited a significantly positive financial performance.

Kumlu (2014) seeking provide an explanation for export process and perceived export performance of Small and Medium Sized Enterprises(SMEs) from Resource-Based

View (RBV). Used Regression and Correlationto analysed results conducted with 1415companies from Metal, Textile, Chemical and Furniture industry from Turkeyto establish the relationship between Intangible Resources (IR) and Competitive Export Strategies (CES) and performance. The results indicated thatthere is a positive relationship between all IR, CES and PER.

John (2010) seeking to investigate the link between business strategy and performance giving special attention to the composition of combination of strategies using survey assessed 277 retail business in the USA. HE established that a combination of strategies was associated with higher performance in some but not all instances.Nyaoga, Magutu and Aduda (2015) investigated if there is a link between supply chain strategiesand firm performance evidence from large-scalemanufacturing firms in Kenya established that supply chain strategies are useful predictors of the firm's performance as supply chain strategies explain 76.7 % of the changes in the firm's performance.

Like the previous studies presented the current study proposes to establish the effect of supply chain strategy on performance. Previous studies for instance,Torres, Sharma, & Garcia-Mprales. (2008) investigated the effect of environmental strategy and performance in small firms in a study of more than 108 SMEs in the automotive repair sector in Southern Spain focused on general organizational strategy, Kumlu (2014) seeking to investigate the relationship between intangible resources and competitive export strategies and performance of 1415 companies from Metal, Textile, Chemical and Furniture industry from Turkey focused on general organizational strategy. John (2010) investigating the link between business strategy and performance giving special attention to the composition of combination of strategies using survey assessed 277 retail business in the USAlikewise focused on general business strategy. Nyaoga, Magutu and Aduda (2015) came very close to the current study when they investigated if there is a link between supply chain strategiesand firm performance evidence from large-scalemanufacturing firms in Kenya, they however employed the BSC in measuring the firm's performance.

The above presented studies on the effect of supply chain strategy on performance were generally focusing on overall organizations strategies and not supply chain strategies. They were therefore unable to identify how and which strategies affected the

performance of the organizations they were studying. Consequently, in an attempt to establish the effect of strategy on performance they employed uncomprehensive measures of performance focusing only on the impact of supply chain functions to the customer and not on the overall firm's performance which is the core reason for the organization existence. To solve this most studies have considered using the BSC, however the BSC is criticized by Neely, Adams &Kennerley (2003) who argue the framework contains a serious failure in its construction as it focuses management strictly on a set of pre-defined indicators and measures making them not able to respond to inevitable and unforeseen factors such as supply chain risks. This implies that it does not take into account the uncertainty inherent risks involved in theevents that can threaten strategy development and implementation. The effect of this control model can lead to seriousdysfunctional behaviour and loss of control over the implementation of the strategy implemented (Norreklit,2003). Due to the problems in the implementation of the strategy it is thereforedifficult to achieve a balance between financial and non-financial measures (Anand *et al.,* 2005).

However, despite the attempts to establish the effect of supply chain strategies on performance, there is still lack of information if expanded measures of supply chain strategy that presents several useful insights for today's supply chain managers as they engage in planning processes by providing a convenient way of identifying how the choice among the sixteen supply chain strategies will additionally effect the performance and robust performance measure combining the BSC and Supply chain performance measure adopted from various scholars are taken into account and this warrants investigation.

2.2.3Supply Chain Strategy,Supply Chain Risks and Performance

Supply chain strategies constitutes to performance as posited by (Zhao, Hao& Zhao, 2012; Ardianto&Natsir, 2014; Nayoga, Magutu&Aduda ,2015; Mburu et al, 2015; Bolo, 2011) and precludes supply chain risks (Wagner & Bode, 2008; Florian &Constangioara, 2014; Soegomo, Alhabsyi&Arif, 2014). Supply chain disruptions are inevitably an integral part of the supply chain environment as allayed by (Deloitte Consulting LLP, 2013; Ellegard, 2008) and comes in various forms (Tang, 2006; Trman& McCormack, 2009; Zsidsin, 2003). At the same time supply chain operations have to continue for the benefit of the organization's internal(employees) and external

stakeholders (shareholders, financiers, the government) through improved customer service, quality products, reduced lead times, products availability and the manufacturing firms through increased sales volumes, reduction in unit cost, high inventory turnover and availability of a wide range of products. Informed by the above presented literature the current seeks to empirically establish what will be the effect on the negative relationship between supply chain risks and performance if a second independent variable supply chain strategy which obstruct risks and amplifies performance is introduced.

According to Onghena, &Noortgate(2005) a confounding variable is a variable that is related to an explanatory variable and at the same time has an effect on a response variable that is entangled with a possible effect of the explanatory variable, possibly leading to wrong conclusions about the latter. Confounding may also occur in situations involving more than one explanatory or response variable, and more than one confounding variable may be present. Observational studies, quasi- experiments, as well as randomized experiments might be affected by confounding. If confounding variables cannot be avoided or ruled out by design, a final option is to model them as covariates.

Confounding is a distortion of the association between an exposure and an outcome that occurs when the study groups differ with respect to other factors that influence the outcome(Wunsch, 2007). Unlike selection and information bias, which can be introduced by the investigator or by the subjects, confounding is a type of bias that can be adjusted for in the analysis, provided that the investigators have information on the status of study subjects with respect to potential confounding factors.In order for confounding to occur, the extraneous factor must be associated with both the primary exposure of interest and the outcome of interest.

According Onghena&Noortgate (2005) there are three conditions that must be present for confounding to occur. The confounding factor must be associated with both the risk factor of interest and the outcome, the confounding factor must be distributed unequally among the groups being compared and lastly a confounder cannot be an intermediary step in the causal pathway from the exposure of interest to the outcome of interest.

There are three ways of identifying a confounding variable. The first way is to compare theestimated measure of association before and after adjusting for confounding. In other words,compute the measure of association both before and after adjusting for a potential confounding factor. If the difference between the two measures of association is 10% ormore, then confounding was present. If it is less than 10%, then there was little, if any,confounding. The second way is to determine whether a potential confounding variable is associated withthe exposure of interest and whether it is associated with the outcome of interest. If there is aclinically meaningful relationship between the variable and the risk factor and between thevariable and the outcome (regardless of whether that relationship reaches statisticalsignificance), the variable is regarded as a confounder. The third way is to perform formal tests of hypothesis to assess whether the variable is associated with the exposure of interest and with the outcome (Onghena&Noortgate, 2005).

Confounding effects may account for all or part of an apparent association and or cause an overestimate of the true association (positive confounding) or an underestimate of the association (negative confounding).The magnitude confounding can be quantified by computing the percentage difference between the crude and adjusted measures of effect. There are two slightly different methods that investigators use to compute this; Percent difference is calculated by calculating the difference between the starting value and ending value and then dividing this by the starting value. Many investigators consider the crude measure of association to be the "starting value"(Onghena&Noortgate, 2005)

There is paucity of research articles that directly relates supply chain strategies, supply chain risks and supply chain performance. Few studies for instance Florian and Constangioara (2014) hints at a possible relationship by stating that the existence of adequate SCRM strategies precludes thenegative consequences of risks on organizational performances. Relatedly, Tang (2006) theorizesthat firms may be able to influence their vulnerability to disruptions by adopting different supply chain strategies (including postponement and storing inventory at strategic locations).

There are studies done that hints at a possible effect of supply chain strategy on the relationship between supply chain risks and performance having established supply strategy precludes of supply chain risks and constitutes of performance. However, based

on the existing literature there is no study that empiricallyattempted to examine the effect of supply chain strategy on supply chain risks and performance.

Mburu et al. (2015) conducted a study to assess the effect of risks identificationmanagement strategy on supply chainperformance in manufacturingcompanies in Kenya. The study findings indicated that inorder to enhance a smooth performance of supply chain in a company given the changing natureof markets due to increased diversity adequate risks identification and management is ineviTable.

Using qualitative findings from phone interviewsand focus groups, Craighead, Jennifer, Johnny &Handfield(2007) proposed that supply-chain density, complexity and nodecriticality contribute to the severity of disruptions, and that the ability to quickly disseminate information within the supply chain dampens the severity of disruptions.

Mentzer (2008) investigating the global supply chain risks management strategies, employed grounded theory to explore the phenomenon of risksmanagement and risks management strategies in global supply chains based on an extensive literature review and aqualitative study comprising 14 in-depth interviews and a focus group meeting with senior supplychain executives. The study provided insights into the applicability ofrisks management strategieswithrespect to environmental conditions and the role of risks management strategies in confounding supply chain risks.

Florian and Constangioara (2014) using a national sample of 64 Romanian companies fromvarious industries to document the relationship between organizational performances andrisks in the context of Romanian supply chains found out that supply chainrisks management strategy successfully mitigates the negative consequences of risks.

Soegomo, Alhabsyi, and Arif (2014) focusing on Company Strategy as the exogenous variables, Enterprise Risks Management, Organizational Culture, Supply Chain Management and Company Performance as the endogenous variables on Coal Mining Companies at East and South Kalimantan used explanatory research, by using the Enterprise Risks Management instruments from KPMG Australia (2001), strategy quality instrument from Tilles(1983), Organizational Culture instruments from Hofstede (1994), and Supply Chain Management instrument from Partiwi (2009). Partial Least

Square was used to test the effect of those variables on five coal mining companies in East and South Kalimantan was tested by Partial Least Square (PLS). The research showed that Company Strategy has a significant effect on Enterprise Risks Management, Company Strategy has a significant effect on Organizational Culture, Company Strategy has an insignificant effect on Supply Chain Management, Company Strategy has a significant effect on Company Performance, and Enterprise Risks Management has a significant effect on Company Performance.

Zhao, Hao, Sun and Zhao (2012) in their study where they were empirically exploring the relationships among supply chain risks (SCRs), supply chain integration (SCI), and company performance in a global context established that. There is a contingent relationship between SCI which is a supply chain strategy and performance.

Kim (2006) purposing to identify the shape of the interactive relationship between corporate competitive capability and supply chain operational capability for performance improvement and investigating the effects of supply chain (SC) integration on such interactive relationships employed separate moderated regression analysis to test the hypotheses of the of three SC integration groups. The study established that the effect of interaction between corporate competitive capability and SC operationalcapability on performance improvement becomes insignificant as the developmental stage of SCintegration increases.

Bolo (2011) in almost a similar study to the present but exploring strategic management focused on the joint effect of selected strategy variables on performance of large privatemanufacturing firms of the supply chains in Kenya. He used cross sectional survey research design and found out from empirical evidence that the independent effect of core competencies,core capabilities, strategy, strategy implementation on firms' performance is weaker compared to thejoint effect of the same variables.

Ardianto&Natsir (2014) did a close study to the current one. Using quantitative (positivist) research methodology and multivariate statistical method (Structural Equation Modelling they examined the practice of TQM and SCM in improving the performance of manufacturing firms in East Java. The results of the experiment indicated that TQM which is management strategy and SCM have an important role to improve Organizational Performance.

Like the previous studies presented the current study proposes to establish the effect of supply chain risks on firm's performance. The reviewed studies on the effect of supply chain risks on supply chain performance and the effect of supply chain strategy on performance did not consider examining the effect of supply chain risks together with supply chain strategy on performance yet supply chain strategy, supply chain risks and performance practically exist together.

Consequently, previous studies used supply chain risks measures that were inadequate, supply chain strategies that were unexpanded and unrobust performance measures. For instance,Mburu et al. (2015) conducting a study to assess the effect of risks identificationmanagement strategy on supply chainperformance in manufacturingcompanies in Kenya only focused on risk and performance, Mentzer (2008) employing grounded theory to explore the phenomenon of risksmanagement and risks management strategies in global supply chains only focused on risks and performance only focused on strategies and performance. Florian and Constangioara (2014) focusing on risks and performance used a national sample of 64 Romanian companies fromvarious industries to document the relationship between organizational performances andrisks.Not so far from this Soegomo, Alhabsyi, and Arif (2014) focusing on general company strategy and enterprise risk management used explanatory research investigated the effects of Company Strategy on Enterprise Risks Management, Organizational Culture, Supply Chain Management and Company Performance of Coal Mining Companies at East and South Kalimantan. Zhao, Hao, Sun and Zhao (2012) employingsupply chain integration as a moderator variable empirically explored the relationships among supply chain risks (SCRs), supply chain integration (SCI), and company performance.Bolo (2011) in almost a similar study to the presentfocusing on selected strategy and performanceexploredstrategic management focusing on the joint effect of selected strategy variables on performance.Also close to this was the work of Ardianto&Natsir (2014) who examinedusing quantitative (positivist) research methodology and multivariate statistical method (Structural Equation Modelling the practice of TQM and SCM in improving the performance. This is not far apart from Nyaoga, Magutu and Aduda (2015) who investigated if there is a link between supply chain strategiesand firm performance.

Based on the reviewed literature, despite theoretical suggestions and empirical attempts, no study has attempted to establish the confounding effect of supply chain strategy on the relationship between supply chain risks and performance. There is therefore lack of empirical information on theeffect of supply chain strategy on the relationship between supply chain risks and performance. Manufacturing firms can benefit from the inclusion of the third variable supply chain strategies to preclude the never-ending negative effects of the inevitable supply chain risks and constitute their ever-dwindling performance.

CHAPTER THREE

RESEARCH METHODOLOGY

The main concern of this thesis was to establish the effect of SCStrategy on the relationship between SCRisks andPerformance from anempirical pointof view. This was achieved through the creation of a model that enabled the establishment of theeffect of SC Risk on Performance, SC Strategy on Performance and SC Strategy on the relationship between SC Risks and Performance using data from large-scalemanufacturing firms in Kenya. This chapter constitutes a methodological description of the approach used to establish the aforementioned objectives.

3.1 Research Design

Research design istheresearch processthatinvolvestheoverall assumptionso f theresearch to the method of data collectionand analysis(Creswell, 2 0 0 9). This studyadopted a correlational surveyresearch design.Survey design assist in securing information andevidence on existing circumstances and to identify ways to compare present conditions so asto plan how to take the next step (Kelley, Clark, Brown, &Sitzia, 2003). Correlation research design on the other hand assist in establishing the associationbetween variables. For this it is most appropriate as it enables securing of information and evidence onexisting situations and to establish the relationship between the study variables in order to planhow to take the next step. Johnson, Scholes & Whittington (2008)in the United States;Gunasekaran, Patel &McGaughey (2004) in India; Bolo, 2011 andMagutu, 2013)successfully did almost a similar study and used correlational survey research design. Given the successful use of correlational research design to obtain empirical data in previous similar studies and its ability to enable securing of information and evidence onexisting situations and to establish the relationship between variables the current study employed the same design.

3.2 Study Area

The study was carried out in Nairobi (see Appendix VI). Nairobi is a city found in Nairobi area, Kenya. It is located $1^{o}17^{o}$S latitude and $36^{o}.49^{o}$E longitude at an elevation of 1684 meters above sea level. Nairobi was chosen because according to Kenya

Association of Manufactures (2017) it has the largest concentration of large scale manufacturing firms Kenya.

3.3 Target Population

The target population for the study were all the large-scalemanufacturing firms in Nairobi. According to the Kenya manufacturers andexporters directory (2017) there are 473 large scale manufacturingfirmsin Nairobi all registered with Kenya Association of Manufactures (see appendix III). The unit of study were represented by the Supply Chain Officers of each of the large-scale manufacturing firms in Nairobi.

3.4 Sample and Sampling Technique

A sample is a subset of a population obtained from the accessible population (Mugenda &Mugenda, 2008). Sampling techniques are methods that are used to select a more manageable sample from the population by reducing it to a more manageable number (Saunders, Lewis& Thornhill, 2007).Out of the target population of four hundred and seventy-threefirms,seventy (70) large scale manufacturing firms randomly selected participated in the pilot study. The remaining four hundred and three (403)all drawn using saturated sampling technique participated in the actual study.

Out of the four hundred and three (403) questionnaires sent out, three hundred and seventy eight (378) questionnaires were returned fully filledand deemed useful with 25 questionnaires having missing items ranging between 72% to 100% items. This gave the study a response rate of (93.7%) of the sampled population. With regard to specific analysis techniques, the 93.7% response rate is adequate. For instance, according to Comrey& Lee's, (1992)advice regarding sample size in exploratory factor analysis: 50 cases is very poor, 100 is poor, 200 is fair, 300 is good, 500 is very, and 1000 cases or more excellent. As a rule of thumb, a bare minimum of 10 observation per variable is necessary to avoid computational difficulties. The returned questionnaireswere 378, all being useful for analysis attest to sampling adequacy. Moreover, Kaiser Meyer-Olkin (KMO) of (0.897) for SC Riskspresented in Table 3.5, (0.9299) for SC Strategiespresented in Table 3.10 and (0.7467)presented in Table 3.15 for performance indicates adequacy of sample size (MacCallum 1999); Habing, 2003; Field, 2005).According to TomaskovicDevey, Leiter, and Thompson, (1994) any response rate of about 15.4% is considered as yielding a relatively high response rate. The sample

size for the study can therefore be confirmed to be adequate in reference to (Comrey& Lee's, (1992; MacCallum 1999; Habing, 2003; Field, 2005; TomaskovicDevey, Leiter, and Thompson, 1994).

The distribution of participation by the fifteen (15) subsectors is shown in Table3.1.

From the research data in Table3.1, all subsectors of the large-scale manufacturing sector were well represented in this study, avoiding any chances of bias or misrepresentation.

Table 3. 1: Participants by Large-Scale Manufacturing Subsectors

	Large Scale Manufacturing Sector	Sampled	Frequency in Respoce	Percentage Response
1	Building, Mining & Construction	31	29	94
2	Chemical & allied sector	35	34	97
3	Energy, Electrical & Electronics	31	30	96
4	Food & Beverages	39	37	94
5	Fresh Produce Products	18	15	83
6	Leather and Foot Wear	13	11	85
7	Metal & Allied Sector	37	34	91
8	Motor Vehicle Assembles & Accessories	33	31	85
9	Paper & Board Sector	33	30	82
10	Pharmaceuticals and Medical Equipment	16	13	81
11	Plastics & Rubber	39	37	95
12	Service and Consultancy	31	30	71
13	Service Sector	10	9	90
14	Textile & Apparels	28	26	93
15	Timber, Wood & Furniture	9	7	78
	Total	**403**	**378**	**93.7**

Source: (Survey Data, 2018

3.5 Data Collection

3.5.1 Data Types and Data Sources

The study's deductionshave been pegged on primary datathat entailed responses on all the study variables: SC Risk, SC Strategies and performance.Since the unit of analysis was the manufacturing firms the primary data wascollectedfrom primary sources who were either the Supply Chain Managers, Operations Managers or Procurement Managers of the sampled manufacturing firms. This was because they bare the greatest responsibility in making and implementation of the supply chain decisions.Wilson &Lilien (1992) showed that single informants are most appropriate in non-new task

decisions. Based on this, the criterion for the choice of a respondent in each firm was that one was to be experienced or knowledgeable about supply chain, supply chain risksmanagement and financial management decisions and activities of the firm at the time of the survey.

3.5.2 Data Collection Procedures

The researcherfirst obtained a research introduction letter from the School of Post Graduate Studies MasenoUniversityand a research permit from National Council for Science, Technology and Innovation (NACOSTI) giving a go ahead to proceed with the data collection. In order to validate the data collection instrument, a pilot study was used to collect data from seventy (70) large scale manufacturing firms drawn randomly from the target population. Before carrying out the pilot study a copy of the introduction letter and a research permit were sent to the randomly selected firms.

For the actual study the researchersimilarly took a copy of the introduction letter and the research permit personally two weeks prior with a goal of explain to the respondent the objectives of the research in detail and creating a rapport. This method of data collection wasappropriate for this study because of the distribution of the population, cost effectivenessand the resulting higher response rate. After two weeks the selected respondents were presented with the questionnaires and encouraged to respond to them after which they were to be collected in one week. After the one week the self-administered questionnaires were collected for analysis.

3.5.3 Data Collection Instruments

Questionnaire (See Appendix IV) was the principal tool for collecting the primary data. The questionnaire was developed with the aim ofcollecting perceptiondata on the independent variables SCRisks, confounding variable SCStrategies) and the dependent variable (performance). An item pool of 36 items was generated through literature review, 10 items representing the independent variable SC Risks, 16 items representing the confounding variable (SC Strategies) and ten items representing the dependent variable (performance).The questionnaire was divided into three sections, sections one dealing with questions on SC Risks, section two questions dealing with questions on SCStrategies and section three dealing with questions on performance.The questionnaire was exposed to both academic and practitioners' experts review, five (5) academic reviewers were drawn from the School of Business and Economics Maseno

University and five (5) practitioner's reviewers drawn from the large-scalemanufacturing firms in Kisumu. The instrument was latter piloted to enable reliability test using Cronbach Alpa and validity test using exploratory factor analysis.

3.5.4 Pilot Study

A pilot survey was conductedon a representative sample of 70Supply Chain Officers representing 70large scale manufacturing firms in Nairobi Countywho were randomly selected and did not take part in the final study. According to Connelly (2008) pilot study sample should be 10% to 20 % of the sample projected for the larger parent study. It is reference to Connelly (2008) that a sample of 70 respondents representing 14% which is more than 10% of the sample population and which left a good number of large scale manufacturing firms for the actual study were selected to participate in the pilot study. The participants in the pre-test survey answered all the questions on the SCRisk, SC Strategies and performance. Out of the 70 who were sampled for the pilot study, sixty-three responded. The respondents however claimed for the purpose of discretion they be allowed not to answer the demographic questions which were requiring their response on their firm's identity and their role. They mentioned the questions attracted bias and after consultation with my supervisor they were struck out in the final questionnaire.The items used in the pre-test survey were evaluated through quantitative analysis.Descriptive statistics were run on responses to the items that were responded to with the mean values ranged from 3.69 to 4.70 on a five Likert scale.Following the refinements, adjustments,modifications and revisions that arouse from thepilot study and subsequent analysis of the pre-test results, the main research wasundertaken whose detailed analysis is in chapter four.

3.5.5Instruments Reliability Test

Reliability is an indication of how consistent the findings are based on the method of data collection andanalysis (Saunders *et al*.,2007). According to Zikmund, Babin, Carr, Griffin (2010) reliability is an indicator of a measure's internal consistency' and the most commonly applied estimate of a multiple-item scales' reliability as it presents the averages of all possible split-half reliabilities for a construct.In the same vein (Mugenda & Mugenda, 2008) reaffirms that Cronbach alpha is a preferredreliability test for multiple regression analysis because it reduces the time required to compute reliability coefficientscompared to other methodsof reliability test and in addition results into a more conservative estimate of reliability.The Cronbach alpha coefficient ranges from 0

to 1. Hair, Anderson, Tatham, & Black, 1998) suggest thatanything above 0.7 indicates acceptable levels of internal reliability on the other hand George and Mallery (2009) suggest α <0.6 as being suitable for business studies.

Table 3. 2: Data Tool Scale Reliability Statistics for SC Risk, SC Strategies and Performance

Scale	Number of Items	Cronbach Alpha	Cronbach's Alpha Based on Standardized Items
Supply Chain Risk Sub - Scale	8	0.8498	0.8647
SC Strategies - Sub - Scale	10	0.8172	0.9601
Performance - Sub - Scale	16	0.9110	0.9118
Overall Scale	34	0.8999	0.9444

Survey: (Pilot Data, 2018)

The reliability of Linkert scale was assessed by subjecting the scales measuring the 8 SC Risks items, 16 SC Strategies items and 10 Performance items to a Cronbach Alpha reliability test. The result of the test from the pilot study indicated a computed Cronbach alpha value of $\alpha = 0.8999$ as presented in Table 3.2 which is above the threshold of $\alpha >$ 0.7 suggested by (Hair, Anderson, Tatham, & Black, 1998; Zikmund et al., 2010 and 0.6 suggested by George & Mallery, 2009. Each subscale is equally reliable at $\alpha > 0.7$; SC Risk $\alpha = 0.8498$, SC Strategies $\alpha = 0.8172$, and Performance $\alpha = 0.9110$ as indicated in Table 3.2. This was a suffice evidence to conclude the data tool was reliable and therefore further analysis was conducted.

3.5.5Instruments Validity Test

Zikmund*et al*., (2010) defines validity as the accuracy of a measure or the extent to which a score truthfully represents a concept.In the classical model of validity test, there are three main types of validity evidence; content validity, criterion validity and construct validity. (Brown,1996; Gion, 1980). To validate the data collections instrument, both content and construct validity were tested. The choice of the two-validity test was guided by (Wirland et al., 2017) who stated that for a valid scale purification of the items from the scale it is advisable to consider both judgemental (content validity) and statistical validity (construct validity). Content validity was

ascertained through expert review while construct validity was ascertained through factor analysis.

According to Mugenda & Mugenda (2008) face or content validity is a measure of the degree to which data collected using a particular instrument reflects a specific domain of indicator or content of a particular concepts. Zikmund*et al*. (2010) alludes to this by referring to face or content validity as an agreement between experts that the scale measures what it is intended to and seems to be a good reflection of the scale.Content or face validity is ensured through experts review and judgements (Bolliger&Inam, 2012). Content validity for the data collection instrument was assessed usingfive (5) academic experts from the School of Business and Economics of Maseno University and (5) Supply Chain practitioners from five large scale manufacturing firms in Kisumu County. The instrument was first given to the academicians to assess what it was trying to measurer and afterwards to the practitioners to determine whether it accurately represented the concept under study. They both gave their inputs which assisted in making the following amendments.Two of the items measuringSC Riskslevel (Added pressure on operational margins and increased risks and social responsibility failure)were after deliberations established not to be valid measure of SC Risksand were therefore deleted.The Linkert scale grading format for SC Risks and SC Strategies representing 1 – very small was revised to 1 representing no extent. Likert scale grading choice options for performance was revised from 1 representing very small extent; 2 - small extent; 3 - average; 4 - great extent and 5 - Very Great Extent to 1 representing very low, 2 – low, 3 – averagely, 4 – high, and 5 – very high.

Construct validity is a measure of the degree to which data obtained from an instrument meaningfully and accurately reflects or represents a theoretical concept (Brown, 1996; Polit DF Beck Ct, 2012; Cronbach, 1955; Sekaran, 2003).Psychologist such as Messick (1998) have pushed for a unified view of construct validity as an integrated evaluative judgement of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of inference and actions based on test score.Key to construct validity are the theoretical ideas behind the trait under consideration(Pennington, Donald,2003).

Convergent and discriminant validity are the two subtypes of validity that make up construct validity. Convergent validity refers to the degree to which two measures of a construct,that theoretically should be related, are in fact related (Struwig, Strugwig, Stead, 2001; John, Benet-Martinez, 2000; Domino& Domino, 2006).For a convergent validity to be confirmed the variables between a factor should be highly correlated. The rule is that variables should relate more strongly to their own factors than other factors.However, the strength of the validity is evidenced by sufficient/significant factor loadings depending on the sample size of the data set as shown in Table 3.3

Table 3. 3: Significant factor loading based on Sample Size

Sample Size	Sufficient factor loadings
50	0.75
60	0.70
70	0.65
85	0.60
100	0.55
120	0.50
150	0.45
200	0.40
250	0.35
350	0.30

Source: (Survey Data, 2018)

Generally, the smaller the sample size the higher the required loading. However regardless of the sample size, it is best to have loadings greater than 0.500 and averaging out to greater than 0.700 for each factor(Hair et al., 1998).

Discriminant validity on the other hand refers to the extent to which factors are distinct and uncorrelated(Campbell & Fiske (1959). The rule is that variables should correlate more strongly to their own factor than to another factor.Two primary methods exist for exploring discriminant validityduring an exploratory factor analysis. The first method is to examine the pattern matrix. Variables should load significantly only on one factor. If cross loadings do exist where variables load on multiple factors, then the cross loadings should differ by more than 0.2 (Fornel&Larcker, 1981). The second method is to examine the factor correlation matrix, a correlation matrix should not exceed 0.7 (Fornel&Larcker, 1981). A correlation greater than 0.7 indicates a majority of shared variance.

To carry out the convergent and discriminant test an exploratory factor analysis was conducted.Factor analysis is a method of data reduction which seeks underlying unobservable (latent) variables that are reflected in the observed variables (manifest variables).A preliminary test to establish singularity and multicollinearity was first conducted. Multicollinearity is the state of high intercorrelations or inter associations among the predictor variables.To validate the use of factor analysis the study carried aKaiser-Meyer-Olkin and Bartlett'stest of Sphericity.Kaiser-Meyer-Olkin establishes theadequacy of the sample for a factor analysis. Sampling Adequacy measure varies between 0and 1, andvalues closer to 1are better. A value of 0.6 is a suggested minimum(Field, 2005; Kaiser, 1974).Bartlett's Test of Sphericitytests the null hypothesis that the correlation matrix is an identitymatrix. An identitymatrix is matrix in which all of the diagonal elements are 1 and all offdiagonal elements are0. For a factor analysis to be conducted the correlation matrix shouldnot be an identity matrix. Taken together, these tests (Kaiser-Meyer-Olkin and Bartlett'stestof Sphericity) provide a minimum standard which should be passed before afactor analysisis conducted.

After testing for factor analysis minimum standards, the study progressed to conductingaexploratory factor analysis using principal component analysis without specifying the number of factors to extract with the primary objective of establishing using a scree plot the number of factors to extract in the final analysis. Principal component analysis strictly speaking isn't factor analysis but would however generate similar result as factor analysis (Field, 2005).After establishing the number of factors to extract as displayed in the scree plot. The factor extraction was redone using principal axis factoring this time specifying the factors to extract as had been established earlier using the scree plot.Owing to the lack of knowledge of the correlation between the construct variables,Promax an oblique rotation method was employed for SC Risk sub scales and Performance while Varimax an orthogonal rotation method was employed for SC Strategies.A preliminary test to establish singularity and multicollinearity was done and the results are as presented in Table 3.4.

Table 3.4: Correlation Matrix for SC Risk Items

		SCR1	SCR2	SCR3	SCR4	SCR5	SCR6	SCR 7	SCR8
Correlation	SCR1	1.000	0.722	0.402	0.430	0.475	0.549	0.427	0.558
	SCR2	0.722	1.000	0.496	0.424	0.462	0.519	0.490	0.574
	SCR3	0.402	0.496	1.000	0.264	0.296	0.350	0.409	0.449
	SCR4	0.430	0.424	0.264	1.000	0.259	0.332	0.340	0.423
	SCR5	0.475	0.462	0.296	0.259	1.000	0.461	0.401	0.417
	SCR6	0.549	0.519	0.350	0.332	0.461	1.000	0.460	0.492
	SCR7	0.427	0.490	0.409	0.340	0.401	0.460	1.000	0.554
	SCR8	0.558	0.574	0.449	0.423	0.417	0.492	0.554	1.000
Sig. (1-tailed)	SCR1		0.000	0.000	0.000	0.000	0.000	0.000	0.000
	SCR2	0.000		0.000	0.000	0.000	0.000	0.000	0.000
	SCR3	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	SCR4	0.000	0.000	0.000		0.000	0.000	0.000	0.000
	SCR5	0.000	0.000	0.000	0.000		0.000	0.000	0.000
	SCR6	0.000	0.000	0.000	0.000	0.000		0.000	0.000
	SCR7	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	SCR8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

a. Determinant = 0.042

Source: (Survey Data, 2018)

A scan on the correlational and significance values to determine singularity established that all the correlational valuesare less than 0.9 and all the p values are significant at 95% confidence level. This is a clear indication that singularity problem could not arise in the data.A determinant of 0.042 which exceeds the minimum threshold value of 0.00001 is a clear indication that multicollinearity did not exist in tis set of data.To validate the use of factor analysis, preliminary tests employing the use of Kaiser Mayer-Olkim (KMO) and Bartlett's test was done as shown in Table3.5.

Table 3.5:KMO and Bartlett's test for SCRisks among large scale manufacturing firms in Kenya

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.897
Bartlett's Test of Sphericity	Chi-Square	1015.414
	Degrees of freedom	28

	P-value	0.000

(a) Based on correlations

Source: (Survey Data, 2018)

The KMO statistics as stated earlier varies between 0 and 1. A value of 0 indicates that the sum of partial correlations is large relative to the sum of correlation, indicating diffusions in the pattern of correlations(hence, factor analysis is likely to be in appropriate). A value close to 1 indicates that patterns of correlation are relatively compact and so factor analysis should yield distinct and reliable factors. Kaiser (1974) recommends accepting values greater than 0.5 as acceptable (values bellow this should lead to either one deciding to collect more data or rethinking which variables to include). Furthermore, values between 0.5 and 0.7 are mediocre, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are superb (Hutcheson&Sofroniou, 1999). For this data the KMO value is0.897, which falls into the range of superb, a suffice evidence that factor analysis is appropriate for these data.Bartlett'smeasures,test the null hypothesis that the original correlation matrix is an identity matrix. For factor analysis to work some relationship is needed between variables and if the R-matrix is an identity matrix then all correlation coefficients would be zero. The Bartlett's test should be significant at 95% confidence level, a significant test tells us that the R-matrix is not an identity matrix; therefore, there are some relationships between the variables that should be included in the analysis. For these data the Bartlett's test is highly significant (0.000<0.05) and therefore the factor analysis is appropriate.A principal component analysiswithout specifying the number of factors to extract was done with the primary intention of establishing the factor to extract and number of factors to extract for the final analysis displayed on a screen plot as shown in Figure 3.1.

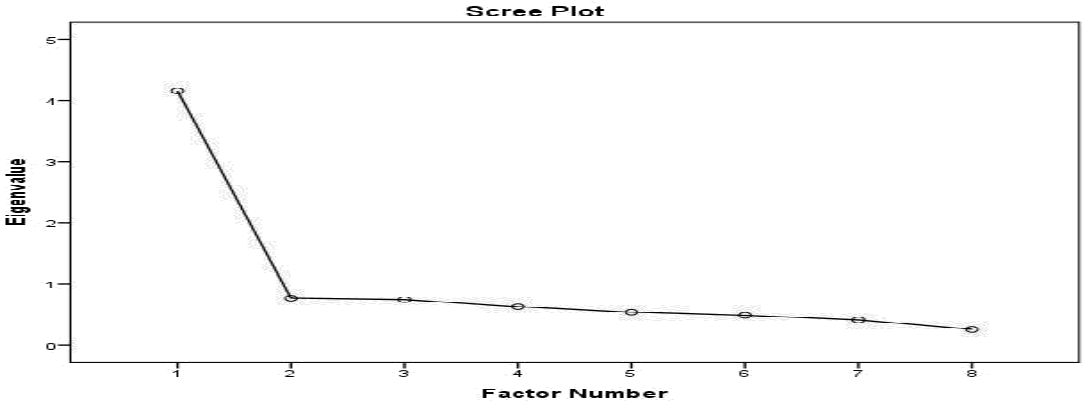

Figure 3. 1: SC Risk Scree Plot

Source: (Survey data, 2018)

The scree plot in Figure 3.1 indicates thatscrees /debris started to develop at factor 1 showing that only 1 factor explains the SC Risk used by large scale manufacturing firms in Kenya. The proceeding extraction of factors was done using one factor.

A factor extraction was then performed and Table 3.6, Table 3.7 and Table 3.8 generated. Thetotal variance Table 3.6 list the eigenvalues associated with each linear component before and after extraction.

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.158	51.970	51.970	3.650	45.626	45.626
2	0.768	9.595	61.565			
3	0.744	9.302	70.867			
4	0.630	7.876	78.742			
5	0.539	6.732	85.474			
6	0.487	6.088	91.562			
7	0.413	5.158	96.720			
8	0.262	3.280	100.000			

Extraction Method: Principal Axis Factoring.

Table 3. 6: Total SC Risk Variance Explained

Source: (Survey Data, 2018)

Before the extraction 8 linear components were identified within the data set. The eigen factors associated with each component explains the variance explained by that particular linear component.Component one explains 51.970% of the total variance

whereas the subsequent factors explains only small amount of the variance.Components with eigen values greater than one were then extracted which left only one factor explaining 45.626% of the variance in the variable.

Factor structure refers to the intercorrelations among the variables being tested in the exploratory factor analysis. Using the pattern matrix in Table 3.7 it is clear on which factor the variable groups have loaded onto.

Table 3.7: Pattern Matrix for SC Risk Items

	Factor 1
Inaccurate demand forecasting	0.967
Fluctuating occupancy of processing and distribution capacity	0.889
Fluctuating financial ratios and capital requirements	0.943
Low service levels	0.869
Profit margin erosion	0.943
Sudden demand change	0.925
Physical products flow disruption	0.934
Product quality failure	0.836
Extraction Method: Principal Axis Factoring	0.857

Rotation Method: Promax with Kaiser Normalization

a. Rotation converged in 4 iterations

Source: (Survey Data, 2018)

From the pattern matrix in Table 3.7 it is evident that the variables group into one factor,which more precisely implies they theyhave “loaded” onto one factor. Convergent validity is evident by the high loadings within the factor while discriminant validity is evident by the non-existent of major cross loading.

To further confirm the discriminant validity of the subscale a factor correlation was computed as shown in Table 3.8.

Table 3. 8: Factor Score correlation matrix for SC Risks Items

Factor	1

1	0.586

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.
Source: (Survey Data, 2018)

As presented in Table 3.8 the factor correlation matrix is 0.586 which is less than the cut of 0.7 a suffice evidence that the instrument subscale is discriminantly valid(Vagias, 2006). Correlations between factors should not exceed 0.7 as correlations greater than 0.7 indicates a majority of shared variance.

A preliminary test to establish singularity and multicollinearity was done and the results are as presented in Table 3.9

Table 3. 9: Correlation Matrix for SC Strategies Items

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1.000	.119	.044	.052	.322	.319	.311	.318	.311	.315	.294	.297	.332	.328	.327	.333
2	.119	1.000	.620	.615	.280	.269	.275	.264	.275	.275	.273	.264	.480	.475	.466	.456
3	.044	.620	1.000	.729	.136	.102	.113	.095	.126	.142	.135	.109	.365	.358	.347	.333
4	.052	.615	.729	1.000	.155	.116	.127	.109	.151	.156	.156	.141	.385	.379	.368	.356
5	.322	.280	.136	.155	1.000	.880	.872	.879	.867	.869	.819	.837	.843	.841	.840	.828
6	.319	.269	.102	.116	.880	1.000	.891	.896	.863	.869	.885	.882	.836	.836	.831	.828
7	.311	.275	.113	.127	.872	.991	1.000	.887	.856	.860	.888	.869	.838	.837	.833	.829
8	.318	.264	.095	.109	.879	.896	.987	1.000	.861	.871	.891	.875	.836	.835	.834	.827
9	.311	.275	.126	.151	.967	.863	.856	.861	1.000	.866	.817	.816	.828	.832	.837	.811
10	.315	.275	.142	.156	.969	.869	.860	.871	.866	1.000	.816	.824	.839	.843	.842	.822
11	.294	.273	.135	.156	.819	.885	.888	.891	.817	.816	1.000	.848	.811	.815	.814	.801
12	.297	.264	.109	.141	.837	.882	.869	.875	.816	.824	.848	1.000	.802	.798	.794	.802
13	.332	.480	.365	.385	.843	.836	.838	.836	.828	.839	.811	.802	1.000	.891	.883	.869
14	.328	.475	.358	.379	.841	.836	.837	.835	.832	.843	.815	.798	.991	1.000	.892	.870
15	.327	.466	.347	.368	.840	.831	.833	.834	.837	.842	.814	.794	.983	.992	1.000	.865
16	.333	.456	.333	.356	.828	.828	.829	.827	.811	.822	.801	.802	.869	.870	.865	1.000
1		.016	.212	.177	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	.016		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
3	.212	.000		.000	.007	.033	.021	.043	.011	.005	.008	.024	.000	.000	.000	.000
4	.177	.000	.000		.002	.018	.011	.024	.003	.002	.002	.005	.000	.000	.000	.000
5	.000	.000	.007	.002		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
6	.000	.000	.033	.018	.000		.000	0.000	.000	.000	.000	.000	.000	.000	.000	.000
7	.000	.000	.021	.011	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
8	.000	.000	.043	.024	.000	0.000	.000		.000	.000	.000	.000	.000	.000	.000	.000
9	.000	.000	.011	.003	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000
10	.000	.000	.005	.002	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
11	.000	.000	.008	.002	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000
12	.000	.000	.024	.005	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000

13	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000
14	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
15	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000
16	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

a. Determinant = 1.060E-005

Source: (Survey Data, 2018)

A scan on the correlational and significance values to establish singularity established that all the correlational values are less than 0.9 and all the p values are less than 0.05 (Hair et al., 2013). This is a clear indication that singularity problem could not arise in the data. A determinant of 0.0001060which exceeds the minimum threshold value of 0.00001 is a clear indication that multicollinearity could not be a problem for this set of data.

To validate the use of factor analysis, preliminary tests employing the use of Kaiser Mayer-Olkim (KMO) and Barlett's test was done as shown in Table3.10.

Table 3.10: KMO and Bartlett's test for SC Strategies used by large scale manufacturing firms in Kenya

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.9299
Bartlett's Test of Sphericity	Chi-Square	10993.482
	Degrees of freedom	120
	P-value	0.000

(a) Based on correlations

Source: (Survey data, 2018)

The KMO statistics as stated earlier varies between 0 and 1. A value of 0 indicates that the sum of partial correlations is large relative to the sum of correlation, indicating diffusions in the pattern of correlations (hence, factor analysis is likely to be in appropriate). A value close to 1 indicates that patterns of correlation are relatively compact and so factor analysis should yield distinct and reliable factors. Kaiser (1974) recommends accepting values greater than 0.5 as acceptable (values bellow this should lead to either one deciding to collect more data or rethinking which variables to include). Furthermore, values between 0.5 and 0.7 are mediocre, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are superb (Hutcheson &Sofroniou, 1999). For this data the KMO value is 0.9299, which falls into the range of superb, a suffice evidence that factor analysis is appropriate for these data. 60

Bartlett's measures test the null hypothesis that the original correlation matrix is an identity matrix. For factor analysis to work some relationship is needed between variables and if the R-matrix is an identity matrix then all correlation coefficients would be zero. The Bartlett's test should be significant at 95% confidence level, a significant test tells us that the R-matrix is not an identity matrix; therefore, there are some relationships between the variables that should be included in the analysis. For these data the Bartlett's test is highly significant (0.000<0.05) and therefore the factor analysis is appropriate.

A principal component analysis without specifying the number of factors to extract was done with the primary intention of establishing the factor to extract and number of factors to extract for the final analysis displayed on a screen plot as shown in Figure 3.2.

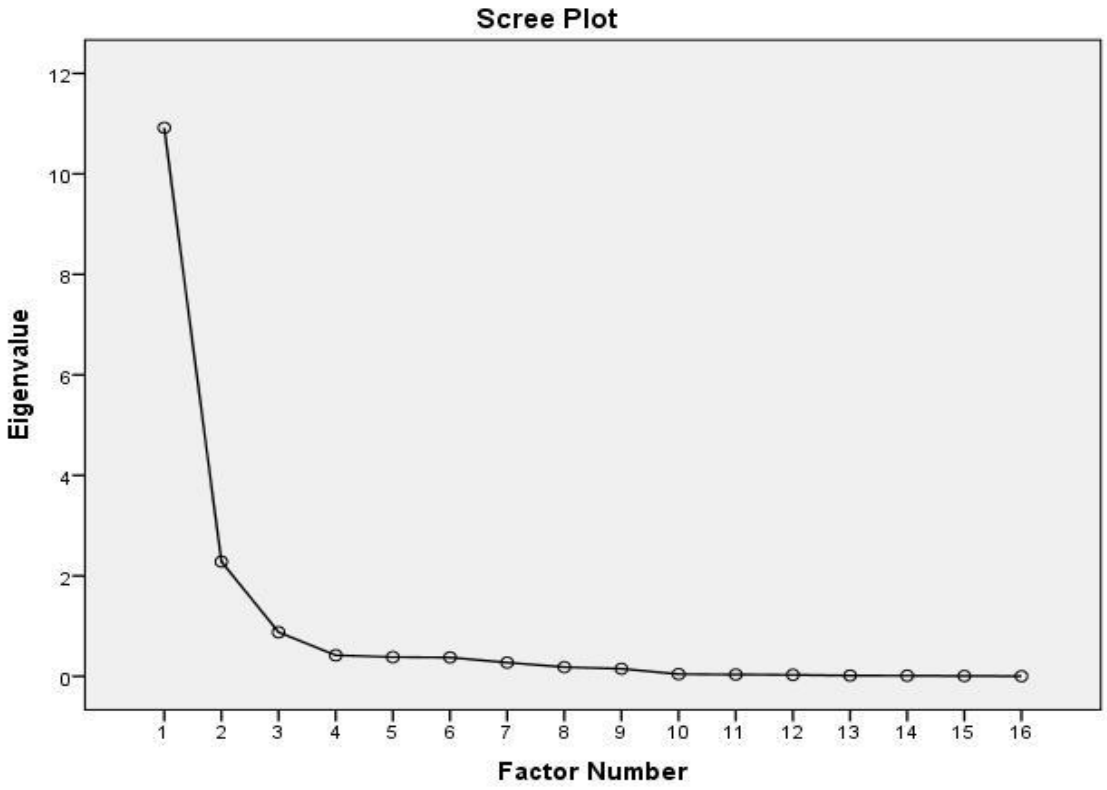

Figure 3. 2: SC Strategies Scree Plot

Source: (Survey data, 2018)

The scree plot in Figure 3.2 indicates thatscrees /debris started to develop at factor 1 showing that only 1 factor explains the SC Strategies used by large scale manufacturing firms in Kenya. The proceeding extraction of factors was done using one factor.

The total variance Table 3.11 list the eigenvalues associated with each linear component before and after extraction.

Table 3. 11: Total SC Strategies Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	10.917	68.233	68.233	10.795	67.467	67.467	10.725
2	2.283	14.267	82.499	1.981	12.380	79.847	3.912
3	0.878	5.489	87.988				
4	0.419	2.618	90.606				
5	0.382	2.385	92.991				
6	0.376	2.347	95.338				
7	0.272	1.702	97.040				
8	0.182	1.139	98.179				
9	0.150	0.934	99.113				
10	0.042	0.265	99.378				
11	0.034	0.214	99.592				
12	0.029	0.182	99.775				
13	0.016	0.097	99.872				
14	0.013	0.078	99.950				
15	0.006	0.035	99.985				
16	0.002	0.015	100.000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Source: (Survey Data, 2018)

Before the extraction 16 linear components were identified within the data set. The eigenvalues factors associated with each factor explains the variance explained by that particular linear component. Component one explains 68.233% of the total variance, factor two explains 14.267% whereas the subsequent component explains only small amount of the variance for example the third component explains 5.489%. Components with eigen values greater than one were then extracted which left only two components with the first component explaining 67.467% and the second component explaining 12.380% of the variance in the variable. Cumulatively thecomponentsexplain 79.847% of the variance in the variable.

Using the pattern matrix in Table 3.12 it is clear on which factor the variable groups have loaded onto.

Table 3.12: Pattern Matrix for SC Strategies Items

	Factor	
	1	**2**
MRSCS 1		0.744
MRSCS 2		0.714
MRSCS 3		0.881
MRSCS 4		0.874
LRSCS 1	0.969	
LRSCS 2	1.000	
LRSCS 3	0.997	
LRSCS 4	1.000	
LRSCS 5	0.957	
LRSCS 6	0.960	
LRSCS 7	0.924	
LRSCS 8	0.927	
LRSCS 9	0.827	
LRSCS 10	0.830	
LRSCS 11	0.833	
LRSCS 12	0.827	

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Source: (Survey Data, 2018)

From the pattern matrix in Table 3.12it is evident that the variables group into twofactors, more precisely they have “loaded” onto two factors. Convergent validity is evident by the high loadings within the two factors while discriminant validity is evident by the non-existent of major cross loading.

To further confirm the discriminant validity of the subscale a factor correlation is computed as shown in Table 3.13.

Factor	1	2
1	1	0.388
2	0.388	1

Extraction Method: Principal Axis Factoring.

Rotation Method: Promax with Kaiser Normalization.

Table 3. 13: Correlation Matrix for SC Strategies Items

Source: (Survey Data, 2018)

As presented in Table 3.12the factor correlation matrix is 0.388 which is lesser than the cut of 0.7 is a suffice evidence that the instrument subscale is discriminantly

valid(Vagias, 2006). Correlations between factors should not exceed 0.7 as correlations greater than 0.7 indicates a majority of shared variance.

A preliminary test to establish singularity and multicollinearity was done and the results are as presented in Table 3.14.

Table 3. 14: Correlation Matrix for Performance Items

		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Correlation	P 1	1.000	-.051	.146	-.037	.381	-.022	.758	.220	.334	.665
	P2	-.051	1.000	.184	.858	.216	.846	.037	.222	.198	.021
	P3	.146	.184	1.000	.195	.475	.201	.167	.457	.424	.137
	P4	-.037	.858	.195	1.000	.198	.868	.039	.243	.180	.036
	P5	.381	.216	.475	.198	1.000	.194	.397	.745	.887	.277
	P6	-.022	.846	.201	.868	.194	1.000	.009	.249	.193	.026
	P7	.758	.037	.167	.039	.397	.009	1.000	.215	.388	.853
	P8	.220	.222	.457	.243	.745	.249	.215	1.000	.694	.154
	P9	.334	.198	.424	.180	.887	.193	.388	.694	1.000	.269
	P10	.665	.021	.137	.036	.277	.026	.853	.154	.269	1.000
Sig. (1-tailed)	P 1		.000	.004	.000	.000	.000	.000	.000	.000	.000
	P2	.000		.000	.000	.000	.000	.000	.000	.000	.000
	P3	.000	.000		.000	.000	.000	.001	.000	.000	.007
	P4	.000	.000	.000		.000	.000	.241	.000	.001	.000
	P5	.000	.000	.000	.000		.000	.000	.000	.000	.000
	P6	.000	.000	.000	.000	.000		.000	.000	.000	.000
	P7	.000	.000	.001	.000	.000	.000		.000	.000	.000
	P8	.000	.000	.000	.000	.000	.000	.000		.000	.003
	P9	.000	.000	.000	.001	.000	.000	.000	.000		.000
	P10	.000	.000	.007	.000	.000	.000	.000	.003	.000	

a. Determinant = 2.293E-005

Source: (Survey Data, 2018)

A scan on the correlational and significance values to establish singularity established that all the correlational values are less than 0.9 and all the p values are less than 0.05 (Hair et al., 2013). This is a clear indication that singularity problem could not arise in the data. A determinant of 0.0002293 which exceeds the minimum threshold value of 0.00001 is a clear indication that multicollinearity could not be a problem for this set of data.

To validate the use of factor analysis, preliminary tests employing the use of Kaiser Mayer-Olkim (KMO) and Barlett's test was done as shown in Table3.15.

Table 3.15: KMO and Bartlett's test for Performance Outcomes among large scale manufacturing firms in Kenya

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.7467
Bartlett's Test of Sphericity	Chi-Square	3427.49
	Degrees of freedom	45
	P-value	0.000

(a) Based on correlations

Source: (Survey data, 2018)

The KMO statistics as stated earlier varies between 0 and 1. A value of 0 indicates that the sum of partial correlations is large relative to the sum of correlation, indicating diffusions in the pattern of correlations (hence, factor analysis is likely to be in appropriate). A value close to 1 indicates that patterns of correlation are relatively compact and so factor analysis should yield distinct and reliable factors. Kaiser (1974) recommends accepting values greater than 0.5 as accepTable (values bellow this should lead to either one deciding to collect more data or rethinking which variables to include). Furthermore, values between 0.5 and 0.7 are mediocre, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are superb (Hutcheson &Sofroniou, 1999). For this data the KMO value is 0.9299, which falls into the range of superb, a suffice evidence that factor analysis is appropriate for these data.

Bartlett's measures test the null hypothesis that the original correlation matrix is an identity matrix. For factor analysis to work some relationship is needed between variables and if the R-matrix is an identity matrix then all correlation coefficients would be zero. The Bartlett's test should be significant at 95% confidence level, a significant test tells us that the R-matrix is not an identity matrix; therefore, there are some relationships between the variables that should be included in the analysis. For these data the Bartlett's test is highly significant ($0.000<0.05$) and therefore the factor analysis is appropriate.

A principal component analysis without specifying the number of factors to extract was done with the primary intention of establishing the factor to extract and number of factors to extract for the final analysis displayed on a screen plot as shown in Figure 3.3.

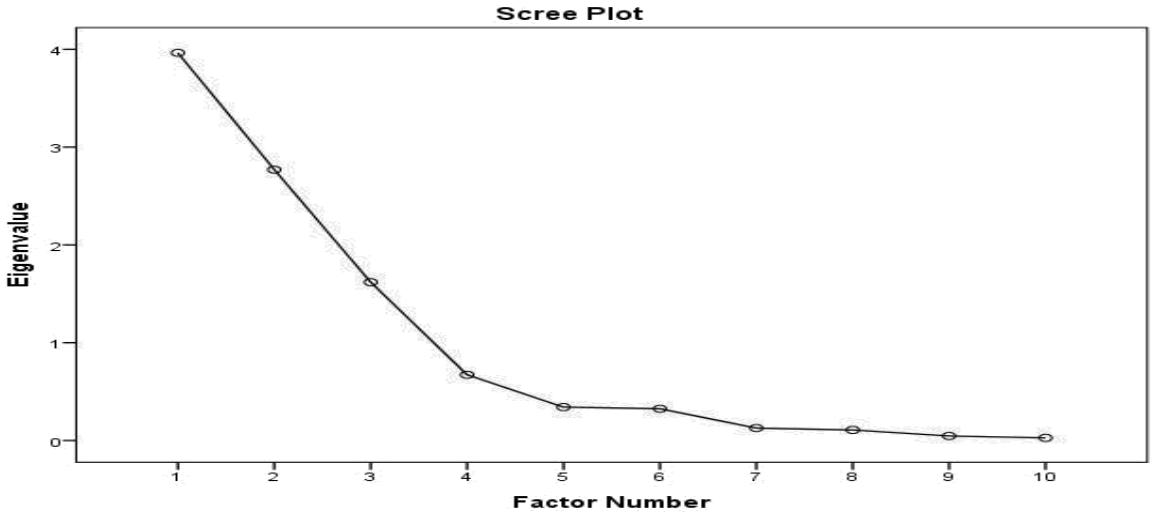

Figure 3. 3: Scree Plot for Performance

Source: (Survey data, 2018)

The scree plot in Figure 3.3 indicates thatscrees /debris started to develop at factor 2 showing that only 2 factor explains the performance of the large-scale manufacturing firms in Kenya. The proceeding extraction of factors was done using one factor.

The total variance Table 3.16 list the eigenvalues associated with each linear component before and after extraction.

Table 3.16: Total Performance Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.964	39.641	39.641	3.611	36.106	36.106	3.232
2	2.770	27.699	67.339	2.518	25.185	61.291	3.088
3	1.619	16.188	83.527				
4	0.672	6.722	90.249				
5	0.342	3.416	93.665				
6	0.325	3.247	96.912				
7	0.127	1.274	98.186				
8	0.108	1.079	99.265				
9	0.046	0.463	99.728				
10	0.027	0.272	100.000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Source: (Survey Data, 2018)

Before the extraction 10 linear components were identified within the data set. The eigenvalues factors associated with each factor explains the variance explained by that particular linear component. Component one explains 39.641% of the total variance, factor two explains 27.699% whereas the subsequent component explains only small amount of the variance for example the third component explains 16.188% while the fourth component explains only 6.722% of the variance. Components with eigen values greater than one were then extracted which leaving only two components with the first component explaining 36.106% and the second component explaining 25.185% of the variance in the variable. Cumulatively the components explain61.291% of the variance in Performance.

Using the pattern matrix in Table 3.17 it is clear on which factor the variable groups have loaded onto.

Table 3. 17: Pattern Matrix for Performance Items

	Factor	
	1	**2**
Customer satisfaction	.699	
Cost efficiency		.952
Capacity Utilization	.396	
Research & Development		.965
Sales Volume	.784	.154
Reduction in Inventory Cost		.963
Reduction in unit Cost	.764	
Range of Products	.576	
Inventory Turnover Rate	.741	
Total Average Inventory	.644	

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Source: (Survey Data, 2018)

From the pattern matrix in Table 3.15it is evident that the variables group into two factors, more precisely they have “loaded” onto two factors. Convergent validity is evident by the high loadings within the two factors while discriminant validity is evident by the non-existent of major cross loading.

To further confirm the discriminant validity of the subscale a factor correlation is computed as shown in Table 3.18

Factor	1	2
1	1.000	.191
2	.191	1.000

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.

Table 3.18: Factor Score correlation matrix for Performance Items

Source: (Survey Data, 2018)

As presented in Table 3.18 the factor correlation matrix is 0.191 which is lesser than the cut of 0.7 a suffice evidence that the instrument subscale is discriminantly valid(Vagias, 2006). Correlations between factors should not exceed 0.7 as correlations greater than 0.7 indicates a majority of shared variance.

A preliminary test done to ascertain singularityand multicollinearity of the SC Risk, SC Strategies and Performance subscale established all the correlational matrix valuesfor the three subscales (SC Risk, SC Strategies and Performance)were all less than 0.9 and significant at 95% confidence level.Thetolerance test for each subscale were also establishedat 0.042 correlational matrix determinant for SC Risks subscale, 0.00001060 correlational matrix determinant for SC Strategies subscale and 0.00002293 correlational matrix determinant for performance subscale all of which are greater than the cut of point of 0.00001(Hair, Anderson, Tatham, & Black, 2013). The less than 0.9 correlational matrix values for all the subscales and the correlational matrix determinants which exceeded the set threshold of 0.00001 indicated singularity and multicollinearity were not going to be a problem for these data sets. To put it simple, the interpretation of the variate was not going to be complicated as it was going to be easy to ascertain the effect of every single variable as the correlation between the variables were below 0.9. which is below the cut-off point of 0.9 (Hair et al., 2013)

Kaiser-Meyer Olkin Measure of sampling Adequacy were computed at 0.897 for SC Risks, 0.9299 for SC Strategies and 0.7467 all indicating sampling adequacy for a factor analysis. This is in harmony to (Field, 2005; Kaiser, 1974) who suggested a value of 0.6 as the minimum measure for sampling adequacy.Bartlett's test of Sphericity for each scale was also established at $\alpha = 0.000$ implying that each scale

unidimensional(instrument can be used to describe only one construct) (Field, 2005). This indicating convergent validity of the subscales.

Each sub-scaleexplainsadequate variance with SC Risk subscale linear components explaining up to45.626 variance in SC Risk, SC Strategies linear components explaining up to79.847 variance in SC Strategies and Performance Subscale linear components explaining 61.291variance in Performance.

The sub scales factor scorescorrelation matrix which are less than the factor score correlation matrix of 0.7 with SC Risks sub scale score being 0.586, SC Strategies sub scale score being 0.388 and performance subscale score being 0.191indicates that the factors measure conceptually different constructs, a clear evidence of discriminant validity (Vagias, 2006).

According to Wirland et al., 2017 for a valid scale purification of the items from the scale it is advisable to consider both judgemental (content validity) and statistical validity (construct validity).Both judgemental and statistical purification have ascertained the instruments sound measure practically and theoretically, the instrument is therefore validated.

Table 3.19: Summary of Validity test for SC Risk, SC Strategies and Performance Items

Subscale	Factors Extracted	Components Retained	Correlational Matrix Determinant	KMO	Bartlett's Test of Sphericity	Variance Explained (%)	Factor Score Correlation Matrix
SC Risk	1	8	0.04200000	0.8970	$\alpha = 0.0000$	45.626	0.586
SC Strategies	2	16	0.00001060	0.9299	$\alpha = 0.0000$	79.847	0.399
Performance	2	10	0.00002293	0.7467	$\alpha = 0.0000$	61.291	0.191

Source: (Survey Data, 2018)

3.6 Data Analysis

The researcher used descriptive statistics including measures of central tendency especially the mean, median and mode for Likert scale variables in the questionnaire. Descriptive statistics provide the essential features of the data collected on the variables and provide the impetus for conducting further analyses on the data (Mugenda & Mugenda, 2008).

Regression analysis and specifically a multivariate analytical approach with a backward elimination was used to establish the effect of SC Risks on performance, the effect SC Strategies on Performance and the confounding effect of SC Strategies on the relationship between SC Risk and Performance.

The multivariate approach was appropriate for this study because the conceptual models usedseveral measures for SCRisks(independent variable)against performance in the first objective several measures for SC Strategies in the second objective against performance and several measures for SC Strategies (confounding variable) and SC Risk (independent variable in the third objective) against performance.

Multiple regression analysis was also used as it allowed the estimation of the association between the independent variable in the first and second objective and the outcome holding all other variables constant.It also provided a way of adjusting for (or accounting for) potentially confounding variables SC Strategy that was adjusted for in the relationship between SC Risks and performance.

In multiple regression analysis, the model takes the form of an equation that contains a coefficient β_1 for each predictor; which indicates the individual contribution of each predictor to the model. In sum, the coefficient $\beta_1$indicate the relationship between the dependent variable and each predictor. If the value is positive, we can tell that there is a positive relationship between the predictor and the outcome variable whereas a negative coefficient represents a negative relationship. R^2 measures the strength of the relationship between the predictor and response. The R^2 in a regression output is a biased estimate of the sample as it is systematically too high or low and will therefore not be used as a measure of variation in this model. An adjusted R^2 which compares the explanatory power of regression models that contain different numbers of predictors and the responses will be used in interpreting the total variation in the dependent variable performance brought about by the independent variable SC Risks. Adjusted R^2 indicates the proportion of the total variation explained by the independent variables in the model adjusted for the number of predictors in the model and is it unlike the R^2 an unbiased estimate of the population mean, and as such it is likely to be too high as it is to be too low.

Confounding is assessed by assessing how much the regression coefficients associated with the independent variable factor in this case SC Risk changes after adjusting for the potential confounder. In this case the study compares the SR Risk in model 1 where the study looks at the direct association between SC Risk and performance and the change in model 3 where the SC Strategies have been adjusted for in the same association between SC Risk and Performance. As a rule of thumb, if the regression coefficients from the first model of SC Risk and performance changes by more than 10%, then SC Strategies will be said to be a confounder of the relationship between SC Risk and performance (Onghena&Noortgate, 2005).

The magnitude confounding can be quantified by computing the percentage difference between the crude and adjusted measures of effect. There are two slightly different methods that investigators use to compute this, as illustrated below. Percent difference is calculated by calculating the difference between the starting value and ending value and then dividing this by the starting value. Many investigators consider the crude measure of association to be the "starting value".

Method Favoured by Biostatisticians

$$\text{Magnitude of confounding} = \frac{\text{R2 Crude–R2 adjusted}}{\text{R2 crude}}$$

Other investigators consider the adjusted measure of association to be the starting value, because it is less confounded than the crude measure of association.

Method favoured by Epidemiologists

$$\text{Magnitude of confounding} = \frac{\text{R2 Crude - R2 adjusted}}{\text{R2 adjusted}}$$

While the two methods above differ slightly, they generally produce similar results and provide a reasonable way of assessing the magnitude of confounding. Note also that confounding can be negative or positive in value.

In a case of an existence of multiple measures of the independent variable then a change in adjusted R^2 in a direct relationship model and the other where the possible confounder is adjusted for should be 10% or and significant at the chosen p-value which in this case is 95%.

In order to establish the effect ofSC Risks(Independent Variable)onperformance(Dependent Variable) of large scale manufacturing firms in Nairobi (First objective; Hypothesis 1), equation (3.1)was written in the following form:

Performance (P)=β_0 + $\beta_1 SCR_1$+ β_2 SCR_2+ β_3 SCR_3+ $\beta_n SCR_n$+ ε_0..... (3.1)

Where;

P Is the dependent variable (Performance) and is a linear function of SCR_1, SCR_2, SCR_3…SCR_n plus ε_i.

β_0 Identifies an adjustment constant due to scale differences in measuring SC Risks and performance (the intercept or the place on the P - axis through which the straight-line passes. It's the value of P when SCR is 0.

$\beta_1, \beta_2, \beta_2 and\ \beta_i$ Are constants describing the functional relationship in the population.

$SCR_1, SCR_2, \& SCR_3,$ Are independent variables (Supply demand risks and demand variability risks)

Epsilon, ε_i Represents the error component for each firm. The portion of P score that cannot be accounted for by its systematic relationship with values of SCR the predictor variable.

In order to establish the effect of SC Strategies (independent variable) on performance(Dependent Variable) of large scale manufacturing firms in Nairobi (Second objective; Hypothesis 2), equation 3.2 was written in the following form:

Performance (P)= β_0 + $\beta_1 SCS_1$+ β_2 SCS_2+ β_3 SCS_3+ $\beta_n SCS_n$+ ε_0..... (3.2)

Where;

P	Is the dependent variable (Performance) and is a linear function of SCS_1, SCS_2, SCS_3…SCS_i plus ε_i.
β_0	Identifies an adjustment constant due to scale differences in measuring SCStrategiesand performance (the intercept or the place on the P - axis through which the straight-line passes. It's the value of P when SCS is 0.
$\beta_1, \beta_2 and\ \beta_3$	Are constants describing the functional relationship in the population.
$SCS_1, SCS_2, \& SCS_3$	Are independent variable SC Strategies (Long-range and mid-range supply chain strategies)
Epsilon, ε_i	Represents the error component for each firm. The portion of Performance score that cannot be accounted for by its systematic relationship with values of supply chain strategy the predictor variable.

The last general model was to establish theconfounding effect of SCStrategies on the relationship between SCRisksand performance. This will take the following form as in equations (3.3) below:

Performance (P) = *f(SCR, SCR, SCS, SCS)*

Performance (P)=β_0 + β_1SCR_1+ β_2SCR_2+ β_3 SCR_3+ β_nSCR_n+ β_1SCS_1+ β_2SCS_2 + $\beta_nSCR_n\varepsilon_0$..... (3.3)

Where

P	Is the dependent variable (performance) and is a linear function of the confounding variable – SC Strategies (SCS**)** and independent variables SC Risks (SCR) plus ε_i
β_0	Identifies an adjustment constant due to scale differences in measuring SC Risks, SC Strategies and Performance (the intercept or the place on the P - axis through which the straight-line passes. It's the value of P when SCR and SCS are 0.

Epsilon, ε	Represents the error component for each firm. The portion of Performance score that cannot be accounted for by its systematic relationship with values of SC Risks and SC Strategies.
SCR_1, SCR_2	Is the independent variable (SC Risks)
SCS_1, SCS_2	SCStrategies is a confounder of the relationship between SCRisks and P.

3.6.1 Hypothesis Testing

The t- testevaluatesthe effect of just one term of the independent variable on the dependent variable.To test for the combined effect of the independent terms on the dependent variable f- test was used.F-test evaluates multiple model terms simultaneously, which allows them to compare the fits of different linear models and hence very flexible and can be used in a wide variety of settings.The f-statistics p-values indicated whether the relationship between the independent and dependent variable are statistically significant.

If the p-value for a variable is less than the significance level which in this case is 95%, then the sample data provides enough evidence to reject the null hypothesis for the entire population. The data will be favouring the hypothesis that there *is* a non-zero correlation. Changes in the independent variable *are* associated with changes in the response at the population level.On the other hand, a p-value that is greater than the significance level indicates that there is insufficient evidence in the sample to conclude that a non-zero correlation exists.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the descriptive statisticson the level of SC Risk experienced by large scale manufacturing firms, the level of SC Strategies adopted by large scale manufacturing firms and the performance level of the large-scale manufacturing firms.Addedly the chapter presents the results of hypotheses testing of the effect of SC Risk on performance; the effect of SCStrategies on performance; and theeffect of SC Strategies on the relationship between SC Risk and performance of large-scale manufacturing firms in Kenya.

4.2Extent of SC Risks Experienced by Large Scale Manufacturing Firms in Kenya

This section describes the extent of SC Risks experienced by large scale manufacturing firms in Kenya by analysis the supply chain risk through descriptive statistics. There are eight SC Risk that the large-scale firms experience today. Among the eight therespondents were to indicate the extent of their experience on a five likert scale (where: 1= No Extent; 2 = Small Extent; 3 = averagely; 4 = Great Extent; 5 = Very Great Extent). The responses are as shown in Table 4.2.

Table 4. 1: Extent of SC Risks Experienced by Large Scale Manufacturing Firms in Kenya

SUPPLY CHAIN RISKS	N	MEAN
Supply Demand Risk		
Inaccurate demand forecasting	326	3.6595
Fluctuating occupancy of processing and distribution capacity	326	3.7147
Fluctuating financial ratios and capital requirements	326	4.727
Low service levels	326	2.7853
Demand Variability Risk		
Profit margin erosion	326	3.7086
Sudden demand change	326	3.7454
Physical products flow disruption	326	4.0337
Product quality failure	326	3.4571
Composite Mean Score for SC Risks		**3.7289**

Source: (Survey data, 2018)

Table 4.1presents the descriptive statistics for determining the extent of SC Risks Experienced by Large Scale Manufacturing Firms in Kenya. It reveals thatthe large-scale manufacturing firms in Kenya were experiencingaveragely experiencing SC 75

Riskas indicated by a composite mean of 3.73 and this explains the physical product flow disruptions, costly shortages, obsolescence, and inefficient capacity utilization experienced by the large-scale manufacturing firms.

4.3Extent of SC Strategies Adopted by Large Scale Manufacturing Firms in Kenya

This section presents a description of the level of SC Strategies used by large-scale manufacturing firms in Kenya. As discussed in the literature review and operationalizationof study variables, there are sixteen SC strategies that firms can use today. Among the sixteen items, therespondents were to indicate the extent of their adoption on a five point Likert scale (where: 1= No Extent; 2 = Small Extent; 3 = Average; 4 = Great Extent; 5 = Very Great Extent). The responses are as shown in Table 4.2.

Table 4. 2: Extent of SC Strategies Adoption by Large Scale Manufacturing Firms in Kenya

Supply Chain Strategies	N	Mean
Mid-term Supply Chain Strategies		
A strategy that aligns information systems architectures and systems to respond to changing customer demands.	326	2.3896
A strategy that allows the firm to cost effectively receives and delivers products as the sources of supply and customer change	326	2.0337
A strategy that allows the firm's assets and operations to react to emerging customers trends at each node of the supply chain.	326	2.0337
A strategy that increases the firm's ability to mass-maximize and build close relations with customers when designing new and modifying existing products.	326	2.0736
Long term Supply Chain Strategies		
A strategy that provides balance of flexibility and cost efficiency in the supply chain while meeting the marketplace requirements.	326	2.8896
A strategy where the firm continuously plans its supply chain network to limit exposure to cost fluctuations.	326	2.8466
A strategy where the firm creates additional relationship with supply chain members at the point where their operation interacts.	326	2.8252
A strategy where the firm evaluates opportunities to outsource areas that are not their core competencies in the supply chain.	326	2.8313
A supply chain strategy aimed at speeding & retaining firm cash flow	326	2.8098
A supply chain strategy focused on variable productivity to meet speculative purchasing and sales promotion.	326	2.8129
A supply chain strategy that allows the firm and supply chain members to adopt to different products of different segment of the market.	326	2.5399

A supply chain strategy directed to minimizing risks like production capacity, quality, floods and earthquakes in the process of procurement, production and distribution.	326	2.5092
A supply chain strategy that is reactive to procurement, production and distribution in dynamic environments to answer to customer needs.	326	2.5387
A supply chain strategy where numerous internal and external activities are coordinated to conform to the overall business strategy.	326	2.7264
A supply chain strategy where the firm does not have or pursue a formal supply chain strategy.	326	2.5101
Supply chain a strategy responsive and flexible to customer needs to enable the firm Feed Customers in ways that are efficient for them.	326	2.7703
Composite Mean Score for SC Strategies		**2.5712875**

Source: (Survey data, 2018)

Aspresented in Table4.2 it was established the large-scale manufacturing firms were adopting supply chain strategies to a small extent average extent indicated by a composite mean of 2.57.

4.4Extent Performance of Large Scale Manufacturing Firms in Kenya

This section attempts to describe the performance of large-scale manufacturing firms in Kenya by analysing the performance indicators through descriptive statistics. Therespondents were to indicate the extent of use on a five point likert scale (where: 1= Very Low; 2 = Low; 3 = Average; 4 = High; 5 = Very High). The responses are as shown in Table 4.3.

Table 4.3: Extent of Large Scale Manufacturing Firm Performance in Kenya

Performance Outcomes	N	Mean
Sales Volume	326	2.2515
Inventory Turnover Rate	326	2.2607
Range of Products	326	2.3282
Reduction in Inventory Cost	326	3.5767
Research & Development	326	2.5798
Cost efficiency	326	3.5675
Total Average Inventory	326	2.4417
Reduction in unit Cost	326	2.4294
Customer satisfaction	326	2.4755
Capacity Utilization	326	2.5552
Composite Mean Score for Performance Outcomes		**2.64662**

Source: (Survey Data, 2018)

As presented in Table 4.4 the performance of the large-scale manufacturing firms islow indicated by a composite mean of 2.65.This explains their stunted growth and downsizing of some of the firms as established by PwC in their 2010 annual report. This could be attributed to the high level of supply chain risk experienced by the large-scale manufacturing firms (3.73) and the average level of supply chain strategies (2.57) adopted by the large-scale manufacturing firmsas alluded by the PwC 2010 report which reported that Kenya's manufacturing subsector has a challenging history in terms of performance attributed to unstructured supply chain strategy and supply chain risks.

4.5Effect of SC Risks on Performance

Objective one purposed to establish the effect of SCRisks on performance of large scale manufacturing firms in Kenya.SC Riskswas categorized into supply demand risk and demand variability risk. Supply demand risk being the risks residing in purchasing, suppliers, supplier relationships, supply networks consisting of (inaccurate demand forecasting,fluctuating occupancy of processing and distribution capacity, fluctuating financial ratios and capital requirements and low service levels)and demand variability risksbeing risk resulting from disruptions emerging from downstream supply chain operationsconsisting of (profit margin erosion, sudden demand change, physical products flowdisruptionproduct quality failure.

Performance was arrived at by finding a composite of the various performance indicators (customer satisfaction, cost efficiency, capacity utilization, research & development, sales volume, reduction in inventory cost, reduction, reduction in unit cost, range of products, inventory turnover rate, total average inventory) to come up with overall performance.

Multiple regression analysis with backward elimination starting with all SC Risk measures and reducing them one by one (from the ones with the highest p-values) until the model remained with only SC Risk indicators that had a significant p-value at 95% Confidence level was done(See Appendix V). The final model had three SC Risks items which had a significant negative effect on Performance namely (profit margin erosion, physical products flow disruption and product failure). All the other indicators of SC Risk namely (inaccurate demand forecasting, fluctuating occupancy of processing and distribution capacity, fluctuating financial ratios and capital requirements and low service levels sudden demand change) had insignificant negative effect on performance

and were therefore eliminated and not presented in the final regression coefficients Table 4.5.

Theoretical reasoning, the empirical and theoretical literature review led to the belief that there exists a negative effect of SC Risk on performance and for this the study postulated that SC risk wouldhave anegativeeffect on the performance of large scale manufacturing firms in Kenya. Hence, the following null hypothesis wasformulated and tested:

$H0_1$: SC Risks have no significant effect on performance of large scale manufacturing firms in Kenya.

To test this null hypothesis, a full regression model was fitted as presented in Table4.4

Table 4. 4 Model Summary of the Effect of SC Risk on Performance

	R Square	Adjusted R Square	RMSE	F	Sig
Model No. i	0.680	0.681	0.445	42.471	0.000

Source: (Survey Data, 2018)

The adjusted R^2 of 0.681 in Table 4.5 indicatesthat 0.681(68.1%) of the variance in Performance is explained by SC Risks.This implies that 68.1% of the variation in Performance is explained by SC Risks and the remaining 31.9% is explained by the other variables not included in the study.The F-statistics (42.47)which is greater than 2 and a p value of0.000 implies that SC Risks have a significant effect on performance at a confidence level of 95%.

Table 4. 5: Effect ofSC Risks on Performance

SC RISKS	B	Std. Error	T	Sig.
(Constant)	3.443	0.989	34.82	0.000
Profit margin erosion	-0.074	0.026	-2.83	0.005
Physical products flow disruption	-0.078	0.022	-3.53	0.000
Product quality failure	-0.113	0.022	-5.08	0.000

Source: (Survey data, 2018)

The equation for the regression model is expressed as:

Performance (P)= 3.443 - 0.0.074 SCR_1 - 0.078SCR_2-0.113SCR_3…..... (4.1)

The equation (4.1) regression model indicates that performance would be at (β=3.443, p= 0.000) holding the SC Risks (profit margin erosion, product flow disruption and product quality failure constant.

Profit Margin erosion was established to be having a significant effect on performance (β = -0.074, p = 0.005).This statistically indicates that a change of one standard deviation in profit margin erosion results in a (-0.074) standard deviations decrease in performance of large scale manufacturing firms at 95% confidence level.Ideally if large scale manufacturing firms were to experience profit margin erosionthen their performance would subside.

Moreover, physical product flow disruption was establishedto be having a significant effect on performance (β-0.078, p = 0.000). This statistically indicates that a change of one standard deviation in physical products flow disruption results in a (-0.078) standard deviations decrease in performance of large scale manufacturing firms at 95% confidence level. Ideally if large-scale manufacturing firms were to experience physical product flow disruption then their performance would subside.

Furthermore, product quality failure was established to be having a significant effect on performance (β = -0.098, p= 0.000). This statistically indicates that a change of one standard deviation in product quality failure results in a (-0.098) standard deviations decrease in performance of large scale manufacturing firms at 95% confidence level. Ideally if large-scale manufacturing firms were to experience product quality failurethen their performance would subside.This implies that among the retained indicators of SC Risks,product quality failure has the highest negative significant effect (β= -0.113) succeeded by Physical product flow disruption (β= -0.078) and eventuallyProfit Margin erosion (β = -0.074). Product quality failure is thus a more hazardousSC Risks for a firm's performance as succeeded by physical product flow disruption and lastlyprofit margin erosion.

The (F=42.471 which is greater than 2 and p=0.000is a suffice evidence to conclude that SC Risks have a significant effect on performance and therefore the null hypothesis that SC Risks have no significant effect on performance of large scale manufacturing firms was rejected.These findingscorroborates the theoretical assertions of RBV 80

(Prahald& Hamel, 1990) that threats (SC Risks) from the firm's environment hamper the firm's ability to exploit opportunities that would otherwise enhance its performance.

The establishment of a negative effect on performance by supply chain risk confirms the assertion by Wagner and Bode (2008 who alluded that firms exposed to risks in supply chainscan expect lower performances as compared to those who are exposed to lower levels ofrisks. According to them higher level of risks means more disruptions and negative consequences such asquality problems, customers' complaints, delays and mismatch of supply and demand.

The study findings are in support of Chopra and Sodhi (2004) findings that there is a wider consequence of a failure to manage risks effectively which include not only financiallosses but also a reduction in product quality, damage to property and equipment, loss ofreputation in the eyes of customers, suppliers and the wider public, and delivery delays. The establishment of a clear significant relationship between SC Risks and performance presented by an adjusted $R^2$of 0.68corresponds to Okonjo (2014) who using a descriptive study design conducted a study seeking to establish the relationship between procurement risks management practices and supply chain performance of mobile phone serviceproviders in Kenya. Okonjo (2014) established that there was a clear significant relationship between procurement risks management practices and supply chain performance represented by adjusted R2 value of 0.646 which translated to 64.6% variance explained by the ten independent practices of Procurement Risks Management that she studied.

In the same vein as the study findings in a study of more than 800 manufacturing companies that announced a supply chain disruption between year 1989 and 2000 globally, Singhal & Hendricks (2005) found that during a three-year span, regardless of industry, disruption cause or time period, affected companies experienced poor performance of 33-40% lower stock of returns related to their industry peers. These findings follow the establishment by Zhao, Hao, Sun and Zhao (2012) who empirically exploring the relationships among supply chain risks (SCRs), supply chain integration (SCI), and company performance in a global context established that SCRs, especially supply delivery risks (SDR), are negatively related to SCI which has a contingent relationship with performance.

The current study has established that of the eight supply chain risks examined only three demand variability risks (profit margin erosion, product flow disruption and product quality failure) have a significant negative effect on the performance of large scale manufacturing firms. The fourth Demand variability risk (sudden demand change) and all the supply demand risks (Inaccurate demand forecasting, fluctuating occupancy of processing and distribution capacity, Fluctuating financial ratios and capital requirements and Low service levels) all were established to be having insignificant negative effect on performance.

4.6Effect of SC Strategies on Performance

The second objective of the study was to determine the effect of SC Strategies on performance of large scale manufacturing firms in Kenya. SC Strategies were categorised as the mid-range and long-rangeSC Strategies. Mid-Range SC Strategies comprising of (synergistic; information networks; project logistics and innovation) while Long range SC Strategies comprised of (nano-chain; market dominance; value chain; extended; efficient; risks-hedging; micro-chain; cash-to-cash cycle; speed to market; tie down; none existent; and demand supply chain strategies).

Even though earlier in validating the instrument the factor loading for supply chain strategies were only two implying that the SC Strategies could be categorised into two for ease of analysis. This was not the case as it is believed that each of the sixteen supply chain strategies has a unique operational effect on performance which the study hoped to determine, and if grouped together then the essence of sixteen strategies would have been lost.

Performance was measured as a composite of (customer satisfaction, cost efficiency, capacity utilization, research & development, sales volume, reduction in inventory cost, reduction, reduction in unit cost, range of products, inventory turnover rate and total average inventory)which were averaged to come up with overall firm's performance.Multiple regression analysis with backward elimination starting with all SC Risk measures and reducing them one by one (from the ones with the highest p-values) until the model remained with only SC Risk indicators that had a significant p-value at 95% Confidence level was done(See Appendix VI).

The final model had only three SC Strategies items which had a significant negative effect on performance namely (a strategy that aligns information systemsarchitectures and systems, a strategy that increases the firm's ability to mass-maximize and build close relations with customers and a supply chain strategy that allows the firm and supply chain members to adopt to different products of different segment of the market). All the other remaining indicators for SC Strategies had insignificant negative effect on performance and were therefore eliminated and not presented in the final regression coefficients Table 4.6.

Theoretical reasoning, the empirical and theoretical literature reviewled to the belief that both Mid-range andLong-range supply chain strategies would have a significant effect on performance.Hence following null hypothesis wasformulated and tested:

$H0_2$: Supply chain strategieshave no significant effect on performance of large scale manufacturing firms in Kenya.

To test this null hypothesis, a full regression model was fitted as in presented in Table 4.6.

	R Square	Adjusted R Square	RMSE	F	Sig
Model No. ii	0.636	0.636	0.450	33.200	0.000

Table 4. 6: Effect of SC Strategies on performance

Source: (Survey data, 2018)

The adjusted R^2 of 0.636 in Table 4.7 indicate that 0.636 (63.6%) of the variance in Performance is explained by SC Strategies. This implies that 63.6% of the variation in Performance is explained by SC Risks and while the remaining 36.4% is explained by the other variables not included in the study. The F-statistics(33.20)which is greater than 2 and a p value of= 0.000 implies that SC Strategies have a significant effect on performance at a confidence level of 95%.

Table 4. 7Effect of SC Strategies on Performance

SC STRATEGIES	B	Std. Error	t	Sig.
(Constant)	0.952	0.174	5.49	0.000

A strategy that aligns information systems architectures and systems	0.064	0.029	2.21	0.000
A strategy that increases the firm's ability to mass-maximize and build close relations with customers	0.158	0.031	5.01	0.000
A supply chain strategy that allows the firm and supply chain members to adopt to different products of different segment of the market.	0.054	0.019	2.84	0.000

Source: (Survey Data, 2018)

The equation for the regression model is expressed as:

$P = 0.952 + 0.064SCS_1 + 0.158SCS_2 + 0.054SCS_3$……...…(4.2)

The results of the regression model equation (4.2) indicatesthat if all the independent variablesSC Strategies (synergistic; information networks; project logistics andinnovation, nano-chain; market dominance; value chain; extended; efficient; risks-hedging; micro-chain; cash-to-cash cycle; speed to market; tie down; none existent; and demand supply chain strategies) wereheld constant, performance would be predicted to be ($\beta = 0.952$, $p = 0.000$.

The study established SCStrategies aligning information systems architectures and systems to respond to changing customer demands to be having significant effect on performance($\beta = 0.064$, $p = 0.000$). This statistically indicates that a change of one standard deviationin SC Strategies that aligns information systems architectures and systems to respond to changing customer demandsresults in 0.064 standard deviations increase in performance.Ideally if the large-scale manufacturing firms were to adopt SC Strategies that alignsinformation systems architectures and systems to respond to changing customer demandsthey would experience an improvement in their performance.

Moreover, SC Strategies increasing the firm's ability to mass-maximize and build close relations with customers when designing new and modifying existing products was established to be having a significant effect on performance($\beta = 0.158$, $p = 0.000$). This statistically indicates that a change of one standard deviationin SC Strategies increasing the firm's ability to mass-maximize and build close relations with customers when designing new and modifying existing products results in 0.158 standard deviations

increase in performance.Ideally if large scalemanufacturing firmswere to increase their adoption of SC strategies that increase their ability to mass-maximize and build close relations with customers when designing new and modifying existing productsthey would experience an increase in their performance.

Furthermore, SC Strategies that allow the firm and supply chain members to adopt to different products of different segment of the market was established to be having a significant effect on performance($\beta = 0.054$, $p = 0.000$). This statistically indicates thata change of one standard deviationinSCStrategies that allow the firm and supply chain members to adopt to different products of different segment of the market results in 0.054 standard deviations increase in performance.Ideally if large-scale manufacturing firms were to adopt SCStrategies that allow it and its supply chain members to adopt to different products of different segment of the marketthey would experience an increase in their performance.

Thus supply chain strategies increasing the firm's ability to mass-maximize and build close relations with customers when designing new and modifying existing products had the highest positive significant effect on performance ($\beta = 0.158$) followed by supply chain strategies aligning information systems architectures and systems to respond to changing customer demands with a significant positive effect of ($\beta = 0.064$) and then Supply chain strategies that allow the firm and supply chain members to adopt to different products of different segment of the market with a significant positive effect of ($\beta = 0.054$) on performance of large scale manufacturing firms in Kenya.

The regression results of ($F=33.200$, $p = 0.000$)clearly indicates a significant effect of SCStrategies on performance and is a suffice evidence to conclude that SC Strategies have a significant effect on performance. The null hypothesis that SC Strategies have no significant effect on performance of large scale manufacturing firms was therefore rejected.These findingscorroborates the assertions of RBV(Prahald& Hamel, 1990) that SC Strategies which are valuable and rare amongst firms, imperfectly imitable and heterogeneous as they are developed within the firmcan be used exploit opportunities to enhance the firm's performance.

In the same vein as the study findings Albert Aragon-Correa, Hurtado-Torres, Sharma, & Garcia-Mprales (2008) investigating the effect of environmental strategy and

performance in small firms in a study of more than 108 SMEs in the automotive repair sector in Southern Spain. Found that SMEs undertake a range of environmental strategies and the most proactive strategies exhibited a significantly positive financial performance.

These findings support the findings of John (2010) who seeking to investigate the link between business strategy and performance giving special attention to the composition of combination of strategies using survey assessed 277 retail business in the USA established that a combination of strategies was associated with higher performance in some but not all instances.

The establishment of an R^2 supports the findings by Nyaoga, Magutu and Aduda (2015) who investigated if there is a link between supply chain strategiesand firm performance evidence from large-scalemanufacturing firms in Kenya and established that supply chain strategies areindeed useful predictors of the firm's performance as supply chain strategies explained63.6%variationsin the firm's performance.These findings clear the contradiction by Menor et al. (2007) that the investment in supply chain strategy is associated with increased costs and it does not translate to improved firm performance.

The study established that SC Strategies have a significant effect on performance of large scale manufacturing firms. Of the sixteen SC Strategies only three SC Strategies that is SC Strategy that aligns information systems architectures and systems to respond to changing customer demands a supply chain strategy that increases the firm's ability to mass-maximize and build close relations with customers when designing new and modifying existing products and a SC Strategy that allows the firm and supply chain members to adopt to different products of different segment of the market had a significant positive effect on the performance of the large scale manufacturing firms in Kenya. The other thirteen SC strategies even though had positive effect on the performance of the firm, their effect were insignificant.

4.7 Confounding Effect of SC Strategies on SC Risks and Performance

Objective three was meant to establish the effect of SC Strategies on the relationship between SC Risks and performance of large scale manufacturing firms in Kenya.The exposure variable were the Supply demand variability risk being the risks residing in purchasing, suppliers, supplier relationships, supply networks consisting of (inaccurate

demand forecasting, fluctuating occupancy of processing and distribution capacity, fluctuating financial ratios and capital requirements and low service levels)and demand variability risks being risk resulting from disruptions emerging from downstream supply chain operations consisting of (profit margin erosion, sudden demand change, physical products flow disruption product quality failure.

The confounder variable was SC Strategies which were categorised as mid-range and long-range SC Strategies. Mid-Range SC Strategies comprising of (synergistic; information networks; project logistics and innovation) while Long range SC Strategies comprised of (nano-chain; market dominance; value chain; extended; efficient; risks-hedging; micro-chain; cash-to-cash cycle; speed to market; tie down; none existent; and demand supply chain strategies).The outcome variable was performance measured as a composite of (customer satisfaction, cost efficiency, capacity utilization, research & development, sales volume, reduction in inventory cost, reduction, reduction in unit cost, range of products, inventory turnover rate and total average inventory)which were averaged to come up with overall firm's performance.

Multiple regression analysis with backward elimination starting with all the SC Strategies and SC Risk measures and reducing them one by one (from the ones with the highest p-values) until the model remained with only SC Strategies and SC Risk indicators that had a significant p-value at 95% Confidence level was done. The final model had only three SC Risks (profit margin erosion, physical product flowdisruption and product quality failure and two SC Strategies(a strategy that aligns information systems architectures and systems to respond to changing customer demands and a supply chain strategy focused on variable productivity to meet speculative purchasing and sales promotion. All the other remaining indicators for SC Strategies and SC Risk had insignificant effect on performance and were therefore eliminated and not presented in the final regression coefficients Table 4.8 (See Appendix VII).

Theoretical reasoning, the empirical and theoretical literature reviewled to the belief that SCStrategies would have an effect on the relationship between SC Risk and performance.Hence following null hypothesis wasformulated and tested:

$H0_3$: Supply chain strategies have no significant effect onthe relationship between supply chain risks and performance of large scale manufacturing firms in Kenya.

To test this null hypothesis, a full regression model was fitted

Table 4. 8: Effect of SC Strategies on the Relationship between SC Risks and Performance

	R Square	Adjusted R Squared	RMSE	F	Sig
Model No. iii	0.780	0.785	0.414	39.44	0.000

Source: (Survey Data, 2018)

The adjusted R^2 of 0.785 in Table 4.8 indicate that 78.5% of the variance in the relationship between SC Risk and Performance is explained by the adjustment of SC Strategies. This implies that only 78.5% of the variation in the relationship between SC Risks and Performance is explained by the adjustment of SC Strategieswhile the remaining 21.5% is explained by the other variables not included in the model. The F-statistics (39.44)is greater than 2 and p value of p= 0.000 implies that SC Strategies have a significant effect on the relationship between SC Risk and performance at a confidence level of 95 percent.

Table 4. 9: Effect of SC Strategies on the Relationship between SC Risks and Performance

SC Risksand SC Strategies	B	Std. Error	T	Sig.
(Constant)	2.609	0.158	16.46	0.000
Profit margin erosion	-0.067	0.024	-2.77	0.006
Physical products flow disruption	-0.062	0.021	-3.00	0.003
Product quality failure	-0.098	0.021	-5.00	0.000
A strategy that aligns information systems architectures and systems to respond to changing customer demands	0.091	0.027	3.41	0.001
A supply chain strategy focused on variable productivity to meet speculative purchasing and sales promotion	0.083	0.017	4.92	0.000

Source: (Survey data, 2018)

The equation for the regression model is expressed as:

$$\text{Performance} = 2.609 - 0.067SCR_1 - 0.62SCR_2 - 0.098SCR_3 + 0.091SCS_1 + 0.083SCS_2 \quad \ldots\ldots 4.3$$

The equation (4.3) regression model indicates that performance would be at (β= 2.609, p= 0.000) holding the SC Risks and SC Strategies factors constant.

After inclusion of SC Strategies in the relationship between SC Risks and performance, SCRisks (profit margin erosion)was established to be having a significant effect on performance (β = - 0.067, p = 0.006).This statistically implies that a change of one deviation in SC Risks (profit margin erosion) after adjusting for SC Strategiesresults in a -0.067 standard deviations decrease in performance at 95% confidence level. Ideally if the large-scale manufacturing firms were to adopt SC Strategies after experiencing SC Risks (profit margin erosion), there would still be a decrease in performance. However,after the adjustment of SC Strategies there is a statistically significant decrease in the negative effect of SC Risk (profit margin erosion) on performance from (β = -0.074, p=0.005) in Table 4.5 to (β = -0.067, p= 0.006) in Table 4.9. The association is lower after the adjustment with a regression coefficient decreases of 10.3%. Considering the first informal rule (i.e. a change in the coefficient in either direction by 10% or more) the criteria for a confounding variable is met by the SC Strategies.

On inclusion of SC Strategies in the relationship between SC Risks and performance, SC Risks (physical product flow disruption) was established to be having a significant effect on performance (β = - 0.062, p = 0.003). This statistically implies that a change of one deviation in SC Risks (physical product flow disruption) after adjusting for SC Strategies results in a -0.062 standard deviations decrease in performance at 95% confidence level. Ideally if the large-scale manufacturing firms were to adopt SC Strategies after experiencing SC Risks (physical product flow disruption), there would still be a decrease in performance. However, after the adjustment of SC Strategies there is a statistically significant decrease in the negative effect of SC Risk (profit margin erosion) on performance from (β = -0.078, p =0.000) in Table 4.5 to (β = -0.062, p = 0.006) in Table 4.9.The association is lower after the adjustment with a regression coefficient decreases of 25.8%. Considering the first informal rule (i.e. a change in the coefficient in either direction by 10% or more) the criteria for a confounding variable is met by the two SC Strategies.

On inclusion of SC Strategies in the relationship between SC Risks and performance, SC Risks (product quality failure) was established to be having a significant effect on performance (β = - 0.098, p = 0.000). This statistically implies that a change of one deviation in SC Risks (product quality failure) after adjusting for SC Strategies results

in a -0.098 standard deviations decrease in performance at 95% confidence level. Ideally if the large-scale manufacturing firms were to adopt SC Strategies after experiencing SC Risks (product quality failure), there would still be a decrease in performance. However, after the adjustment of SC Strategies there is a statistically significant decrease in the negative effect of SC Risk (product quality failure) on performance from (β = -0.098, p =0.000) in Table 4.5 to (β = -0.113, p = 0.000) in Table 4.9. The association is lower after the adjustment with a regression coefficient decreases of 25.8%. Considering the first informal rule (i.e. a change in the coefficient in either direction by 10% or more) the criteria for a confounding variable is met by the two SC Strategies.

SC Strategy that align information systems architectures and systems to respond to changing customer demands was established to be having a significant positive effecton performance (β = 0.091, p = 0.001). This statistically indicates thata change of one standard deviation in SC Strategy that align information systems architectures and systems to respond to changing customer demands results in 0.091 standard deviationsincrease in performance.Ideally if the large-scale manufacturing firms were to adopt a SC Strategy that align information systems architectures and systems to respond to changing customer demands there would be a significant increase in their performance.On adjusting SC strategies into the relationship between SC Risk and performance an increase is noted on the effect SC Strategies that align information systems architectures and systems to respond to changing customer demands from (β = 0.064, p = 0.000) in table 4.7 to (β = 0.091, p = 0.001) in Table 4.9

SC strategy that is focused on variable productivity to meet speculative purchasing and sales promotionwas established to be having a significant positive effect on performance (β = 0.091, p = 0.001). This statistically indicates that a change of one standard deviation in SC strategy that is focused on variable productivity to meet speculative purchasing and sales promotion results in 0.091 standard deviations increase in performance. Ideally if the large-scale manufacturing firms were to adopt a SC strategy that is focused on variable productivity to meet speculative purchasing and sales promotion there would be a significant increase in their performance. On adjusting SC strategies into the relationship between SC Risk and performance an increase is noted on the effect SC strategy that is focused on variable productivity to meet

speculative purchasing and sales promotion from (β = 0.054, p = 0.000) intable 4.7 to (β = 0.083, p = 0.000) in Table 4.9

Due to the severalitemsused for the independent variables only the second informal rule could be applied in making conclusion as to the weather SC Strategies is a confounding variable.The difference between the adjusted R^2 in Table 4.4(68.1%) and the adjusted R^2in Table 4.8(78.5%) is 10.4%. In reference to the second informal ruleof a confounding variable (i.e.an adjusted R^2 change of 10% or more in either directionafter adjustment of a variable is a sufficient evidence that the adjusted variable is a confounding variable) the criteria for a confounding variable was met by the SC Strategies.

The adjusted R^2change(increase)of 10.4%from an adjusted $R^2$68.1% in Table 4.4to an adjusted $R^2$of 78.5% in Table 4.8 and the f-test of (39.440) with (p= 0.000) at 95% confidence level is suffice evidence to conclude that SC Strategies have a significant confounding effect on the relationship between SC Risk and performance of large scale manufacturing firms in Kenya.The results indicate that 78.5% of the variance in the relationship between SC Risk and Performance is explained by the adjustment of SC Strategies. This implies that only 78.5% of the variation in the relationship between SC Risks and Performance is explained by the adjustment of SC Strategies while the remaining 21.6% is explained by the other variables not included in the model. The F-test is (39.440) with p value of = 0.000 implying that SC Strategies have a significant effect on the relationship between SC Risk and performance at a confidence level of 95%.

The hypothesisthatSC Strategies have no significant confounding effect onthe relationship between SCRisks and performance of large scale manufacturing firms in Kenya was therefore rejected.These finding resonates with the assertions of RBV (Prahald& Hamel, 1990)that SC Strategies which are valuable and rare amongst firms, imperfectly imitable and heterogeneous as they are developed within the firmcan be used to neutralize threats (supply chain risks) from the firm's environment and exploit opportunities to enhance the firm's performance.

These findings confirm the postulation Florian and Constangioara (2014) of a relationship between supply chain risk, supply chain strategies and performance. They

hinted at hints at a possible relationship between supply chain strategy, supply chain risk and performance by stating that the existence of adequate SCRM strategies precludes thenegative consequences of risks on organizational performances. The findings also support the theoretical suggestion by Tang (2006) who relatedly theorizedthat firms may be able to influence their vulnerability to disruptions by adopting different supply chain strategies (including postponement and storing inventory at strategic locations).

The study findings corroborates Mburu*et al*. (2015) findings who in attempt to assess the effect of risks identificationmanagement strategy on supply chainperformance in manufacturingcompanies in Kenya. The study findings indicated that inorder to enhance a smooth performance of supply chain in a company given the changing natureof markets due to increased diversity adequate risks identification and management is inevitable. These findings are in the same vein with the findings of Florian and Constangioara (2014) who using a national sample of 64 Romanian companies fromvarious industries to document the relationship between organizational performances andrisks in the context of Romanian supply chains found out that supply chainrisks management strategy successfully mitigates the negative consequences of risks.

Relatedly Soegomo, Alhabsyi, and Arif (2014) focusing on Company Strategy as the exogenous variables, Enterprise Risks Management, Organizational Culture, Supply Chain Management and Company Performance as the endogenous variables on Coal Mining Companies at East and South Kalimantan used explanatory research, by using the Enterprise Risks Management instruments from KPMG Australia (2001), strategy quality instrument from Tilles(1983), Organizational Culture instruments from Hofstede (1994), and Supply Chain Management instrument from Partiwi (2009). Partial Least Square was used to test the effect of those variables on five coal mining companies in East and South Kalimantan was tested by Partial Least Square (PLS). The research showed that Company Strategy has a significant effect on Enterprise Risks Management, Company Strategy has a significant effect on Organizational Culture, Company Strategy has an insignificant effect on Supply Chain Management, Company Strategy has a significant effect on Company Performance, and Enterprise Risks Management has a significant effect on Company Performance.

The establishment of supply chain strategies as a confounder lend credence to the work by Bolo (2011) who in almost a similar study to the present but exploring strategic management focused on the joint effect of selected strategy variables on performance of large privatemanufacturing firms of the supply chains in Kenya. He used cross sectional survey research design and found out from empirical evidence that the independent effect of core competencies,core capabilities, strategy, strategy implementation on firms' performance is weaker compared to thejoint effect of the same variables.

CHAPTER FIVE

SUMMARY CONCLUSSION AND RECOMENDATIONS

This chapter presents summary of the study findings, conclusion of the study, recommendations of the study and suggestions for further studies.

5.1 Summary of Findings

The first objective sought to establish the effect of SCRisk on performance of large scale manufacturing firms in Kenya.Supply Chain Risks were established to be having a significant effect on performance of the large scale manufacturing firms in Kenya.The current study has established that of the eight supply chain risks examined only three demand variability risks (profit margin erosion, product flow disruption and product quality failure) have a significant negative effect on the performance of large scale manufacturing firms. The fourth Demand variability risk (sudden demand change) and all the supply demand risks (Inaccurate demand forecasting, fluctuating occupancy of processing and distribution capacity, Fluctuating financial ratios and capital requirements and Low service levels) all were established to be having insignificant negative effect on performance.

The second objective sought to determine the effect of the sixteen supply chain strategies on performance of large scale manufacturing firms in Kenya.The study established thatSC Strategies have a significant effect on performance of large scale manufacturing firms.Of the sixteen SC Strategies only three SC Strategies that is SC Strategy that aligns information systems architectures and systems to respond to changing customer demands a supply chain strategy that increases the firm's ability to mass-maximize and build close relations with customers when designing new and modifying existing products and aSC Strategy that allows the firm and supply chain members to adopt to different products of different segment of the market had a significant positive effect on the performance of the large scale manufacturing firms in Kenya.The other thirteen SC strategies even though had positive effect on the performance of the firm, their effect were insignificant.

The third objective sought to establish the effect of supply chain strategies on the relationship between SC Risks and performance of large scale manufacturing firms in

Kenya.The study established that SC Strategies have a significant confounding effect on performance of large scale manufacturing firms in Kenya.Confounding effect was noticeable on all the SC Risks and SC Strategy items. However the only significant confounding effect was on SC Risks (Profit margin erosion, Physical products flow disruption and Product quality failure) and on SC Strategies (SC Strategy that aligns information systems architectures and systems to respond to changing customer demands and SC Strategy focused on variable productivity to meet speculative purchasing and sales promotion) whereas the rest were insignificant.

5.2 Conclusion

The results for objective one indicate that SC Risks generally have a significant effect on performance of large scale manufacturing firms. It also emerged that even though all the SC Risks have negative effect on performance not all of them are significant as only three of the demand variability risk (Profit margin erosion, physical products flow disruption and product failure) have a significant effect while the rest of the studied SC Risks have insignificant effect on performance. The study therefore concludes that demand variability risks are the SC Risks whose occurrence negatively impacts on the performance of the firms.

The results for objective two indicate that SC Strategies have a significant effect on performance of large scale manufacturing firms. It also indicate that even though all the SC strategies have a positive effect on performance not all them have a significant effect on the performance of the firms as only three SC Strategies have a significant effect on performance with the other thirteen SC Strategies having insignificant effect on performance. It is evident from the results that when examined together the SC Strategies will have a significant effect on performance but when examined as single strategies most of them have no significant effect on performance and this leads this to the conclusion that the SC Strategies can best constitute to the firms performance when all employed in the SC Process.

The study established that SC Strategies have a significant confounding effect on the relationship between SC Risks and performance.The confounding effect is however only significant on two SC Strategies and three SC Risks items. The results have also indicated that only those SC Risk and SC Strategies that were established to be having significant effect on performance are the ones that have been confounded. The study

therefore concludes that the confounding effect is only occurs on the items that have significant effect on the dependent variable and for this case it is performance and only upon introduction of all the SC Strategies into the relationship.

5.3 Recommendations

All supply chain risk have been established to be having a negative effect on performance, of all the supply chain risk studied on three have a significant negative effect on performance while the other seven supply chain risk have insignificant negative effect on performance. The study recommendstherefore that all supply chain risks be averted and in particular product quality failure, physical products flow disruption and profit margin erosion as they have a high negative effect on performance compared to the other SC Risks.

Based on the conclusion of objective two the study recommends that managers recognize the need ofall the SC Strategies in enhancing performance of the various functions of the supply chain. The study highly recommends the adoption of all the sixteen SC Strategies as their effect is more pronounced when they have all been adopted.

Based on the conclusions of objective three the study recommends the adoption of SC Strategies to preclude the negative effect that SC Risks have on performance and at the same time enhance performance. It advocates for the adoption of all the sixteen SC Strategiesin precluding the negative effect of SC Risk and constituting performance at the same time.

5.4 Limitations of the Study

A number of steps were taken to ensure precision and realism through the pilot study to ensure applicability if the questions to the respondents and the large scale manufacturing
firms. Although these steps were taken, the following limitations were observable in this
empirical study. A recognized constraint was that the study lacked the benefit of a similar
local study in an African context rendering it difficult to make comparisons as most of them are done in western developed countries

The study had another challenge to do with covering all large scale manufacturing firms in Kenya with geographically dispersed towns requiring a lot resources and time. My research assistants were forced to use some family infrastructures while taking a lot of time to get to all the large scale manufacturing firms which are widespread in Nairobi.

Another limitation is respondents to this study were supply chain managers. This gave the study good depth and breadth within the firms supply chain as they are the ones responsible with the overall management. This did notextend beyond the firm's boundaries hence lacked a dyadic approach. Given thatinformation was not captured from both sides of the dyad, this might have led to biaswhere some important details about the phenomenon might have been ignored given thesupply chain is made up several partners for example the manufacturers' suppliers andcustomers.

5.5 Suggestions for Further Studies

The limitations in the previous section can be addressed but beyond that, there are a number of interesting and exciting future research possibilities based on the findings from

this study. While the objective of this study was achieved, the future research in an effort

to enhance the conclusions of this study's findings can consider the following.

This study drew its sample from large scale manufacturing firms, and further research should include a broader perspective of all manufacturing firms or small scale firms. The

same can be applied to the service firms and industry.

Overall firm performance was measured by supply chain performance outcome and firm

performance in this study. This did not treat supply chain performance outcome as a mediating variable. Future research can test the mediating effect of supply chain performance in the relationship between SC strategies and firm performance. This will involve checking whether the SC performance has an influence on firm performance.

The current study was done in a manufacturing setting. Future studies can therefore bedone on the service industry given that operations and supply chain strategies are for bothservice and manufacturing settings. This can compare the supply chain strategies 97

and supply chain risks that apply to service and manufacturing settings in adeveloping economy.

This study focused on supply chain strategies which could cut across procurement, valuecreation and distribution. Future studies can narrow their focus to procurement strategies, value creation strategies and distribution strategies by comparing their impact on firmsupply chain performance and overall performance.

The data collected for firm and SC performance was quantitative in nature. This was in order to provide a rich research data basefor future research, future study may explore alternative performance measurementindicators of the quantitative nature, such as financial measures, accounting measures,balance score cards, linkages to financial statements amongst others. These secondarydata was not easy to get. The firms indicated that it was classified information while otherindicated that was confidential, hence giving the researcher tough conditions in its use.Future research can use the indicators on firm performance and supply chain performancein an effort to get qualitative information and issues regarding the resources andcapabilities that have been dedicated to these indicators. The implementation process insupply chain strategies and adoption of the supply chain technologies was not well covered in this study. Further research can focus on the implementation and “adoption” as opposed to “use” within the same relation to give some insight the qualitative issuesbehind the use of supply chain strategies and technologies in firms.

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APPENDICES

Appendix I: Research Permit

Appendix II: Introduction Letter

Dear Sir/Madam, ----------

RE: Supply Chain Risks, Supply Chain Strategies and Performance of Large Scale ManufacturingFirms in Kenya

I am a doctoral Candidate in the Department of Management Science, School of Business and Economic,Maseno University. I am in my research year of my postgraduate studies focusing on "supply chain risks, supply chain strategies and performance of manufacturing firms in Kenya".Please assist me in gathering enough information to present a representative finding on the currentstatus of the confounding effect of supply chain strategies on the relationship between supply chain risks and performance of large scale manufacturing firms in Nairobi, by completing theattached questionnaire.

Your participation is entirely voluntary and the questionnaire iscompletely anonymous.Any queries regarding the questionnaire or theoverall study can be directed to the undersigned. Please be assured that this information is soughtfor research purposes only and your responses will be strictly confidential. No individual'sresponses will be identified as such and the identity of persons responding will not be publishedor released to anyone. All information will be used for academic purposes only.Thank you very much for helping with this important study.

Sincerely,

Albert Washington Ochung Tambo
0713433035
alberttambo@yahoo.com

Appendix III: Informed Consent Release

Investigator:

"My name is ALBERT WASHINGTON OCHUNG TAMBO, and I am aDoctoral Student at Maseno University. I am inviting you to participate in a research study. Involvement in the study is voluntary, so you may choose to participate or not. I am now going to explain the study to you. Please feel free to ask any questions that you may have about the research; I will be happy to explain anything in greater detail.

"I am interested in learning more about *the relationship between Supply Chain Risks, Supply Chain Strategies and Performance*. You will be asked to tick in the boxes where appropriate. This will take approximately 30 mins of your time. All information will be kept *anonymous and confidential*. This means this means that your name will not appear anywhere and no one except me will know about your specific answers. A number will be assigned to your responses, and only I will have the key to indicate which number belongs to which participant. In any articles I write or any presentations that I make, I will use a made-up name for you, and I will not reveal details or I will change details about where you work, where you live, any personal information about you, and so forth.

"The benefit of this research is that you will be helping us to understand the relationship between Supply Chain Risk, Supply Chain Strategy and Performance of Larges Scale Manufacturing Firms in Kenya.Information from the findingswill act as a preamble for further research in Supply Chain. The findings will also be helpful to practitioners in understanding the role that SC Strategies in averting SC Risk and elevating organizations performance.

There are no risks to you for participating in this study. If you do not wish to continue, you have the right to withdraw from the study, without penalty, at any time."

Participant:

"All of my questions and concerns about this study have been addressed. I choose, voluntarily, to participate in this research project and I certify that I am above 18 years of age.

Name of participant _____

Signature of participant _____ Date _____

Name of investigator _____

Signature of participant _____ Date _____

Appendix IV: Questionnaire

Declaration

This research intends to determine the**effect of supply chain strategies on the relationship between supply chain risks and performance of large scale manufacturing firms in Kenya**. The information obtained from this survey shall be kept confidential and shall be used strictly for academic purposes only.

Your participation in this survey shall be highly appreciated. Tick where appropriate

SECTION A: SUPPLY CHAIN RISKS

1. To what extent has your firm suffered from the following supply chain risks? Use the following scale: 1= No Extent; 2 = Small Extent; 3 = Average; 4 = Great Extent; 5 = Very Great Extent

Supply Chain Risks	Extent				
	1	2	3	4	5
Inaccurate demand forecasting					
Fluctuating occupancy of processing and distribution capacity					
Fluctuating financial ratios and capital requirements					
Low service levels					
Profit margin erosion					
Sudden demand change					
Physical products flow disruption					
Product quality failure					

SECTION B: SUPPLY CHAIN STRATEGIES

2. To what extent has your firm used the following supply chain strategies in an effort to support Supply Chain Management and improve the overall organizational performance? Use the following scale: 1= No Extent; 2 = Small Extent; 3 = Average; 4 = Great Extent; 5 = Very Great Extent

Supply Chain Strategies	Extent				
	1	2	3	4	5
A strategy that aligns information systems architectures and systems to respond to changing customer demands.					
A strategy that allows the firm to cost effectively receives and delivers products as the sources of supply and customer change.					
A strategy that allows the firm's assets and operations to react to emerging customers trends at each node of the supply chain.					
A strategy that increases the firm's ability to mass-maximize					

and build close relations with customers when designing new and modifying existing products.					
A strategy that provides balance of flexibility and cost efficiency in the supply chain while meeting the marketplace requirements.					
A strategy where the firm continuously plans its supply chain network to limit exposure to cost fluctuations.					
A strategy where the firm creates additional relationship with supply chain members at the point where their operation interact.					
A strategy where the firm evaluates opportunities to outsource areas that are not their core competencies in the supply chain.					
A supply chain strategy aimed at speeding & retaining firm cash flow					
A supply chain strategy focused on variable productivity to meet speculative purchasing and sales promotion.					
A supply chain strategy that allows the firm and supply chain members to adopt to different products of different segment of the market.					
A supply chain strategy directed to minimizing risks like production capacity, quality, floods and earthquakes in the process of procurement, production and distribution.					
A supply chain strategy that is reactive to procurement, production and distribution in dynamic environments to answer to customer needs.					
A supply chain strategy where numerous internal and external activities are co-ordinated to conform to the overall business strategy.					
A supply chain strategy where the firm does not have or pursue a formal supply chain strategy.					
Supply chain a strategy responsive and flexible to customer needs to enable the firm Feed Customers in ways that are efficient for them.					

SECTION C: PERFORMANCE

3. To what extent would you rate your organizations performance on the following? Use the following scale: 1= Very Low; 2 = Low; 3 = Averagely; 4 = High; 5 = Very High

FIRMS PERFORMANCE	**Extent**				
	1	**2**	**3**	**4**	**5**
Firm's Performance					
Customer satisfaction					
Cost efficiency					
Capacity Utilization					
Research & Development					
Supply Chain 5**Performance**					

Sales Volume					
Reduction in Inventory Cost					
Reduction in unit Cost					
Range of Products					
Inventory Turnover Rate					
Total Average Inventory					

THANK YOU FOR YOUR TIME

Appendix V: Model Summary for the Effect of SC Risk on Performance

Model 1				
SC RISKS	**B**	**Std. Error**	**T**	**Sig.**
(Constant)	3.583	0.17	21.04	0.000
Inaccurate demand forecasting	0.035	0.045	0.78	0.434
Fluctuating occupancy of processing and distribution capacity	0.004	0.055	0.07	0.947
Fluctuating financial ratios and capital requirements	-0.032	0.035	-0.92	0.358
Low service levels	-0.046	0.039	-1.17	0.241
Profit margin erosion	-0.064	0.028	-2.29	0.022
Sudden demand change	-0.038	0.022	-1.68	0.094
Physical products flow disruption	-0.065	0.023	-2.82	0.005
Product quality failure	-0.098	0.025	-3.9	0.000
Model 2				
SC RISKS	**B**	**Std. Error**	**T**	**Sig.**
(Constant)	3.586	0.164	21.83	0.000
Inaccurate demand forecasting	0.036	0.039	0.93	0.354
Fluctuating financial ratios and capital requirements	-0.032	0.034	-0.93	0.353
Low service levels	-0.046	0.039	-1.17	0.241
Profit margin erosion	-0.064	0.028	-2.3	0.022
Sudden demand change	-0.038	0.022	-1.68	0.093
Physical products flow disruption	-0.065	0.023	-2.84	0.005
Product quality failure	-0.098	0.025	-3.93	0.000
Model 3				
SC RISKS	**B**	**Std. Error**	**T**	**Sig.**
(Constant)	3.532	0.118	29.84	0.000
Low service levels	-0.04	0.038	-1.05	0.296
Profit margin erosion	-0.06	0.027	-2.21	0.028
Sudden demand change	-0.034	0.021	-1.57	0.117
Physical products flow disruption	-0.068	0.023	-3.01	0.003
Product quality failure	-0.097	0.024	-4.1	0.000
Model 4				
SC RISKS	**B**	**Std. Error**	**T**	**Sig.**
(Constant)	3.443	0.099	34.82	0.000
Profit margin erosion	-0.074	0.026	-2.83	0.005
Physical products flow disruption	-0.078	0.022	-3.53	0.000
Product quality failure	-0.113	0.022	-5.08	0.000

Source: Survey Data, 2018)

Appendix VI: Model Summary for the Effect of SC Strategies on Performance

Model 1				
SC STRATEGIES	**B**	**Std. Error**	**t**	**Sig.**
(Constant)	0.91	0.205	4.43	0.000
MRSCS - 1	0.114	0.03	3.83	0.000
MRSCS – 2	0.064	0.037	1.72	0.087
MRSCS – 3	-0.024	0.05	-0.49	0.627
MRSCS – 4	0.137	0.049	2.8	0.005
LRSCS – 1	-0.089	0.086	-1.03	0.302
LRSCS – 2	-0.106	0.275	-0.39	0.699
LRSCS – 3	0.126	0.134	0.94	0.349
LRSCS – 4	-0.071	0.236	-0.3	0.765
LRSCS – 5	0.069	0.083	0.84	0.401
LRSCS – 6	0.112	0.084	1.33	0.185
LRSCS – 7	0.116	0.046	2.54	0.012
LRSCS – 8	-0.023	0.045	-0.52	0.603
LRSCS – 9	0.057	0.156	0.36	0.716
LRSS – 10	-0.063	0.225	-0.28	0.779
LRSCS – 11	-0.107	0.17	-0.63	0.529
LRSCS – 12	0.074	0.086	0.86	0.391
Model 2				
SC STRATEGIES	**B**	**Std. Error**	**t**	**Sig.**
(Constant)	0.893	0.198	4.51	0.000
MRSCS - 1	0.115	0.03	3.83	0.000
MRSCS - 2	0.064	0.037	1.74	0.083
MRSCS - 3	-0.022	0.05	-0.45	0.655
MRSCS - 4	0.139	0.049	2.86	0.005
LRSCS - 1	-0.085	0.085	-1	0.317
LRSCS - 2	-0.178	0.139	-1.28	0.202
LRSCS - 3	0.130	0.133	0.98	0.328
LRSCS - 5	0.072	0.08	0.91	0.363
LRSCS - 6	0.105	0.081	1.29	0.197
LRSCS - 7	0.111	0.044	2.55	0.011
LRSCS - 8	-0.02	0.044	-0.45	0.652
LRSCS - 11	-0.124	0.084	-1.47	0.141
LRSCS - 12	0.08	0.079	1.01	0.312
Model 3				
SC STRATEGIES	**B**	**Std. Error**	**t**	**Sig.**
(Constant)	0.853	0.188	4.53	0.000
MRSCS - 1	0.117	0.29	3.97	0.000
MRSCS - 2	0.061	0.035	1.74	0.084
MRSCS – 4	8 0.129	0.042	3.11	0.002

LRSCS – 1	-0.075	0.083	-0.91	0.365
LRSCS - 2	-0.188	0.134	-1.4	0.161
LRSCS – 3	0.141	0.131	1.07	0.284
LRSCS – 5	0.063	0.079	0.81	0.421
LRSCS – 6	0.102	0.081	1.26	0.208
LRSCS – 7	0.107	0.042	2.54	0.011
LRSCS - 11	-0.059	0.048	-1.23	0.220
Model 4				
SC STRATEGIES	**B**	**Std. Error**	**t**	**Sig.**
(Constant)	0.94	0.174	5.4	0.000
MRSCS - 1	0.111	0.029	3.79	0.000
MRSCS – 2	0.051	0.034	1.5	0.133
MRSCS – 4	0.115	0.04	2.91	0.004
LRSCS – 2	-0.074	0.045	-1.63	0.104
LRSCS - 6	0.071	0.036	1.96	0.051
LRSCS – 7	0.106	0.04	2.64	0.009
Model 5				
SC STRATEGIES	**B**	**Std. Error**	**t**	**Sig.**
(Constant)	0.952	0.174	5.49	0.000
MRSCS - 1	0.064	0.029	2.21	0.000
MRSCS – 4	0.158	0.031	5.01	0.000
LRSCS – 7	0.054	0.019	2.84	0.000

Source: (Survey Data, 2018)

Appendix VII: Model Summary for the Effect of SC Strategies on SC Risk and Performance

Model 1

SC Risks and SC Strategies	B	Std. Error	t	Sig.
(Constant)	2.412	0.301	8	0.000
DVR–1	0.047	0.042	1.11	0.268
DVR–2	0.047	0.052	0.9	0.368
DVR–3	-0.042	0.033	-1.25	0.211
DVR–4	-0.024	0.037	-0.64	0.525
SDR–1	-0.064	0.026	-2.41	0.016
SDR–2	-0.038	0.021	-1.78	0.076
SDR–3	-0.055	0.022	-2.45	0.015
SDR–4	-0.098	0.024	-4.07	0.000
MRSCS - 1	0.093	0.027	3.46	0.001
MRSCS – 2	0.051	0.034	1.53	0.128
MRSCS – 3	-0.052	0.046	-1.11	0.267
MRSCS – 4	0.057	0.046	1.25	0.212
LRSCS – 1	-0.018	0.078	-0.23	0.817
LRSCS – 2	0.05	0.25	0.2	0.842
LRSCS – 3	0.058	0.12	0.49	0.627
LRSCS – 4	-0.138	0.214	-0.65	0.518
LRSCS – 5	0.003	0.074	0.05	0.963
LRSCS – 6	0.14	0.076	1.86	0.064
LRSCS – 7	0.084	0.041	2.04	0.042
LRSCS – 8	-0.08	0.041	-1.94	0.053
LRSCS – 9	0.169	0.14	1.21	0.228
LRSCS – 10	0.019	0.202	0.09	0.927
LRSCS – 11	-0.24	0.153	-1.57	0.118
LRSCS – 12	0.017	0.078	0.21	0.832
Model 2				
SC Risks and SC Strategies	**B**	**Std. Error**	**t**	**Sig.**
(Constant)	2.421	0.296	8.18	0.000
DVR–1	0.046	0.042	1.09	0.276
DVR–2	0.047	0.052	0.9	0.369
DVR–3	-0.042	0.033	-1.26	0.208
DVR–4	-0.023	0.037	-0.63	0.531
SDR–1	-0.064	0.026	-2.45	0.015
SDR–2	-0.038	0.021	-1.81	0.071
SDR–3	-0.055	0.022	-2.49	0.013
SDR–4	-0.097	0.024	-4.1	0.000
MRSCS - 1	0.093	0.027	3.48	0.001
MRSCS – 2	0.051	0.033	1.54	0.125
MRSCS – 3	-0.051	0.046	-1.12	0.264
MRSCS – 4	0.057	0.045	1.25	0.213
LRSCS - 2	0.056	0.24	0.23	0.817

LRSCS – 3	0.058	0.119	0.49	0.627
LRSCS – 4	-0.145	0.202	-0.72	0.472
LRSCS – 6	0.128	0.037	3.48	0.001
LRSCS – 7	0.084	0.04	2.09	0.037
LRSCS – 8	-0.08	0.04	-2	0.046
LRSCS – 9	0.183	0.103	1.78	0.076
LRSCS – 11	-0.221	0.1	-2.2	0.028

Model 3

SC Risks and SC Strategies	B	Std. Error	t	Sig.
(Constant)	2.36	0.287	8.23	0.000
DVR–1	0.039	0.041	0.94	0.348
DVR–2	0.046	0.051	0.9	0.367
DVR–3	-0.043	0.032	-1.34	0.183
SDR–1	-0.062	0.026	-2.4	0.017
SDR–2	-0.038	0.021	-1.83	0.068
SDR–3	-0.055	0.022	-2.5	0.013
SDR–4	-0.102	0.023	-4.39	0.000
MRSCS - 1	0.092	0.026	3.47	0.001
MRSCS – 2	0.051	0.033	1.54	0.125
MRSCS – 3	-0.043	0.045	-0.95	0.343
MRSCS – 4	0.058	0.045	1.31	0.193
LRSCS – 6	0.121	0.035	3.48	0.001
LRSCS – 7	0.072	0.035	2.04	0.042
LRSCS – 8	-0.086	0.036	-2.41	0.016
LRSCS – 9	0.182	0.101	1.81	0.071
LRSCS – 11	-0.227	0.098	-2.31	0.022

Model 3

SC Risks and SC Strategies	B	Std. Error	t	Sig.
(Constant)	2.382	0.21	11.35	0.000
DVR–1	0.048	0.035	1.36	0.175
SDR–1	-0.064	0.026	-2.5	0.013
SDR–2	-0.040	0.020	-1.93	0.054
SDR–3	-0.054	0.021	-2.56	0.011
SDR–4	-0.106	0.023	-4.69	0.000
MRSCS - 1	0.091	0.026	3.47	0.001
MRSCS – 2	0.052	0.028	1.84	0.066
LRSCS – 6	0.041	0.034	1.	0.001
LRSCS – 7	0.072	0.035	2.04	0.042
LRSCS – 8	-0.086	0.035	-2.41	0.016
LRSCS – 9	0.191	0.098	1.94	0.053
LRSCS – 11	-0.229	0.098	-2.33	0.002

Model 4

SC Risks and SC Strategies	B	Std. Error	t	Sig.

(Constant)	2.609	0.158	16.46	0.000
SDR–1	-0.067	0.024	-2.77	0.006
SDR–3	-0.062	0.021	-3	0.003
SDR–4	-0.098	0.021	-5	0.000
MRSCS - 1	0.091	0.027	3.41	0.001
LRSCS – 6	0.083	0.017	4.92	0.000

(Source: Survey data, 2018)

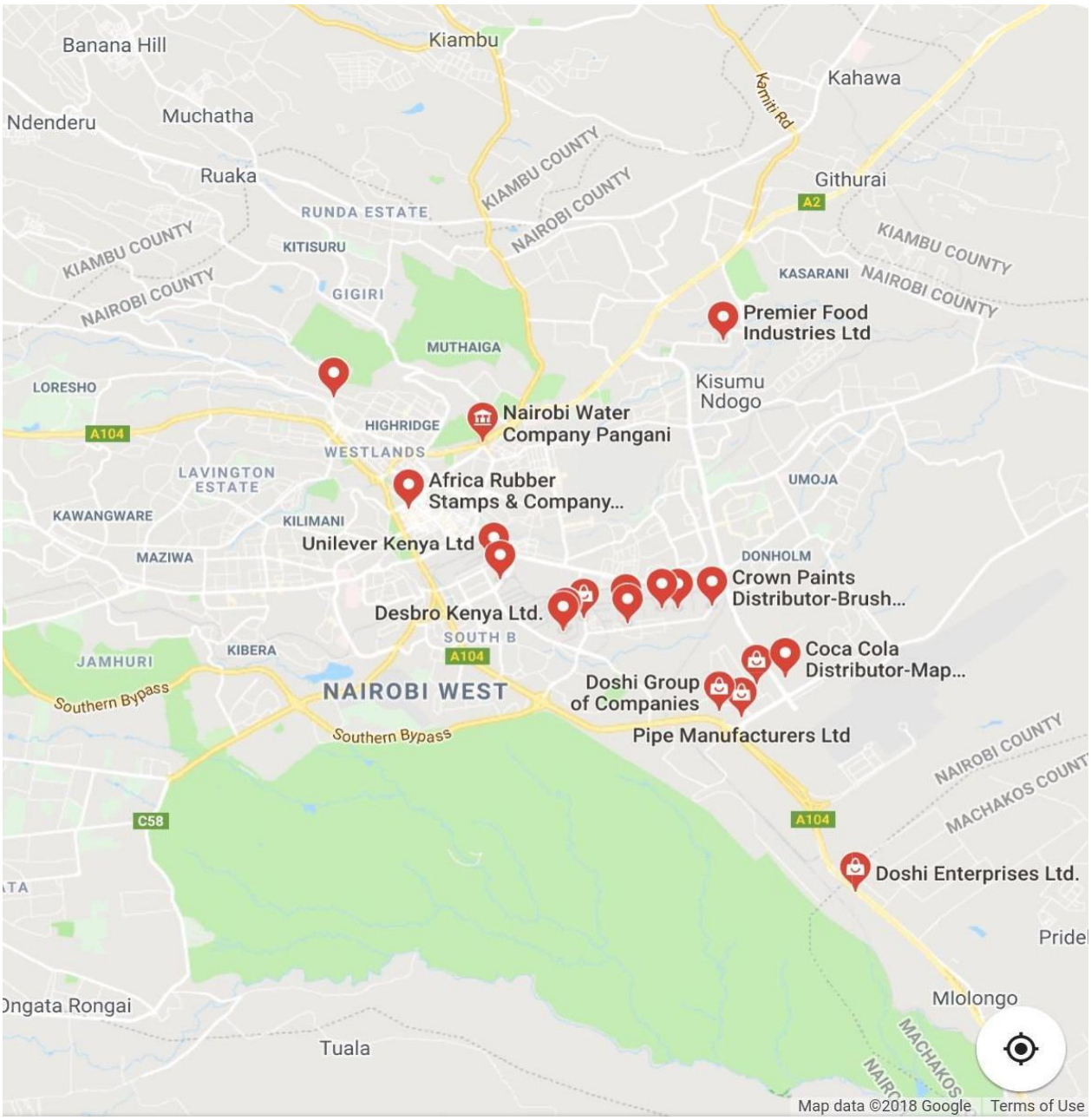
Appendix VIII: Work Plan

Month	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Year	**2016**						**2017**												**2018**											
Development of Proposal	x	x	x	x	x	x	x	x	x	X																				
Proposal Presentation at the school											x	x																		
Proposal presentation in SGS													x	x	x	x	x	x												
Carry out a pilot survey																			x											
Carry out full survey																				x	x									
Data entry and analysis																						x								
Writing the Thesis report																							x							
Submission of draft report																								x						
Submission of final report																														
External Examination																														
Oral defence																														
Report Correction																														
Graduation																														

Appendix IX: Proposal Budget

	Item	Unit	Quantity	Unit Cost	Total
1.	Pens	Pkt	100	30.00	3000.00
2.	Secretariat	No.	3	50,000	100,000.00
3.	Research Assistants	No.	20	20,000.00	400,000.00
4.	Travelling& Accommodation	No	15	50,000.00	750,000.00
5.	Binding	Pcs	50	200.00	10,000.00
6.	Airtime	Pcs	20	1,000.00	20,000.00
7.	Modem	Pcs	3	6,000.00	18,000.00
8.	Photocopying Papers	Ream	50	600.00	30,000.00
9.	Foolscap	Ream	10	450.00	4,500.00
10.	Notebooks	No.	80	100.00	8,000.00
11.	Laptops	No.	3	50,000.00	150,000.00
12.	Printer	No.	2	35,000.00	70,000.00
13.	Tonner	No.	2	15,000.00	30,000.00
14.	Flash disk	No.	3	2,500.00	7,500.00
15.	Windows Operating Systems	No.	3	7,500.00	22,500.00
16.	Data Analysis Software (SPSS)	No.	3	5,500.00	16,500.00
17.	Word Processing Software	No.	3	5,500.00	16,500.00
18.	Office Rent	Months	3	10.000.00	30,000.00
19.	Miscellaneous				50,000.00
Total					**1,736,500.00**

Appendix X: Map of Nairobi



Source: (Google Map, 2017)

Appendix XI: List of Large Scale Manufacturing Firms in Nairobi

	Manufacturing Firms		Manufacturing Firms
1	Central Glass Industries Ltd	40	KarsanMurji& Company Limited
2	Kenya Builders & Concrete Ltd	41	Manson Hart Kenya Ltd
3	Africa Spirits Ltd	42	Al-Mahra Industries Ltd
4	Belfast Millers Ltd	43	Bidco Oil Refineries Ltd
5	Breakfast Cereal Company (K) Ltd	44	Bio Foods Products Limited
6	British American Tobacco Kenya Ltd	45	Broadway Bakery Ltd
7	C.Czarnikow Sugar(EA) ltd	46	Coca-Cola East Africa Ltd
8	Cadbury Kenya Ltd	47	Confec Industries (E.A) Ltd
9	Centrofood Industries Ltd	48	Corn Products Kenya Ltd
10	Crown Foods Ltd	49	Deepa Industries Ltd
11	Cut Tobacco (K) Ltd	50	Del Monte Kenya Ltd
12	East African Breweries Ltd	51	East African Sea Food Ltd
13	Eastern Produce Kenya Ltd	52	Farmers Choice Ltd
14	Frigoken Ltd	53	Giloil Company Limited
15	Glacier Products Ltd	54	Global Allied Industries Ltd
16	Global Beverages Ltd	55	Global Fresh Ltd
17	Hail & Cotton Distillers Ltd	56	Gonas Best Ltd
18	Highlands Canners Ltd	57	Highlands Mineral Water Co. Ltd
19	Homeoil	58	Insta Products (EPZ) Ltd
20	Jambo Biscuits (K) Ltd	59	Kenblest Limited
21	Jetlak Foods Ltd	60	Kenya Breweries Ltd
22	Karirana Estate Ltd	61	Kenya Nut Company Ltd
23	Kenafric Industries Limited	62	Kenya Sweets Ltd
24	Nestle Kenya Ltd	63	Nicola Farms Ltd
25	Palmhouse Dairies Ltd	64	Patco Industries Limited
26	Pearl Industries Ltd	65	Pembe Flour Mills Ltd
27	Premier Flour Mills Ltd	66	Premier Food Industries Limited
28	Proctor & Allan (E.A.) Ltd	67	Promasidor (Kenya) Ltd
29	Trufoods Ltd	68	UDV Kenya Ltd
30	Unga Group Ltd	69	Usafi Services Ltd
31	Uzuri Foods Ltd	70	ValuePak Foods Ltd
32	W. E. Tilley (Muthaiga) Ltd	71	Basco Products (K) Ltd
33	Anffi Kenya Ltd	72	Bayer East Africa Ltd
34	Beiersdorf East Africa Ltd	73	Blue Ring Products Ltd
35	BOC Kenya Limited	74	Buyline Industries Ltd
36	Carbacid (CO2) Limited	75	Chemicals & Solvents E. A. Ltd
37	Chemicals and Solvents E.A. Ltd	76	Coates Brothers (E.A.) Limited
38	Wrigley Company (E.A.) Ltd	77	Super Bakery Ltd
39	Anffi Kenya Ltd	78	Buyline Industries Ltd

79	Basco Products (K) Ltd	118	Carbacid (CO2) Limited

80	Bayer East Africa Ltd	119	Chemicals & Solvents E. A. Ltd
81	Beiersdorf East Africa Ltd	120	Chemicals and Solvents E.A. Ltd
82	Blue Ring Products Ltd	121	Coates Brothers (E.A.) Limited
83	BOC Kenya Limited	122	Crown Gases Ltd
84	Decase Chemicals (Ltd)	123	Deluxe Inks Ltd
85	Desbro Kenya Limited	124	E.Africa Heavy chemicals (1999) Ltd
86	Colgate Palmolive (E.A.) Ltd	125	Magadi Soda Company Ltd
87	JohnsonDiversey East Africa Limited	126	Maroo Polymers Ltd
88	Kel Chemicals Limited	127	Match Masters Ltd
89	Kemia International Ltd	128	United Chemical Industries Ltd
90	Ken Nat Ink & Chemicals Ltd	129	Rumorth East Africa Ltd
91	Oasis Ltd	130	Sadolin Paints (E.A.) Ltd
92	Rumorth EA Ltd	131	Saroc Ltd
93	Sara Lee Kenya Limited	132	Super Foam Ltd
94	Syngenta East Africa Ltd	133	Synresins Ltd
95	Tri-Clover Industries (K) Ltd	134	Twiga Chemical Industries Limited
96	Murphy Chemicals E.A Ltd	135	Murphy Chemicals E.A Ltd
97	Strategic Industries Limited	136	Unilever Kenya Ltd
98	Supa Brite Ltd	137	Marshall Fowler (Engineers) Ltd
99	A.I Records (Kenya) Ltd	138	Mecer East Africa Ltd
100	Amedo Centre Kenya Ltd	139	Metlex Industries Ltd
101	Assa Abloy East Africa Ltd	140	Metsec Ltd
102	Aucma Digital Technology Africa Ltd	141	Modulec Engineering Systems Ltd
103	Avery (East Africa) Ltd	142	Mustek East Africa
104	Baumann Engineering Limited	143	Nationwide electrical industries
105	Centurion Systems Limited	144	Nationwide electrical Industries Ltd
106	Digitech East Africa Limited	145	Optimum Lubricants Ltd
107	Manufacturers & Suppliers (K) Ltd	146	PCTL Automation Ltd
108	Power Engineering International Ltd	147	Pentagon Agencies
109	Power Technics Ltd	148	Kenya Power & Lighting Co. Ltd
110	Betatrad (K) Ltd	149	Kenya Scale Co. Ltd/Avery Kenya Ltd
111	Blowplast Ltd	150	Libya Oil Kenya Limited.
112	Bobmil Industries Ltd	151	Socabelec East Africa
113	Complast Industries Limited	152	Virtual City Ltd
114	Kenpoly Manufacturers Ltd	153	King Plastic Industries Ltd
115	Kentainers Ltd	154	Kingsway Tyres &Automart Ltd
116	L.G. Harris & Co. Ltd	155	Laneeb Plastics Industries Ltd
117	Metro Plastics Kenya Limited	156	Ombi Rubber Rollers Ltd
157	Packaging Industries Ltd	196	Plastics & Rubber Industries Ltd
158	Polyblend Limited	197	Polyflex Industries Ltd
159	Polythene Industries Ltd	198	Premier Industries Ltd
160	Prestige Packaging Ltd	199	Prosel Ltd

161	Qplast Industries Ltd	200	Wonderpac Industries Ltd
162	ACME Containers Ltd	201	Afro Plastics (K) Ltd
163	Alankar Industries Ltd	202	Embalishments Ltd
164	Africa Apparels EPZ LTD	203	Midco Textiles (EA) Ltd
165	Alltex EPZ Ltd	204	Mirage Fashionwear EPZ Ltd
166	Alpha Knits Limited	205	MRC Nairobi (EPZ) Ltd
167	Apex Apparels (EPZ) Ltd	206	Sanpac Africa Ltd
168	Baraka Apparels (EPZ) Ltd	207	Signode Packaging Systems Ltd
169	Bhupco Textile Mills Limited	208	Silpack Industries Limited
170	Blue Plus Limited	209	Solvochem East Africa Ltd
171	Bogani Industries Ltd	210	Springbox Kenya Ltd
172	Brother Shirts Factory Ltd	211	Sumaria Industries Ltd
173	Ngecha Industries Ltd	212	J.A.R Kenya [EPZ] Ltd
174	Premier Knitwear Ltd	213	Kikoy Co. Ltd
175	Spinners & Spinners Ltd	214	Kenya Trading EPZ Ltd
176	Storm Apparel Manufacturers Co. Ltd	215	Thika Cloth Mills Ltd
177	Straightline Enterprises Ltd	216	United Aryan (EPZ) Ltd
178	Sunflag Textile & Knitwear Mills Ltd	217	Silver Star Manufacturers Ltd
179	Tarpo Industries Limited	218	Rolex Garment EPZ Ltd
180	Teita Estate Ltd	219	Riziki Manufacturers Ltd
181	Yoohan Kenya EPZ Company Ltd	220	Hwan Sung Industries (K) Ltd
182	Economic Housing Group Ltd	221	Transpaper Kenya Ltd
183	Eldema (Kenya) Limited	222	Twiga Stationers & Printers Ltd
184	Fine Wood Works Ltd	223	Uchumi Quick Suppliers Ltd
185	Furniture International Limited	224	Uneeco Paper Products Ltd
186	Kenya Wood Ltd	225	WoodMakers Kenya Ltd
187	Newline Ltd	226	Woodtex Kenya Ltd
188	PG Bison Ltd	227	United Bags Manufacturers Ltd
189	Alpha Medical Manufacturers Ltd	228	Statpack Industries Ltd
190	Beta Healthcare International Limited	229	Pharm Access Africa Ltd
191	Biodeal Laboratories Ltd	230	Bulk Medicals Ltd
192	Cosmos Limited	231	Laboratory & Allied Limited
193	Manhar Brothers (K) Ltd	232	Medivet Products Ltd
194	Novelty Manufacturing Ltd	233	Oss.Chemie (K)
195	Laboratory & Allied Limited	234	Manhar Brothers (K) Ltd
235	Novelty Manufacturing Ltd	274	Medivet Products Ltd
236	Allied Metals Alloy Steel Castings Ltd Services Ltd	275	Oss.Chemie (K)
237	Apex Steel Ltd - Rolling Mill Division	276	ASP Company Ltd
238	ASL Ltd	277	East African Foundry Works (K) Ltd
239	Elite Tools Ltd	278	Friendship Container Manufacturers
240	J. F. McCloy Ltd	279	General Aluminium Fabricators

			Ltd
241	Mecol Limited	280	Gopitech (Kenya) Ltd
242	Metal Crowns Limited	281	Heavy Engineering Ltd
243	Morris & Co. Limited	282	Insteel Limited
244	Nails & Steel Products Ltd	283	Rolmil Kenya Ltd
245	Orbit Engineering Ltd	284	Sandvik Kenya Ltd
246	Wire Products Limited	285	Sheffield Steel Systems Ltd
247	Alpharama Ltd	286	Welding Alloys Ltd
248	Bata Shoe Co (K) Ltd	287	Tononoka Steel Ltd
249	New Market Leather Factory Ltd	288	Viking Industries Ltd
250	C & P Shoe Industries Ltd	289	Warren Enterprises Ltd
251	Auto Ancilliaries Ltd	290	CP Shoes
252	VarsaniBrakelinings Ltd	291	Dogbones Ltd
253	Bhachu Industries Ltd	292	East African Tanners (K) Ltd
254	Chui Auto Spring Industries Ltd	293	Leather Industries of Kenya Limited
255	Toyota East Africa Ltd	294	Impala Glass Industries Ltd
256	Unifilters Kenya Ltd	295	Kenya Grange Vehicle Industries Ltd
257	Ajit Clothing Factory Ltd	296	Pipe Manufacturers Ltd
258	Associated Paper & Stationery Ltd	297	Sohansons Ltd
259	Autolitho Ltd	298	Theevan Enterprises Ltd
260	Bag and Envelope Converters Ltd	299	Conventual Franciscan Friers
261	Bags & Balers Manufacturers (K) Ltd	300	Creative Print House
262	Brand Printers	301	Business Forms & Systems Ltd
263	Carton Manufacturers Ltd	302	Paperbags Limited
264	Cempack Ltd	303	Primex Printers Ltd
265	Chandaria Industries Limited	304	Print Exchange Ltd
266	Colour Labels Ltd	305	Printpak Multi Packaging Ltd
267	Colour Packaging Ltd	306	Printwell Industries Ltd
268	Colourprint Ltd	307	Prudential Printers Ltd
269	Kenya Stationers Ltd	308	Punchlines Ltd
270	Kim-Fay East Africa Ltd	309	Ramco Printing Works Ltd
271	Paper Converters (Kenya) Ltd	310	Dodhia Packaging Limited
272	Paper House of Kenya Ltd	311	East Africa Packaging Industries Ltd
273	Kenafric Diaries Manufacturers Ltd	312	Kitabu Industries Ltd
313	Modern Lithographic (K) Ltd	352	Pan African Paper Mills (E.A) Ltd
314	SIG CombiblocObeikan Kenya	353	
315	Kenbro Industries Ltd	354	General Motors East Africa Ltd
316	Mombasa Cement Ltd	355	Kenya Vehicle Manufacturers Ltd
317	Alliance One Tobacco Kenya Ltd	356	Labh Singh Harnam Singh Ltd
318	Alpha Fine Foods Ltd	357	Mann Manufacturing Co. Ltd
319	Alpine Coolers Ltd	358	Megh Cushion Industries Ltd

320	Annum Trading Company Ltd	359	D. L. Patel Press (Kenya) Ltd
321	Aquamist Ltd	360	Elite Offset Ltd
322	Brookside Dairy Ltd	361	Ellams Products Ltd
323	Candy Kenya Ltd	362	English Press Limited
324	Capwell Industries Ltd	363	General Printers Limited
325	Carlton Products (EA) Ltd	364	Graphics & Allied Ltd
326	Chirag Kenya Limited	365	Guaca Stationers Ltd
327	Coast Salt Works Limited	366	Icons Printers Ltd
328	E & A Industries Ltd	367	Interlabels Africa Ltd
329	Kakuzi Ltd	368	Jomo Kenyatta Foundation
330	Erdemann Co. (K) Ltd	369	Kartasi Industries Ltd
331	Excel Chemicals Ltd	370	Kul Graphics Ltd
332	Kenya Wine Agencies Ltd	371	Label Converters
333	Kevian Kenya Ltd	372	Regal Press Kenya Ltd
334	Koba Waters Ltd	373	KAM Industries Limited
335	Kwality Candies & Sweets Ltd	374	KAM Pharmacy Limited
336	Lari Dairies Alliance Ltd	375	Pharmaceutical Manufacturung Co
337	London Distillers (K) Ltd	376	Regal Pharmaceuticals
338	Mafuko Industries Ltd	377	Universal Corporation limited
339	Manji Food Industries Ltd	378	Pharm Access Africa Ltd
340	Melvin Marsh International	379	Pharmaceutical Manufacturing Co
341	Kenya Tea Development Agency	380	Universal Corporation limited
342	Mini Bakeries (Nbi) Ltd	381	Booth Extrusions Limited
343	Miritini Kenya Ltd	382	City Engineering Works Ltd
344	Mount Kenya Bottlers Ltd	383	Crystal Industries Ltd
345	Nairobi Bottlers Ltd	384	Davis &Shirtliff Ltd
346	Nairobi Flour Mills Ltd	385	Devki Steel Mills Ltd
347	Rafiki Millers Ltd	386	East Africa Spectre Limited
348	Razco ltd	387	Kens Metal Industries Ltd
349	Re-Suns Spices Limited	388	Khetshi Dharamshi & Co. Ltd
350	Smash Industries Ltd	389	Nampak Kenya Ltd
351	Softa Bottling Co. Ltd	390	Napro Industries Limited
391	Spice World Ltd	430	Specialised Engineer Co. (EA) Ltd
392	Spin Knit Dairy Ltd	431	Steel Structures Limited
393	Sunny Processors Ltd	432	Steelmakers Ltd
394	Continental Products Ltd	433	Steelwool (Africa) Ltd
395	Cooper K- Brands Ltd	434	Uni-Plastics Ltd
396	Cooper Kenya Ltd	435	FulchandManek& Bros Ltd
397	Crown Berger Kenya Ltd	436	Image Apparels Ltd
398	European Perfumes & Cosmetics Ltd	437	Le-Stud Limited
399	Elex Products Ltd	438	Metro Impex Ltd
400	Galaxy Paints & Coating Co. Ltd	439	Protex Kenya (EPZ) Ltd

401	Grand Paints Ltd	440	Vaja Manufacturers Limited
402	Henkel Kenya Ltd	441	UpanWasana (EPZ) Ltd
403	Imaging Solutions (K) Ltd	442	YU-UN Kenya EPZ Company Ltd
404	Interconsumer Products Ltd	443	Rosewood Office Systems Ltd
405	Odex Chemicals Ltd	444	Shah Timber Mart Ltd
406	Osho Chemicals Industries Ltd	445	Shamco Industries Ltd
407	PolyChem East Africa Ltd	446	Slumberland Kenya Limited
408	Procter & Gamble East Africa Ltd	447	TimSales Ltd
409	PZ Cussons ltd	448	Taws Limited
410	Rayat Trading Co.Ltd	449	Tetra Pak Ltd
411	Reckitt Benckiser (E.A.) Ltd	450	Dawa limited
412	Revolution Stores Co. Ltd	451	Elys Chemicals Industries Ltd
413	Soilex Chemicals Ltd	452	Gesto Pharmaceuticals Ltd
414	Vitafoam Products Limited	453	Glaxo Smithkline Kenya Ltd
415	East African Cables Ltd	454	Reliable Electricals Engineers Ltd
416	Eveready East Africa Limited	455	Sanyo Armco (Kenya) Ltd
417	Frigorex East Africa Ltd	456	Specialised Power Systems Ltd
418	Holman Brothers (E.A) Ltd	457	Synergy-Pro
419	IberaAfrica Power (EA) Ltd	458	Dune Packaging Ltd
420	International Energy Technik Ltd	459	Elgitread (Kenya) Ltd
421	Kenwest Cables Ltd	460	Elgon Kenya Ltd
422	Kenwestfal Works Ltd	461	Eslon Plastics of Kenya Ltd
423	Kenya Shell Ltd	462	Five Star Industries Ltd
424	Nairobi Plastics Ltd	463	General Plastics Limited
425	Nav Plastics Limited	464	Haco Industries Kenya ltd
426	Ombi Rubber	465	Hi-Plast Ltd
427	Packaging Masters limited	466	Jamlam Industries Ltd
428	Plastic Electricons	467	Kamba Manufacturing (1986) Ltd
429	Raffia Bags (K) Ltd	468	Keci Rubber Industries
469	Rubber Products Ltd	472	Super Manufacturers Ltd
470	Safepak Limited	473	Techpak Industries Ltd
471	Sameer Africa Ltd		

Source: Kenya Association of Manufacturers (KAM) Directory. June, 2017