Role of Supply Chain Management in the Automotive Industry of the United Arab Emirates

دور إدارة سلسلة التوريد في صناعة السيارات في دولة الإمارات العربية المتحدة

by

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Abstract

The paper studies the role of supply chain management in the automotive industry of the United Arab Emirates and its significance of the production activities. The supply chain has a direct relation with improvements of business operations and other related activities. The paper determines supply chain activities declines to productivity loss and improves logistics. The automotive industry in UAE faces the issues of supply chain activities that affect the overall performance of organizations.

The research determines the risks and threats that auto industry faces in supply chain management. The identification of risks helps companies that the auto industry to formulate a policy that helps to improve supply chain activities. The common risk factors that companies in auto industry encounter involve uncertain risks such as natural calamities, terrorist attacks, loss of data and thefts. Technology has a significant role in effective supply chains operations, and lapse in technology declines the effectiveness' of the supply chain.

The supply chain disruptions lead to deteriorated performance of business activities those results in reduces revenues and profitability of organizations. Fluctuations in exchange rates and prices serve as risk factors for the ineffective supply chain. The study incorporates qualitative and quantitative research methodology. The secondary data involves scholarly databases and available literature on an electronic database. The primary data involves a survey of employees of the automotive industry in UAE. The survey involves questionnaire that seeks information from employees about the supply chain practices in organizations. The information of questionnaires provides the understanding and awareness of organizations about the role of the supply chain.

The responses of employees provide information about the common risk factors that organizations face in the implementation of the effective supply chain. The statistical technique involves SPSS for assessment of participants' responses. The results confirm the risk factors of supply chain causes implication son the supply chain. The information about risks suggests the need to address the issue of the supply chain that leads to improvements in the automotive industry of UAE.

الملخص

تدرس الورقة دور إدارة سلسلة التوريد في صناعة السيارات في دولة الإمارات العربية المتحدة وأهميتها في أنشطة الإنتاج. ولسلسلة الإمداد علاقة مباشرة مع تحسين عمليات الأعمال والأنشطة الأخرى ذات الصلة. وتحدد الورقة أن أنشطة سلسلة التوريد تنخفض إلى فقدان الإنتاجية وتحسن الخدمات اللوجستية. تواجه صناعة السيارات في دولة اإلمارات العربية المتحدة قضايا أنشطة سلسلة التوريد التي تؤثر على األلداء العام للمنظمات.

يحدد البحث المخاطر والتهديدات التي تواجه صناعة السيارات في إدارة سلسلة التوريد. ويساعد تحديد المخاطر الشركات على أن تقوم صناعة السيارات بصياغة سياسة تساعد على تحسين أنشطة سلسلة الإمداد. وتشمل عوامل الخطر الشائعة التي تواجهها الشركات في صناعة السيارات مخاطر غير مؤكدة مثل الكوارث الطبيعية والهجمات الإرهابية وفقدان البيانات والسرقات. وللتكنولوجيا دور هام يف عمليات سالسل التوريد الفعالة، كما أن االنخفاض يف التكنولوجيا يقلل من فعالية سلسلة اإلمداد.

وتؤدي انقطاعات سلسلة الإمداد إلى تدهور أداء الأنشطة التجارية مما يؤدي إلى تقليل إيرادات المنظمات وربحيتها. وتشكل التقلبات في أسعار الصرف وأسعاره عوامل خطر لسلسلة التوريد غير الفعالة. وتتضمن الدراسة منهجية البحث النوعي والكمي. وتتضمن البيانات الثانوية قواعد بيانات علمية ومطبوعات متاحة على قاعدة بيانات إلكترونية. وتتضمن البيانات الأولية استقصاء لموظفي قطاع السيارات في الإمارات العربية المتحدة. ويتضمن الاستبيان استبيان يسعى للحصول على معلومات من الموظفين بشأن ممارسات سلسلة الإمداد في المنظمات. توفر المعلومات من الاستبيانات فهم ووعي المنظمات حول دور سلسلة التوريد.

وتوفر ردود الموظفين معلومات عن عوامل الخطر الشائعة التي تواجهها المنظمات في تنفيذ سلسلة التوريد الفعالة. وتتضمن التقنية الإحصائية سبس لتقييم ردود المشاركين. وتؤكد النتائج عوامل الخطر من سلسلة التوريد يسبب ضمنا ابن سلسلة التوريد. وتشير المعلومات حول المخاطر إلى ضرورة معالجة مسألة سلسلة التوريد التي تؤدي إلى تحسينات في صناعة السيارات في دولة اإلمارات العربية المتحدة.

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Chapter 1: Introduction

1. Introduction

1.1 Background

The present study discusses the role of supply chain management in the automotive industry of UAE. The study assesses the risks that the automotive companies face in the supply chain activities and identifies potential threats that lead to the inefficiencies and incapability of the SCM. The supply chain management is one of the advanced business tool employed by medium and large organizations due to the number of benefits that it provides. The companies recognize the importance of supply chain management in business operations and relate them to the performance of the company.

The organizations that have employed supply chain management experience to gain a number of advantages that include effective management of the logistic activities, on-time delivery of services, effective networks and improved service. Supply chain management has a direct relationship with an organizational performance that depicts the need to assess risk factors (Gunasekaran, Lai, and Cheng, 2008).

Supply chain management links the manufacturing process with production and delivery phase that provides enhanced service to end users. The concept of supply chain network in the auto industry is not simple to build all required facilities that lead to effective systems. Planned procurement is one of the most crucial advantages of the supply chain. The incorporation of

supply chain management boosts the quality of production processes in the auto industry that generates high revenues and profits.

The lack of sustainability is one of the major components that influences supply chain in the auto industry (BT, 2014). The supply chain is a process that provides benefits in activities related to logistics, enhances the storage capacity of inventory effective management of supply activities the remote areas. The organizations employ supply chain management to reduce the time duration of the project period as SCM helps organizations to manage production activities efficiently.

The supply chain improves the business operations that help in the management of productivity loss and operational losses. The automotive industry of UAE adopts advanced supply chain procedures that improve the quality of the project and generates highlight responsive production systems. The supply chain helps companies to maintain effective networks through vendors and distributors that enhance to speed and performance of distribution activities.

The automotive industry of UAE recognizes the importance of supply chain and perceived advantage from the high-end supply. The performance and success of companies are derived from the effectiveness of its supply chain operations and well-managed supply chain provides a competitive advantage to the companies. Service of the automotive industry depends on supply chain management and highly effective supply chain management results in high customer satisfaction.

The automotive industry in UAE adopts supply chain management with advanced technological interventions that enhance the routine operational activities. The incorporation of supply chain practices results in the high growth of sales in the IS auto industry. The supply chain is one of the

necessary business practices for the auto industry that operates at global levels. The effectively designed rooms, technology, and equipment transform the traditional auto industry to advanced form (Juttner, 2005).

The present study collects data through primary and secondary research methods. The primary research incorporates a well-structured questionnaire that collects information from employees of different organizations in the automotive industry of UAE. The questionnaire seeks information about the risks and vulnerabilities of SCM. It also provides information about the awareness of organizations related to supply chain activities and associated risks. The secondary data involves the literary database that includes research papers, journals, and information on supply chain risks retrieved through electronic means. The study uses SPSS for the analysis of results. The paper presents data in the form of graphs and tables that yield information in an appropriate manner.

1.2 Problem statement

The organizations recognize the risks of supply chain activities influences the business performance and identify the need to address the potential threats. The threats and risks have a direct relation with the efficiency of supply chain activities that further links to the business performance.

The study addresses the disruption risks related to the supply chain activities. The assessment of associated risks provides an idea about the real issues wins the supply change that helps to formulate solutions to resolve the issues. The identification of the potentials risks leads to the implementation of risk management program that controls the issues and ensures the successful supply chain procedures.

UAE has a strong automotive industry that operates at global levels and involved in the trade of an automotive. Supply chain plays a significant role in the operations and business activities of the company. The export and import of automobiles require effective management of the supply chain activities at global levels. The maintenance of supply chain at global levels increases the extent of risks that local companies face. The major risks are the disruption risks that influence the business and operational activities at global levels (Schmitt & Singh 2012; Ambulkar, Blackhurst and Grawe, 2015).

The stakeholders' interest also links with the risks of supply chain activities and effective supply chain improves stakeholders' interest that is in favor of the companies. The study recognizes the importance of risk management in the supply chain that improves the stakeholders' interest (Ambulkar, Blackhurst &Grawe2015). Keeping in view the importance of supply chain the automotive industry needs to identify potential risks that help to devise measures to control disruptions and potential threats in the automotive industry.

1.3 Rationale of the study

The present study focuses on the automotive industry of United Arab Emirates. The data related to the automotive industry is collected that provides information about the supply chain activities of these companies. The focus on the automotive sector uncovers the potential risks and threats that the automotive industry faces in UAE.

The study involves companies of different sizes that include small enterprise that employees less than 50 employees, medium enterprises that employee 50 - 100 employees and large enterprises that include more than 100 employees. The involvement of participants from different sizes of organizations reveals information about the overall threats faced by the automotive industry. The

study focuses on automotive companies that have adopted supply chain management and have good financial standing.

1.4 Research objectives

- To identify risks in project supply chain
- To identify allocation of project supply chain risks
- To identify the extent to which players of the automotive industry in UAE addresses the risks and vulnerabilities of the supply chain activities that lead to the formulation of risk mitigation strategies.
- To assess the imperative issues for effect-related management that associates to continuity and risk disruptions.
- To determine the relation of supply chain risks with organizational performance.
- To determine the practices of supply chain and the risks that influence' the profitability of the companies.
- To assess the overall supply chain management and functions of risk management in the automotive industry of UAE.

1.5 Research questions

Keeping in view, the objectives of the study following research questions are designed:

- What are the risks associated with supply chain?
- How are the supply chain risks allocated?

These questions address the issues and risks faced by the automotive industry in UAE. The question enables the examination of the relationship between the automotive supply chain officers and SCRM.

- What are supply chain risk management and enterprise risk management functions within the organization of the automotive industry?

The question investigates the organizational structure of the SCRM and identifies roles and responsibilities of the automotive organizations.

- Do the players of the automotive industry address the risks and vulnerabilities of supply chain activities?
- Does the automotive industry emphasize on the risk mitigation strategies of supply chain management?

These questions determine the empirical aspects of the initiative of supply chain management and provide information about supply chain implementation before the occurrence of disruptions. Disruptions are the biggest challenge of the automotive industry, and its control is important to generate effective supply chain process. These questions emphasize the need of automotive industry for the supply chain management and investments in supply chain activities.

- What are the common risks of supply chain procedures and how they are related to organizations' performance?
- What are the most imperative issues of the supply chain management that leads to continuity and disruption risks?

The questions uncover the issues and vulnerabilities of the supply chain that are most likely to influence the supply chain activities and causes disruptions and continuity.

- How the risks and supply chain activities links to the organizational profitability?

The question reveals necessary information about the significance of supply chain activities on organizations'' performance and how SCM leads to profitability. The question addresses how risks of SCM can influence the business activities those results in variations of profits. It examines the role of SCM on performance.

- What are the potential risks of supply chain management and functions of enterprise risk management that in the automotive industry?

The question helps to formulate the policy for risk mitigation strategies' that helps to reduce the extent of risks that the automotive industry faces in UAE. The control of risks in the automotive industry leads to effective supply chain operations that further connect to improved performance.

1.5 Hypothesis

H1: supply chain risk allocation leads to improved supply chain

H2: supply chain risk management and enterprise risk management functions affects the automotive industry

H3: effective enterprise and supply management leads to improved SCM

H4: disruptions and supply chain risks affects the operational activities of automotive industry

H5: risk mitigation strategies leads to effective supply chain management that influences profitability

The hypothesis of the study is developed for objectives that allow the researcher to assess the relationship between SCM and performance of the automotive industry. The main focus of the paper is to assess the impacts of supply chain activities on profitability and revenues. The

hypothesis tests if the revenues and profitability enhance under improved supply chain management or not.

Chapter 2: Literature Review

2. Literature review

2.1 Definitions of the supply chain

The supply chain can be defined as the network of resources, information, activities, people, and organizations which are involved in the movement of a service or a product to the customer from the supplier's end. According to Venkatesh, Rathi &Patwa (2015) it is basically the activities that are involved in transforming of components, raw material, and natural resources into items or services that are later formed into finished goods to be finally consumed or used by the customers.

A supply network which if of typical nature starts with political, organic, or environmental direction of normal assets, trailed by the human extraction of crude material, and incorporates a few links of production such as merging, assembly, or construction of components, before proceeding onwards to layers of storerooms of the size which is constantly diminishing and progressively remote land areas, and then lastly coming into the hands of the end user, to be consumed (Wieland and Marcus 2012).

Supply chain management, on the other hand, is the management of the entire supply network and logistic of a company, starting from inventory management and all the way to the relationship with the customers and managing these relations for the long term. Large portions of the trades experienced within these supply networks are in this way between various organizations that look to amplify their income inside their circle of interest, yet may have practically zero learning or enthusiasm for the remaining players in the production network (Hofmann, Busse, Bode & Henke 2014; Chopra &Sodhi 2014). All the more as of late, the inexactly coupled, self-sorting out system of organizations that coordinates, in order to give its

customers with better quality services and product offerings, has been given the title of an enterprise which is Extended indicated by Atwater, Gopalan, Lancioni & Hunt (2014).

2.2.1 Background of Supply Chain Management

An evolution in the purchase of materials occurred during last fifteen years. A phenomenon of SCM evolved from earlier practices of organizations for procurement of raw materials, production, logistics and information sharing. According to Monczka, Handfield, Giunipero & Petterson (2009), the history of materials management can be traced back to 150 years. The period can be divided into five phases, each phase reflecting some advancement. Particularly in the period of 1970s to 1999, the technological innovations caused the changes in SCM. The next period is categorized as 2000 and beyond in which the integration of SCM is observed.

It can be compared with its predecessor named Agile Manufacturing (AM). In early 1990s AM gained consideration from researchers and organizations willing to adopt advanced logistics management. The notable characteristic of AM has increased the capability to meet the challenges of the volatile marketplace. It was logical for the era as the technology was developing drastically (Gunasekaran, Lai & Cheng, 2008).

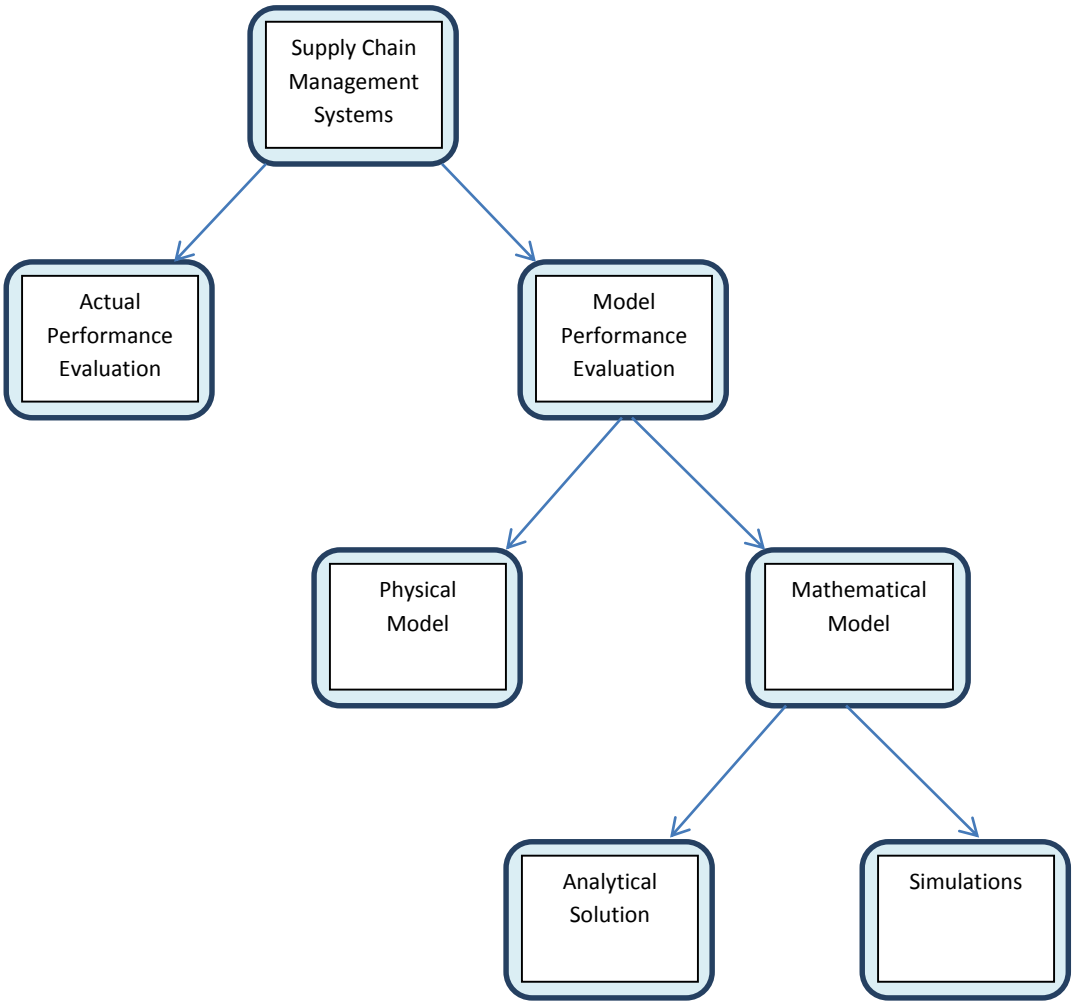
SCM gained attention in the late 1990s with an emphasis on integrated activities of suppliers, manufacturers, distributors, retailers, and customers. The fundamental principle of SCM is the cost reduction and usage of Information Systems (IS) resources. Later developments can be identified as Responsive Supply Chains (RSC) and automation of SCM ensuring certain technological innovations (Gunasekaran, et al.2008). RES are defined as the integrated supply chains with flexibility and cost effectiveness.

2.2 Initiation of supply chain risk management

The studies have uncovered many reasons that resulted in supply chain risk management and the world trade incident is determined as one of the important reasons for supply chain risk management. The research Vanany, Zailani & Pujawan (2006) uncovered terrorist attack on world trade center as one of the major factors raising the concerns for supply chain risk management and the review of available literature presents there had been rapid growth in supply chain risk management from the period of 2000 to 2016. Supply chain risk management involves the use of effective technologies such as RFID and ERP and collaborative risk management is an effective method of mitigating risks (Vanany, Zailani & Pujawan, 2006).

The study Byrne &Heavey (2006) investigated the vulnerabilities and risks associated with supply chain management and the main factors uncovered are natural calamities, terrorist attacks, and economic crisis. The potential risks involved in supply chain are the disturbances in supply activities resulting from changes in components of supply that also affects the manufacturers and sub- contractors. The vulnerability involves both internal and external causes leading to blankness in resilience.

Figure 2.1 Performance evaluation of optimized supply chain



Source: Byrne et al. (2006)

The results of lahmar, Galasso, Chabchoub and Lamothe (2016)revealed that the commonly recognized risks of supply chain management involve the productivity loss, customers' complaints and high costs of working. It also prevented different methodological approaches for studying the potential risks and vulnerabilities. It assessed the risks of the supply chain by considering the cases of Nokia and Ericson, land rover and Toyota.

The results highlight that the supply chain risks are dependent on four factors including exposure that determines the nature of the significant risks involved, sensitivity explaining the degree of effectiveness, a susceptibility that identifies factors that are vulnerable to risks and level of preparedness that determines the ability of supply chain to handle risks. The factors influencing risks exposure are product variations, outsourcing, globalization, ineffective manufacturing and reductions in supply (lahmar, Galasso, Chabchoub & Lamothe 2016).

2.3 Risks between the supply chain and network partners

The research Gaonkar & Viswanadham (2014) explored the nature of risks that supply chain management faces and determined that risks arise from the interaction between the organization and the network partners. The research further recognized the important supply chain risks include; operation uncertainties resulting from employees' strike, shortage of raw materials resulting from the spread of diseases such as mad cow, failure of machines, quality issues and unavailability of spare parts. The risk identified in the research includes opportunist nature of the top management including CEO, managers, and other staff members.

According to Gaonkar & Viswanadham (2014), the Supply chain management suffers from a range of risks including supply network risks, internet based risks such as ineffective interactions between manufacturing, logistics and distribution partners. Network partner risks involve irregular behaviors that involve sharing of sensitive information between supplier and competitive manufacturer. The introduction of a disruptive technology and price and quality fluctuations resulting from a new entrant is are also vulnerable risks. The environmental risks that the supply chain faces includes the risk associated with the region and the country such as fluctuations in foreign exchange, policy risks, price control risks, terrorist attacks, risks related to trade and natural calamities including droughts, storms, and earthquakes etc. The risks are

classified in six categories including supply side risks resulting from input shortages due to the delays or unavailability of materials and affecting the overall production.

The second risk is transportation risk associated with carrier breakdown and the inability of moving goods. The third effective risk is the facilities risk that associated with machinery breakdown, power outages, inadequate plant size and building etc. the fourth risk is breached attempt arising from criminal issues such as thefts, stealing of company's information and smuggling of weapons. The fifth potential risks are the failed communications risk resulting from ineffective hardware and software, viruses' attacks and failure of coordinating operations. The sixth risk is the fluctuations in demand associated with the economic downturn, war and bankruptcy (Gaonkar & Viswanadham 2014).

2.4 Risk Associated With Supply Chain

Chopra & Sodhi (2014) stated that the supply chain risk can be defined as a circumstance or an event which involves getting exposed to a certain loss, harm or danger. It is something that can cause severe damage to any situation if not managed properly or within time. According to Samvedi, Jain & Chan (2013) it is an evident fact that supply chain always has an element of risk involved within its activities especially for the companies that are multinational or have global supply chains. The focus of this paper is the supply chain of the organizations of UAE.

The most evident risk faced by the companies of UAE is the risk of disruption. According to Venkatesh, Rathi & Patwa (2015), these supply chain disruptions can cause serious damages to the supply activities of a company, for instance, it might impact the profitability and revenues of a company and might reduce them. Supply disruptions can also cause negative publicity, reduced company performance, reduced customer service, a decrease in the market share and

stock prices of the company, dissatisfied customers, and lastly declining the market value of the company (Wieland & Marcus 2012; Ambulkar, Blackhurst &Grawe 2015).

2.5 Disruption Risk Impacting Stakeholders and Supply Chains

Disruption risk can severely damage a supply chain and leave its stakeholders unsatisfied and unhappy with the performance of the automotive company as indicated by Atwater, Gopalan, Lancioni & Hunt (2014). It can interfere with the regular activities of a supply chain such as increasing the lead time, delaying the distribution process and over pulled stock inventory (Wieland & Marcus 2012). The stakeholders can also be greatly affected by these disruptions as the whole process of supply and demand is slowed down due to this unplanned and interrupting risk (Schmitt & Singh 2012).

In case the lead time is increased, production of the product is impacted and takes more time to produce the product than usual. According to Ambulkar, Blackhurst&Grawe (2015), this slows down the process of delivery and thus the product would not reach the end user on time, which will leave the customer angry and unsatisfied with the company.

The research FLORIAN & CONSTANGIOARA (2014) describes the risk factors associated with the supply chain management and pointed out the risks under five categories including the demand side supply chain risks, legal and regulatory risks, infrastructure risks and catastrophic risks. The supply chain risk identified are poor performance of logistics of supply, problems related to the quality of supply, unexpected suppliers default, poor service providers and logistic performance and fluctuations in capacity and shortages in supply in the supply markets. It is also revealed that risk factors of the supply chain are negatively linked to the organizational performance and the volatility in the external markets has a significant impact on the supply chain management.

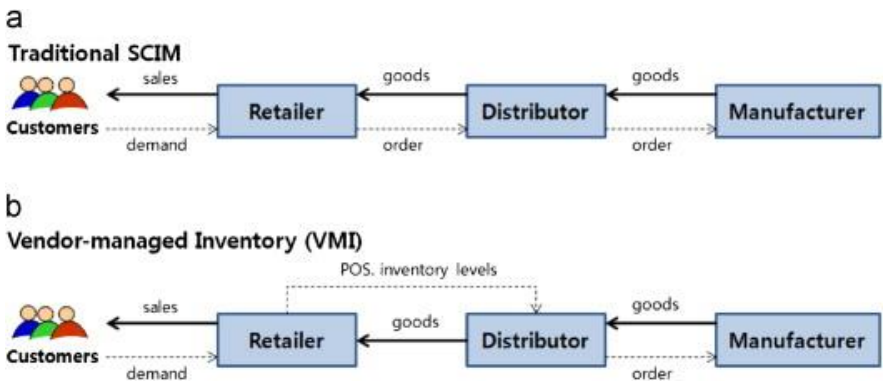
2.6 Material flow risks

The research Musa & Nurmaya (2011) assessed the important techniques for mitigating the risks that supply chain management faced and the risks are suppliers' risks, sustainability, and flow of raw materials. Musa & Nurmaya (2011) classified the identified risks into two categories the material flow risks and financial flow risks. Material flow risks are associated with the risks of sourcing, outsourcing, suppliers' selection, product quality and supply capacity. The financial flow risks are associated with the inability of settling payments and improper investing capacity and these risks are resulting from fluctuations in exchange rate, cost ineffectiveness, and risks of supply chain partners.

2.6.1. Vendor Managed Inventories (VMI)

The concept of vendor managed inventories is extensively dynamic in nature as it is based on the principle that an organization's suppliers are allowed to manage the inventories. The critical dimensions of VMI are third and second party access to information related to sales and stock levels of an organization. It is, however, significant in reducing order placement and receiving time and allows shifting the responsibility of stock levels to suppliers.

Figure 2.2 Traditional supply chain Vs. VMI



Source: Ryu, Moon, Oh & Jung (2012)

The benefits of VMI could be that customers can receive stocks based on their inventory levels and it is not an obligation on the customer to receive the delivered number of items as the supplier can manage to consolidate the stock with other customers which are located in the same areas. It is also beneficial for SMEs as well as large corporations.

The sourcing risk that Ericson faced resulted from fire accident(Peck et al. 2003). Outsourcing is determined as a potential risk of the supply chain that involves low manufacturing costs but increases the choices options that affect the reliability of supplier in terms of transportation and supplying capacity (Levary 2007). Outsourcing involves more risks for supply chain such as variations in taxes, fluctuations in currency rates, high transportation costs and audit costs of suppliers(Crone 2006).

The researchFitzgerald (2005) identified the absence of monitoring systems as another risk of outsourcing associated with the issues of product quality and safety. The supply capacity is also identified as a risk faced by supply chain when it does not lead to the development of a new product. The research uncovered the risks associated with supply chain as process design risks, production risks, and operational disruptions. The risks of product designs involve the inability of managing change resulting in failure of product development(Khan, Christopher & Burnes 2008).

The production capacity risks recognized are risks related to skills, technology and quality and the capacity risks are the risks related to products positioning (Handfield, Ragatz, Petersen & Monczka 1999). According to Kleindorfer & Saad (2005) has uncovered the operational risks as natural disasters, political instability and contingencies leading to operational

disruption. Exchange rate risks are identified as cost and price risks and fluctuations in exchange rate affect the price and cost. The fluctuations in the exchange rate are due to the inadequate supply of raw materials (Papadakis 2006).

2.7 Financial flow risks

Hendricks &Singhal (2005) determined the vulnerability of financial flow and its impact on supply chain management and the results uncovers that financial risk, increasing equity risks and leverage risks. The risks associated with the supply chain that is classified into three main categories including the upstream risks depending on suppliers' relationships, operation risks that exist at the organizational level and downstream risks depending on customer's relationship (Ouabouch & Paché 2014).

Zsidisin, Wagner, Melnyk, Ragatz & Burns (2008) uncovered that the three main sources of supply risks involve product and services risks, suppliers involved in supply chain and their nature and the type of market in which supply chain is operating. High supply chain risks are the outcome of high fluctuations in exchange rate, price instability, constraints in capacity and presence of a small number of alternative suppliers. Unpredictable risks affecting the supply chain management includes quality and price of the product, time of delivery, inadequate supply of raw materials, employees strike and production issues (Zsidisin, Wagner, Melnyk, Ragatz & Burns 2008).

The potential supply chain risks are associated with company's operational capacity. The commonly identified operational risks include risks in the logistic processes and modification impact on the operations such as adoption of the new process, restructuring and product changes etc.(Borghesi & Gaudenzi 2013). The operational risks associated with the supply chain

management also involve failures at infrastructure level such as delays in delivery time and failure in production management and defective quality of goods (Narasimhan & Talluri 2009). The supply chain risks arise from the uncertain environment related to logistical performance. Supply chain risks include environmental risks, organizational risks, and network related risks.

The environmental risks are associated with the uncertain external factors such as natural calamities, earthquakes, and hurricanes. Natural disasters are determined as effective environmental risks affecting the supply chain (Kleindorfer & Saad 2005). Market risks and business volume risks are also determined as external risks affecting the supply chain. Organizational risks involve internal risks related to a company such as bankruptcy and uncertainties in IT infrastructure and production issues. Network related risks are the risks that are resulting from the interaction between organizations and supply chain. This includes contingencies and fraud resulting in organizations disturbances (Jüttner 2005).

2.8 Impact of risks on performance

The research presented the assessment of the risk factors affecting the performance of the supply chain management and identified the risks involved in the flow process that moves from suppliers of raw materials to manufacturers and then reaching the markets. Outsourcing is achieved by many organizations for attaining cost effectiveness but it is also linked to high supply chain risks. The supply chain network involves the risks of information sharing among the extensive network and the risks determined are information disruption, redundancy, and inaccuracy.

The damage of the chips resulting from fire accident had been the major cause of Ericson's crisis in 2000. The research also highlights the reduction in sales of Volvo by 28% resulting from fluctuations in the value of dollar thus decreasing the revenues of the company.

the supply chain management faces the unexpected and the expected risks where the important unexpected risks recognized are terrorist attacks, wars, and employees strikes and the commonly expected risks identified are deficiencies in quality and capacity shortages (Musa & Nurmaya 2011).

The research Wagner & Bode (2008) highlights the risks faced by the supply chain management and pointed out catastrophic events as the main factor affecting supply chain management negatively and the common catastrophic events include hurricanes, terrorist attacks, and epidemics that are unpredictable and affect the performance of the supply chain. These events are likely to increase the disruptions of the supply chain. The study also relates influence of such events on the economic losses.

The second risk factor uncovered in the study Wagner & Bode (2008) is the increased competition among organizations in the global world causing organizations to increase the effectiveness of the intro businesses and inter businesses by the adoption of outsourcing and offshoring strategies for manufacturing and research and development purposes. Outsourcing is adopted by organizations for reducing costs but it involves high external risks such as fragility and disruptions faced by the supply chain. Wagner & Bode (2008) determined instability as one of the most crucial factors affecting the performance of the supply chain. The risks associated with the supply chain management are divided into demand side risks, supply-side risks, infrastructure risks and catastrophic risks. The demand side risks involve the uncertainty in the consumers' demand and the supply side risks include the capacity of supply and the product quality (Wagner & Bode 2008).

2.9 Factors of suppliers failure

Ouabouch & Amri (2013) pointed out the main factors contributing to risks for the supply chain management as suppliers' failure, quality problems of supplier, high prices of risk management, unexpected barriers on trade or trade restrictions, inability of transportation handling, failure of machinery, outrages or failure in the IT systems, accidents, fluctuations in demands, shortage of inventory, disruptions of delivery chain and market price fluctuations. Results of the research highlight the significant impact of all the explained factors on the supply chain performance and the high probability of such factors increase the risks for the supply chain.

The impact of supply chain risks factors on organizations' performance and the non-core activities causing a negative impact on the supply chain as they involve high risks. The supply chain risks of an organization are dependent on its vulnerability rate and the potential outcomes that the company is likely to experience. The partner link of an organization with external suppliers involves risks that can cause a negative impact on company's objectives (Bavarsad, Boshagh & Kayedian 2014).

The study(Bavarsad, Boshagh & Kayedian 2014)depicted the major risk factors include internal risks that are related to the internal processes of the organization, external risks linked to the organizational environment and external risks associated with the supply network.

The internal risks include internal control and processes risks, external environmental risks involve the demand and supply risks and supply network risks (Bavarsad, Boshagh & Kayedian 2014). The seven risks of supply chain predicted include industry risks, environmental risks, risks resulting from members of the supply chain, strategic risks, configuration risks, problem specific risks and decision-related risks (Ritchie & Brindley 2007).The main risks

linked to the supply chain are depicted as; uncertain and unreliable sources, quality of supplier, inadequate capacity and manufacturing yield, internal risks faced by supply chain including the delays in the flow of information, unexpected actions of the competitors, political instability and fluctuations in prices (Cucchiella & Gastaldi 2006).

The major risks uncovered in the paper reflects the factors affecting the overall supply chain are the quality of products and services, time effectiveness and precision in the process and cost effectiveness. It reflects, positive and significant association between these factors and supply chain management. The low product and services quality, delays in time, low accuracy and high costs are the possible risks that affect the supply chain negatively (Avelar-Sosa, García-Alcaraz & Castrellón-Torres 2014).

The research (Ho, Zheng, Yildiz & Talluri 2015) focused on the risks that supply chain management faces and provides the mitigation strategies for the risk management. The need for the risk mitigation increased due to the risks faced by the multinational organizations' including the fire risks, terrorist attacks, earthquakes, and flooding. The results of such events had been adverse causing financial and operational losses to organizations. The risks are divided into four categories including the demand side risks, supply-side risks, product management risks and the IT-related risks. The mitigation of these risks reduced the potential risks faced by the supply chain (Ho, Zheng, Yildiz & Talluri 2015).

Table 2.1 Type of supply chain risks

Material flows risks		
Risks/ sources	**Qualitative solutions**	**Authors**
Single sourcing risks	▪ Adding more sourcing options ▪ Considering different sourcing at home and a foreign country. ▪ Supply chain resilience	(Fitzgerald 2005) (Peck et al. 2003)
Flexible sourcing risks	▪ Supply chain resilience	(Peck et al. 2003)
Monitoring of supply product Quality controls risks	▪ Adopting alternative methods of sourcing at home and foreign.	(Fitzgerald 2005)
Risks of supply capacity	▪ Adoption of alternative sourcing at home country and foreign ▪ Multiple outsourcing options ▪ Building flexible network of partners ▪ Suppliers involvement at earlier phase	(Fitzgerald 2005) (Papadakis 2006)
Risks associated with selection of supplier and outsourcing risks	▪ Adoption of alternative sourcing ▪ Avoidance of outsourcing and offshoring ▪ Adopting in-house manufacturing	(Fitzgerald 2005) (Crone 2006)

Risks related to designs and process of product	▪ Adoption of effective information systems	(Handfield, Ragatz, Petersen & Monczka 1999) (Peck et al. 2003) (Khan, Christopher & Burnes 2008)
Risks related to production capacity	▪ Adoption of early warning systems ▪ Efficient information systems	(Handfield, Ragatz, Petersen & Monczka 1999) (Peck et al. 2003) (Khan, Christopher & Burnes 2008)
Risks related to operational disruption	▪ Effective control systems ▪ Adoption of alternative sourcing at home and foreign ▪ Effective designs of supply chain ▪ Adoption of operational hedging	(Fitzgerald 2005) (Handfield, Ragatz, Petersen & Monczka 1999) (Khan, Christopher & Burnes 2008) (Kleindorfer & Saad 2005)
Fluctuations in demand	▪ Adopting licensing ▪ Postponing strategy when needed ▪ Adopting effective systems	(Jüttner 2005) (Papadakis 2006)

Risks of access inventory Inability of meeting demand	▪ Reductions in inventory holdings ▪ Adoption of lean manufacturing	(Avelar-Sosa, García-Alcaraz & Castrellón-Torres 2014) (Jüttner 2005)
Risks associated with logistics	▪ Reduction in the transportation distance ▪ Using effective shipments	(Crone 2006)
Risks of price fluctuations	▪ Adoption of operational hedging	(Gaonkar & Viswanadham 2014)
Political risks	▪ Adoption of operational hedging	(Gaonkar & Viswanadham 2014)
Risks associated with supply networks	▪ Developing e- business loyalty	(Ritchie & Brindley 2007)

Table 2.2 Supply chain risks

Financial flow risks		
Risks/ sources	**Qualitative solutions**	**Authors**
Fluctuations in exchange rate	▪ Adoption of hedging	(Gaonkar & Viswanadham 2014)
Price and cost fluctuations	▪ Not supplying in low-cost country	(Bavarsad, Boshagh & Kayedian 2014)
Strength of financial partners	▪ Receiving payments earlier ▪ Benchmarking of stock	(Handfield, Ragatz, Petersen & Monczka 1999)

	prices	
Risks associated with handling	▪ Early receiving of payments	(Handfield, Ragatz, Petersen & Monczka 1999)

2.10 Literature Gap

A number of studies are available that discusses the risk factors faced by the supply chain management and the impacts of such risks on the business processes. The literature presents the significant contribution of researchers specifically from the period of 2000 to 2016 discussing the effective role of risks in supply chain operations. Although the research studies have contributed significantly providing information and facts about the risks associated with the supply chain there exists knowledge gap reflecting the need for further research. The future research is also evident due to the rapid adoption of outsourcing by the organization for achieving cost effectiveness and the outsourcing involves the suppliers' network that adds the potential risks that the companies may suffer.

Chapter 3: Risk Allocation

3. Risk allocation

Keeping in view the risks faced by the supply chain hypotheses have been developed where the first hypothesis is concerned about shifting the risks and the second hypothesis involves risk absorption. The risk shifting hypotheses is related to the buyers' behavior whose goal is whose interest is cost minimization and transferring cost to suppliers' side. Buyers' actions include the exploitation of suppliers, costs reductions and buffering in response to business fluctuations (Camuffo, Furlan & Rettore 2005). However, limited information about suppliers' costs and technology are unfavorable for buyers. Buyers attempt to obtain supplies information related to the business source, costs, technologies employed in product development manufacturing capacity and financial standing etc.

The buyers adopt effective risk allocating strategies for supply chain optimization and modern practices of quality management for overcoming issues of the information system, reductions in moral hazards and more control over suppliers. The risk absorption hypothesis explains the buyers' intention of declining purchasing costs, gaining more profits irrespective of costs volatility and development of reliable relationships with suppliers. Buyers are also concerned about risks absorption of unpredictable costs and fluctuations in demand. Global optimization of supply chain and effective supply chain contracts are common interests for buyers and suppliers (Camuffo, Furlan & Rettore 2005).

3.1 Strategies for risk allocation

The risk allocation in the present research Souza, Goh, Kumar & Chong (2011) involves the application of robust supply chain strategies that for sharing of risks between manufacturers and first tier suppliers in the automotive industry of UAE. Risk allocation helps in developing a

balance between reduces costs, operational activities of supply chain and reduces the risks faced by the automotive industry. Risk allocation is also associated with high products use, availability and flexibility of supply, increased product control over demand sand exposure. The risk allocation strategies involve postponement that is associated with customization of products demand for achieving time effectiveness in case of delays.

The postponement strategy is used by Dell when certain parts are missing. Another risk allocation strategy is strategic stock in which inventory stock is shared and is located at various locations of different partners that minimize the supply losses resulting from warehouse damages. The third strategy is supply chain rebalancing that is associated with the maintenance of flexible supply chain. Under this allocation, the supplier is allowed to switch in case of supply disruptions.

The fourth strategy is outsourcing certain production that allows firms shifting production to other locations when it is required. The fifth strategy involves the networked economic and supply incentives that are applicable to the industry having a limited number of suppliers and incentives are offered by the government allowing suppliers to enter the markets that lead to the establishment of suppliers' network. The adoption if this strategy by Li and Fung allowed identification of most suitable places for sourcing of raw materials. It also helps in maintaining alliances between suppliers and manufacturers (Souza, Goh, Kumar & Chong 2011).

3.2 Evidence on risk allocation

According to Souza, Goh, Kumar & Chong (2011) flexible model choices are also effective risk allocation strategy that explains the already defined trade lanes and routes are the cause of a hindrance for the logistic companies. It depicts that the favorable option is having multiple transportation modes allowing diversified and flexible logistic strategy that is associated

with more than one carrier option and many routes options. It is more favorable for companies, allowing them to achieve customer's agility and options of changing routes when needed.

Another effective risk allocation strategy involves dynamic pricing and promotion that is linked to shaping demand and management of revenue. The case where production is in excess use of dynamic pricing and promotion is more favorable that allows effective selling of products. It is also applicable in the case of products disruption that allows the company to increase sales through pricing of alternative products that distracts the customers from the original product.

Another risk allocation strategy is the psychological buying and on time availability that involves changing products location on the shelf and displaying less or a number of products. This also includes displaying limited version of any product for attracting customers. This strategy is most effective when the company faces fluctuations in the supply of the product. Silent product rollover is also an effective strategy used for risk allocation that involves the replacement of the original product with the substitutes that involves a planned strategy (Souza, Goh, Kumar & Chong 2011).

Table 3.1 Risk allocation

Risk allocation	Purpose	Benefits under normal conditions	Benefits after disruption	Actions of logistic firm
Postpone	Enhances flexibility of product	Improvements incapability of managing supply	Effective changes in configuration products	Increases adaptability of services with changes in the product line.

Strategic stock	Enhances product's availability	Improvements incapability of managing supply	Immediate response to market demand in case of major disruptions.	Effective management of shared warehouses. Management of stocks by supply chain partners.
Rebalancing of supply chain	Enhances flexibility of supply	Improvements incapability of managing supply	Immediate shifting of products among suppliers.	Ensuring adequate supply through changing routes.
Outsourcing	Enhances flexibility of supply	Enhanced management capacity of supply	Shifting of production between in-house and to other suppliers	Enhances the supply chain network and involve active interactions.
Network economic & supply incentives	Increases the availability of product	Improvements of supply managing capability	Rapid adjustments in quantities	Increases in the adaptability of services with changes in the product line.

Flexible model choices	Enhances flexibility of transportation	Enhanced management capacity of supply	Swift changes in transportation mode	Having end to end supply chain visibility. Rapid changes in use of transport.
Demand shaping and management of revenue	Increase in product demands control	Improvements in capabilities of managing demand	Influences selection of consumers product	Increases in adaptability of services with changes in product line
Psychological buying & on time availability	Increases in control of products demand	Improvements in capabilities of managing demand	Demand for different products is influenced.	Increases in adaptability of services with changes in product line
Silent product rollover	Increases in products control and customers exposure	Improvements in capabilities of managing demand and supply	Effective management of different products and their demand	Increases in adaptability of services with changes in product line

3.4 Impacts of regionalization and segmentation

According to the study Chopra & Sodhi (2014), the risk allocation of the supply chain involves two effective strategies segmenting supply chain and regionalization supply chain as both strategies allow organizations to respond effectively to disruptive risk incidents. Segmentation of supply chain is associated with a reduction in supply chain fragility and improvements in organizational gains. This involves the use of decentralized and specialized capacity for commodities of high and low volume demands. This strategy is likely to minimize costs and disruptions faced at the single location as the similar item is produced by many suppliers. In the case of low volume products facing uncertainties in demand, the strategy allows the flexible capacity option for the supply chain.

The risk concentration is minimized by the flexible supply chain. Multiple facilities are also selected for the production of low volume items and segmentation is more favorable for companies having sufficient capacity. The examples of supply chain segmentation involve W.W Grainger Inc. and Lake Forest Company that is having a capacity of 400 stores in the US. Segmentation is also adopted by Amazon for increasing the distribution channel. It is suggested that the centralization of capacity as an effective risk allocation strategy for increasing sales and reducing uncertainties (Chopra & Sodhi 2014).

Regionalizing is another effective strategy used for risk allocation as it is associated with reduced distribution costs and reductions in risks of global supply chain. This involves the strategic designing of the supply chain for dealing with the natural calamities or terrorist attacks. It involves setting up of supply chains in neighboring regions that can be used temporarily in when a home country suffers from any calamity.

Regionalizing suggests the responding against risks by detecting disruptions, solution designing, and deployment. Rationalization also involves the use of effective IT systems that are likely to allocate the risks associated with the supply chain. Development of contingency recovery plans is also part of risk mitigation strategy (Li and Fund Ltd). Is a manufacturing company that has adopted contingency supply plans in other countries also that allows it to shift production to the other region in case of any disaster? The other possible measures for risk allocation include; reductions in resource concentration by adopting pooling of inventory and by overestimation of the possibilities of disruption including the bankruptcy of supplier, plants fire failure of components (Chopra & Sodhi, 2014).

Chapter 4: Research Framework

4. Research framework

The research framework has been developed on the basis of literature review and the risk allocation strategies that need to be been discussed above in the study. In order to understand the preparedness of the automotive industry against the supply chain risks, it is important to assess the type of risks that exists in the supply chain process and then develop the strategies for risks allocation that results in the minimization of the risks and helps the organization to achieve its goals. Cyber risks, security breaches and information systems risks are the risks associated with the supply chain and it is important for organizations to get rid of all such risks. The conceptual framework has been developed on the basis of available literature that involves;

- Finding the vulnerable factors of supply chain risks and assessing the contribution of each factor to risks and finding the level of risks involved.
- It involves determining the relationship of the factors with the supply chain risks and finding solutions for avoiding such risks.

4.1 Identification of vulnerabilities

A variety of definitions and explanation of supply chain risks are considered from literature and the study of conditions that leads to the risks and increases the vulnerabilities. The main factors of vulnerability identified are; exposure of the disturbance that is of serious nature and the combination of supply chain characteristics that is likely to minimize the risks associated with supply chain or it reveals the exact nature of the risks involved. The level of sensitivity of the supply chain is considered for assessment of the crucial factors and their impact on the SC that involves both internal and external factors. The purpose of supply chain risk allocation is to

minimize the possible levels of risks that the SME faces by incorporating sufficient degree of preparedness and combating the threats in advance.

4.2 Assessment of risk factors

Four key elements have been considered for assessing the presence and impact of the risk factors.

i. The first element is exposure that provides information about the level of degree and nature of each risk thus revealing the significant contribution of each risk factor. The assessment is made on the basis of previous trends of supply chain and the changes in the environment.

ii. The second crucial element is a denoted as sensitivity that explains how sensitive the supply chain is against each particular risk. It involves the examination of the organizational processes, assets, and products and determines the potential level of risks involved. It also finds the magnitude of risks involved and the degree to which supply chain can be affected by the potential vulnerabilities. Every component of the supply chain is assessed that involves measurement of its position, objective, mission and its impact on the network.

iii. The third important element is the susceptibility that uncovers the degree of losses and risks that the supply chain may suffer and also uncovers risks perturbations. Susceptibility is done on the basis of previous two elements exposure and sensitivity.

iv. The fourth element is the level of preparedness that reveals the requirements for maintenance of acertain level of preparedness sin advance for minimizing the degree of potential risks and preparedness is important for the organizational performance in future. The future risks that organization faces are also

determined in this phase along with the level of maturity. It provides information about the awareness of the supply chain and trends and reveals the risks that the organization is likely to suffer in future. The maturity level is involved with the management of the supply chain and minimizing the degrees of risks involved in supply chain networks.

The management techniques are designed on the basis of the associated risks that the organization is facing and different possibilities are considered for assessing different risk situations associated with the supply chain. The process also provides information about the possible actions that are required to be taken in order to reduce the chances of risks and minimizing to the maximum possible levels.

4.3 Risk mitigation

The effective actions required for risk mitigation in automotive industry involve the following stages;

i. Avoiding risk: that is associated with avoiding the practices and conditions those results in supply chain risks. It involves particular actions required for removing associated risks and using alternative supplier if required.

ii. Risk transfer: the second action is risk transfer that includes transferring of risk from the vendor and passing on the possibility as part of the project.

iii. Risk mitigation: it involves the actions taken in advance in order to minimize the levels of potential risks and eliminating them. It is associated with minimizing the effects of such actions on risks.

iv. Risk acceptance: risk acceptance is involved taking actions for in advance after recognizing the possibilities of risks.

Keeping in view the literature review the potential supply chain risks that automotive industry faces include terrorist attacks that are the biggest risks that an organization may face and the initiation of supply chain risk management started after the first terrorist attacks on world trade center. Effective technologies are used for mitigating risks and collaborative risk management (Vanany, Zailani & Pujawan 2006). Natural calamities, terrorist attacks and economic downturn and natural uncontrolled factors identified as supply chain risks. Disturbances in supply chain activities from contractors and subcontractors' side are also recognized as risks. The uncovered risks factors are variations in products, globalization, outsourcing, supply reductions and ineffective manufacturing (Levary 2007).

The possibility of risks emerges from the interactions between organizations and partners of networks. The identified operational uncertainties are also risks including employees strike, low supply of raw materials, the breakdown of machinery and equipment, limited availability of spare parts and quality factor. Supply network risks and cyber risks are also likely to contribute a significant level of risks for the enterprises that are present between the distributors and logistic partners.

The irregular behavior patterns existing between suppliers and manufacturing partners also contributed towards the significant level of risks. Other vulnerable risks involve the exchange of information between supplier and competitive manufacturer, disruptive technology and fluctuations in price. Foreign exchange fluctuations, policy risks and risks of price controls also contain significant elements of risks towards supply chain. Shortages resulting from delays in materials and the production levels also contribute to risks.

Systems risks involve ineffective hardware and software, viruses and cyber-attacks that result in a breach of confidential information and failure of the coordinating systems in operations are also potential risks (Gaonkar & Viswanadham 2014). The effects of the risks on the organization are negative including high costs of working, customers' complaints and productivity loss. The ability of supply chain is assessed on the basis of organizational handling capacity that is dependent on the level of preparedness for dealing with the risk factors.

4.4 Supporting evidence

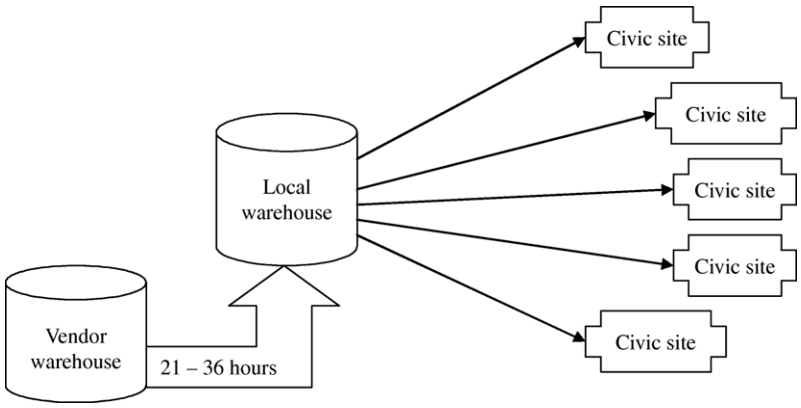
Disruption risk is also an effective risk affecting the supply chain and resulting in dissatisfaction of the stakeholders. Delays in delivery due to the operational ineffectiveness also affect the supply chain negatively. The literature has revealed that risk factors associated with the supply chain are likely to cause a negative influence on the organizational process thus affecting the performance of organization negatively. Volatility in the external markets is also recognized as the potential risks faced by supply chain (FLORIAN & CONSTANGIOARA 2014).

FLORIAN & CONSTANGIOARA (2014) further classifies the risks into two broader categories and provides the solutions for mitigating the risks. The effective solutions provided by various researchers' include; use of alternative sourcing options, different sourcing options in the home country and in a foreign country, adoption of supply chain resilience that helps in handling flexible sourcing risks. Quality control risks are controlled by the adoption of alternative methods of sourcing and risks related to the capacity of supply are controlled by considering multiple options for sourcing and building flexible networks for partners. Outsourcing risks are minimized by adoption of the in-house manufacturing process and avoidance of outsourcing. The designs and process risks are controlled by the adoption of effective information systems that are

capable of maintaining the effective information flows. Production capacity risks are controlled by developing early warning systems and adopting effective information systems.

Information Systems are underlying success factor in innovative and automated supply chain cycles. It is possible for the partners (Customers & Suppliers) of a supply chain to collaborate with each other to compliment and share the benefits of advanced supply chain management (Fawcett, Magnan & McCarter2008). The researchers have realized the importance of sharing information such as shared inventory, sales, demand forecast, order status, and production schedule etc. Information transfer model, information hub, and third party information sharing are elaborated in the study as alternatives of information sharing and automating supply chain cycles (Lee 2000). The process diagram below reflects the advantage of automated supply Chain

Figure 4.1 Automated vendor managed inventory diagram



(Hu, Zeng & Zhao 2009).

Information sharing influences supply chain performance in terms of total cost and service level. A higher level of information sharing is associated with lower total cost and shorter order cycle time. However, it should be noted that while sharing of information is

crucial, its impact on the performance of a supply chain depends on what information is shared, how it is shared, and with whom (Byrne & Heavey 2006; Li & Lin 2006).

The operational disruption risks are handled by incorporating effective control systems, using different sourcing methods at home country and at a foreign country and adopting operational hedging option. Fluctuations in demand are handled by adopting licensing and using effective systems similarly inventory risks are controlled by reducing the holdings of inventory and using lean manufacturing. Logistic risks are controlled by using effective shipments that save time and more distance can be covered in less time. Price fluctuation risks are controlled by the use of operational hedging strategy and it is also used to manage political and instability risks. Supply networks risks are controlled by the development of e- business loyalty.

The studies (Byrne &Heavey 2006; Li & Lin 2006) have also provided solutions for handling the financial flow risks and the exchange rate fluctuations are mitigated by using the operational hedging strategy that minimizes the fluctuations. Price and cost fluctuations are handled by avoiding the supplying in low-cost countries. The risks associated with the strengths of financial partners are handled by receiving advance payments and benchmarking the stock prices. Handling risks are then controlled by receiving early payments. The risk allocation strategies have been incorporated for mitigating risks and reducing them to minimum possible levels.

It provides capability improvements for the supply chain and the logistics firm is likely to increase the services adaptability in response to changes in the product line. The commonly used risk allocation strategies are postponed, strategic shock, rebalancing of the supply chain, outsourcing, network economic supply incentives, flexible model choices,

demand shaping and management of revenue, psychological buying and time availability and silent product rollover.

Chapter 5: Methodology

5. Methodology

5.1 Research methodology

The primary requirement of the research is to answer the research questions formulated in the chapter of Introduction. Research remains the primary tool in literary studies and research papers. The primary idea of research is to assess the objectives of the study and determine the association between the variables. The initial stage of research involves the formulation of the hypothesis that are statements needed to be tested.

The observations of the methodology follow hypothesis that leads to the evaluation of data in a systematic manner that further results in deductions and conclusions. The purpose of research is to guide future research, and effective research methodology increases the accuracy of data. The research that is conducted in appropriate manner enhances the usability of data and generates accurate results. The research involves some limitations that leave room for future research (Marczyk, DeMatteo, & Festinger, 2005).

5.2 Research design

An important stage of research methodology is appropriate to research design that as scientific method depends on the empirical approach that includes observations and experimentations. The emphasis of empirical approach is on direct observations that lead to hypothesis formulation. Effective observations are measurements that lead to an appropriate investigation of facts. The ability of the researcher to use his intelligence influences the process of research design.

The construction of research questions depends on the observations. The research questions provide information about the facts that are needed to be assessed. Researcher questions hold

significance as they resolve the issue of the researcher and highlights what researcher wants to seek (Marczyk, DeMatteo, & Festinger, 2005).

5.3 Quantitative and qualitative research

The quantitative research involves the description of facts in the form of data and statistics. The quantitative research incorporates systematic measures to search results. The qualitative research is different from quantitative research, and it depends on interviews and questionnaires. The qualitative research plays a significant role in the in- depth analysis of respondents and the accurate results of qualitative research depends on the questionnaire technique. Appropriate and well- organized questionnaire leads to statements that yield accurate information (Saunders, Lewis, & Thornhill, 2012).

5.4 Empirical research

The present study utilizes the primary and secondary research techniques to assess the information required for the analysis. The present study aims to assess the impacts of supply chain management of auto industry of UAE. It develops a 26- item questionnaire that is divided into three parts.

The first part of the questionnaire seeks information about the organizational characteristics. The first part reveals information about the awareness and knowledge organization related to supply chain management. The questions emphasize on the experience of employees in the organization, their annual turnover, the size of organization and information about the adoption of supply chain practices.

The second part of the questionnaire targets information about the awareness of participants related to the significance of supply chain management and risk allocation. The second part also

inquires information about the role of supply chain officers in risk mitigation. The questions focus on the importance of supply chain management, their impact on production processes and time efficiency. The second part also seeks information about the impact of supply chain activities on organizational performance, effective management of inventory and storage capacity. It inquires information about the importance of communication networks and uncovers how often the organizations conduct meetings with their networking partners such as vendors and suppliers. The questions reveal information about the influences of SCM on productivity and quality of project improvements.

The third part of questionnaire seeks information about the risk factors associated with the supply chain management and the role of supply management and enterprise management in risk mitigation. The questions provide an idea about the perceptions of participants related to the natural calamities and disasters. The information yields how organizations relate terrorist attacks, thefts and uncertain events with the supply chain. It reveals an awareness of organization about the association of machinery breakdowns and inappropriate plant size with supply chain risks.

The questions uncover the information about the relationship between the disruptions of the supply chain with organizations' profits and revenues. The information revealed the awareness about the association of stakeholders' interests with production delays and pulled over inventory stocks. The questions also yield information about the impacts of technology lapse on the effectiveness of supply chain management.

The questions highlight how the participants relate the price fluctuations and exchange rate risks with the supply chain. The information yields how competition causes implication son the supply chain activities in the auto industry of UAE. The questions gather information about the

association of the off- shoring strategies with SCM. It inquires the awareness of participants about the relationship between SCM and financial and operational losses. The information yields the knowledge of participants about the success of the company and its relation with SCM.

5.5 Statistical analysis

The present study uses the statistical software SPSS that assess the data obtained from the questionnaire. The SPSS provides the statistics of the total number of participants and generates their responses in table form that provides a clear analysis of differences among responses.

The study uses of five pointsLikert scales to state the responses of the participants. The 5- point Likert scale includes the options as' strongly agree, agree, strongly disagree, disagree and neutral. The respondents choose the most appropriate option. The option that reflects the highest number of responses is considered right for the research and results are developed on the basis of the highest selected option (Khan, 2014).

5.6 Correlation analysis

The correlation analysis assesses the relationship between two variables, and the positive correlation depicts the variable have a positive association with each other. The negative correlation depicts that the variables have a negative relationship with each other. The positive relation among variables leads to the acceptance of the hypothesis.

5.7 Secondary data

The present study also utilizes the secondary data that involves the literary databases and published journals of supply chain management. The purpose of secondary data is to evaluate the work on the relevant topic that is previously produced by the researchers. The incorporation of secondary data provides a better idea about the relationship between variables, and it leads to a

more accurate analysis of the results. The future researchers utilize the secondary databases that help them to enhance their research and cover the literature gap left by previous researchers.

5.8 Sample size

The selection of sample size is important to assess the appropriate number of people that leads to the formulation of the idea of masses. The sample is the selected number of people from a total population that is assessed by overall strata. The reason to include limited sample is for the convenience of research.

5.9 Consent

It is important for the researcher to fulfill the criteria of research as the researcher cannot force the participants to choose the answer that he wants. The research must include no elements of coercion and undue influence over the respondents. The questionnaires are filled under free consent of the participants, and they are not influenced to choose an answer.

5.10 Participants in the research

The research study investigates total 50 employees from the auto industry at the United Arab Emirates that serves at middle and higher positions. The reason to include the participants from middle and upper levels is their years of experience. The employees that serve at higher ranks have better knowledge about the organizational practices, and they can provide better information about the supply chain activities. All employees belong to the auto industry at UAE. The participants are informed about the purpose of research, and all interviews are conducted under their free consent.

5.11 Validity of research

The validity of the research depends on the techniques adopted to perform research, and the appropriateness of the research methodology improves the chances of the validity of the research. The study confirms the results acquired from primary survey through secondary literature that enhances the validity of the research. The reduction of bias also improves the validity of the research. During the interview process and collection of data, the researchers if remains impartial and provides free choice to employees to choose the appropriate answers that minimize the chances of invalidity.

Chapter 6: Analysis

6. Analysis

Table 6.1 Epic assessment of supply chain

Region	Economy	Politics	infrastructure	Competence	Overall grade
UAE	B	B+	A	A	B+
Saudi Arabia	B+	B-	B+	B+	B+

Source: (BT, 2014)

6.2 Data collection

The study collects data through primary survey technique that involve face-to-face interviews and questionnaires'. The responses of the participants provide information about the supply chain issues that the company faces. It also uncovers the organization's actions to address the issues of the supply chain, the imperative issues of supply chain management and disruption risks. The survey develops 21 main questions that seek information about the company's strength, turnover, supply chain management along with advantages and disadvantages.

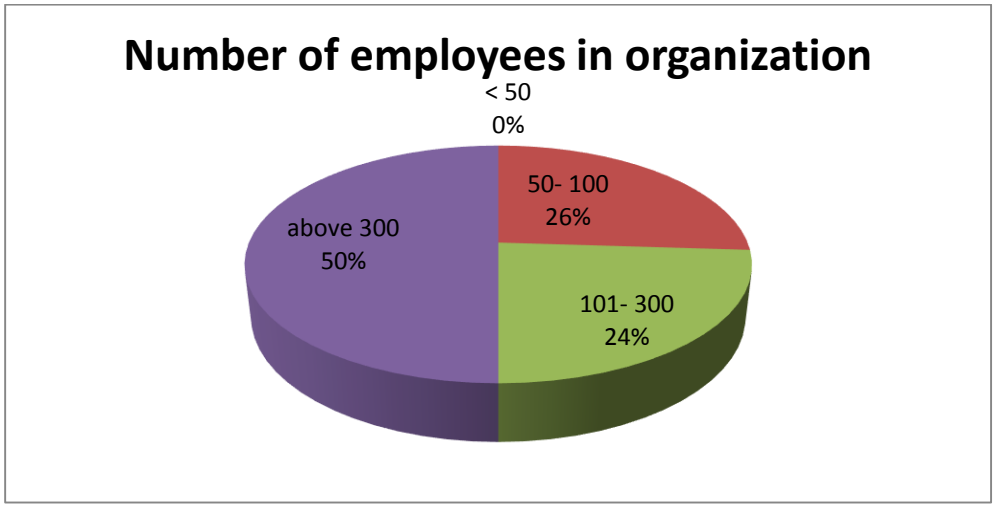
6.2.1 Part I questionnaire

The first part of the questionnaire obtains information about the basic background of the company. The survey indicates the employee strengths of the company that gives amide about the size of the organization. The survey results depict that majority of respondents are from big organizations that employees over 300 employees. 50% of organizations depicts small to medium size organizations.

Table 6.2 Number of employees

Employees	Percentage	Response count
Less than 50	0	0
50-100	25%	13
101-300	25%	12
Over 300	50%	25

Figure 6.1 Employees distribution

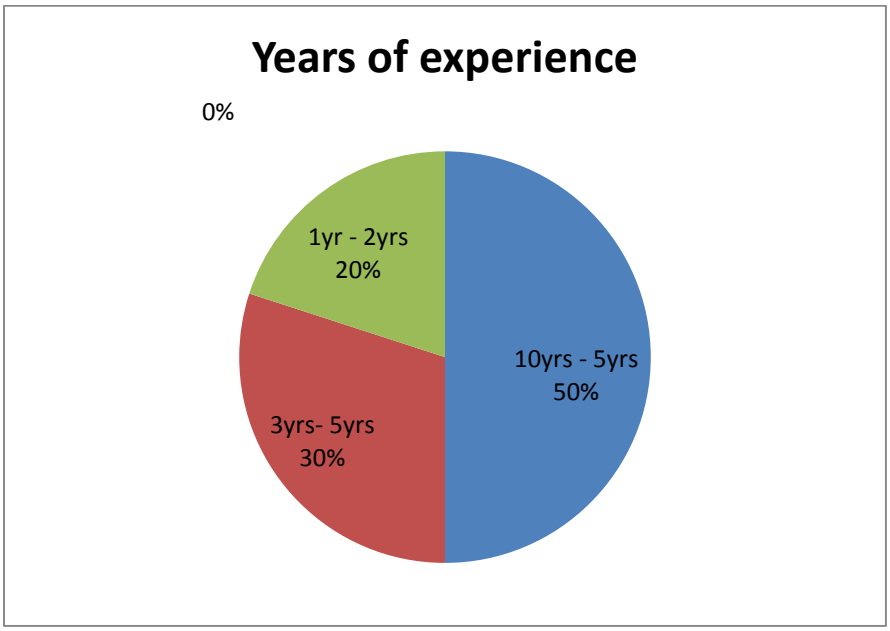


The second question seeks information about the period of employment. The majority of the respondents state their experience between 5-10 years (50%); the other respondents have experience of 3-5 years (30%) and 1-2 years (20%).

Table 6.3 Experience of respondents

Years	Response count
10-5 years	25
3-5 years	15
1-2 years	10

Figure 6.2 Years of experience

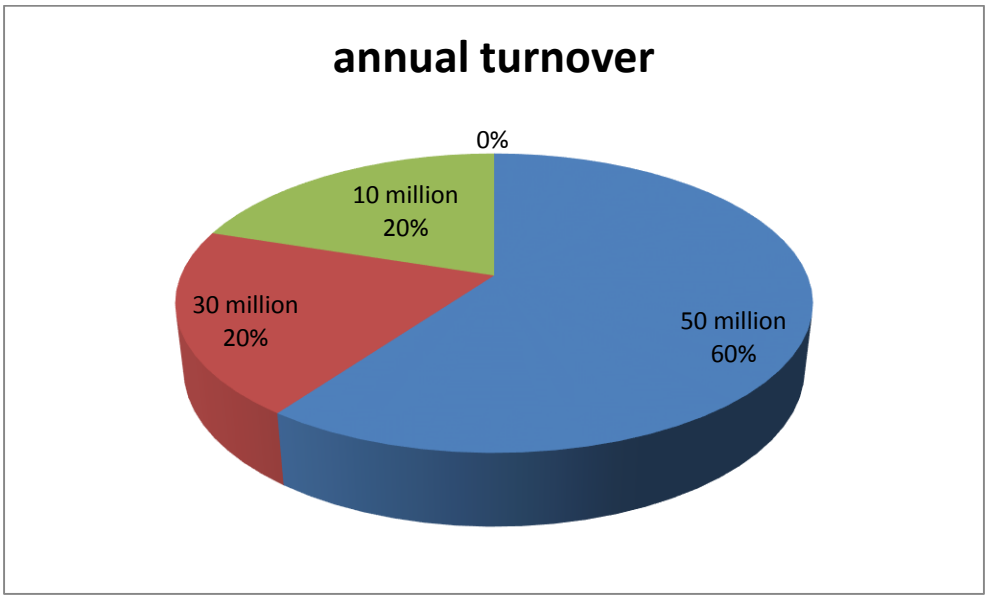


The third question reveals information about the annual turnover of employees that states that majority earns USD 50 million (60%). The remaining participants earn USD 30 million (20%) and USD 10 million (20%).

Table 4.4 Annual turnovers

Annual turnover USD	Response count
50 million	30
30 million	10
10 million	10

Figure 6.3 Distribution of annual turnover



The information about the annual turnover depicts that the participants are affiliated with profitable organizations. The Egan Report on automotive industry reflects that the high turnover associated with the high annual turnover, reduced project duration, high productivity, and reduced capital costs due to inappropriate supply chain management tools.

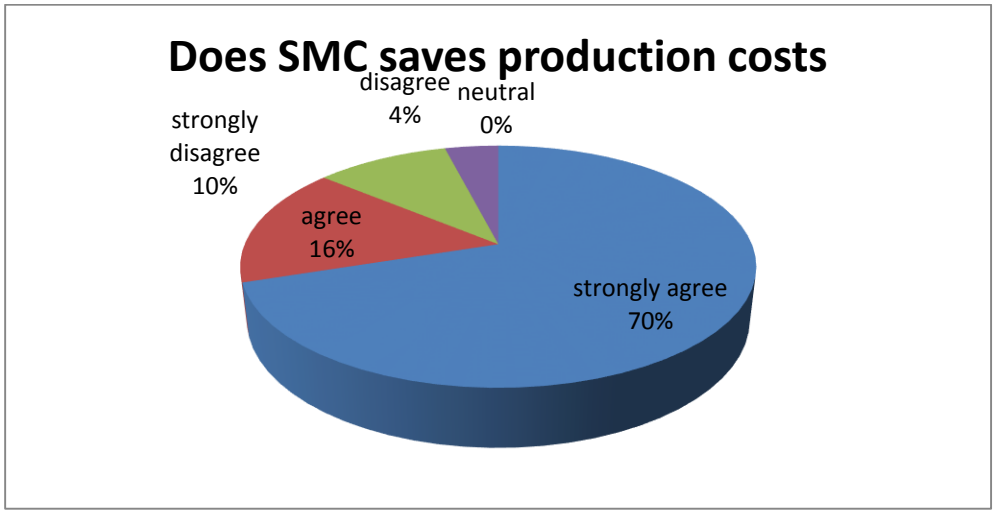
The fourth question seeks information about the importance of supply chain management and asks employees that do you think supply chain manages saves production costs and beneficial for

the organization? The response of the participants depicts mixed results that state the majority accepts the role of supply chain management in the organizational performance by strongly agreeing (70%). The other participants reflect different responses to 15% only agree to the role of SMC, 10% disagrees, and 5% strongly disagree with the statement.

Table 6.5 responses about role of SMC

Strongly agree	35
Agree	8
Strongly disagree	5
Disagree	2
Neutral	0

Figure 6.4 Respondents' responses to role of SMC



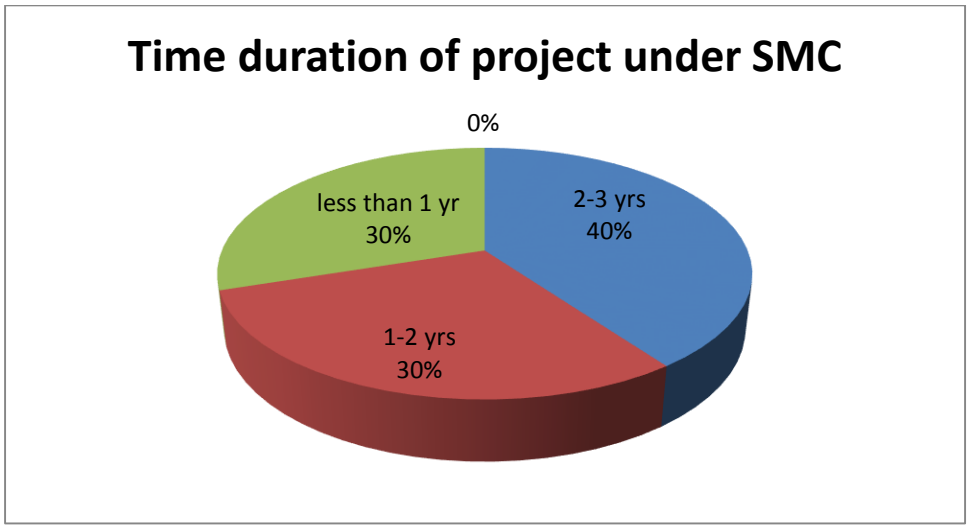
The responses of the employees state that they accept the role of SMC in the organization and reduced costs. The responses generated from survey reflect high awareness and knowledge about the SMC. The fifth question reveals information about the duration of the project. The question asks the employees do you think that the adoption of SMC declines the overall period of a

project that gives three set of options to the employees. The majority of the participants states that the project under SMC takes 2-3 years' time (40%). The other employees' state that the project duration is 1-2 years (30%) and less than one year (30%).

Table 6.6 Project duration under SMC

Years	Response count
2-3 years	20
1-2 years	15
Less than 1 year	15

Figure 6.5 Length of project under SMC



6.2.2 Part II: Questionnaire

The second section of the questionnaire seeks information about the supply chain role in the organization and associated risks. The section depicts information about the adoption of SMC and the barriers that organizations face to implement the SMC procedures.

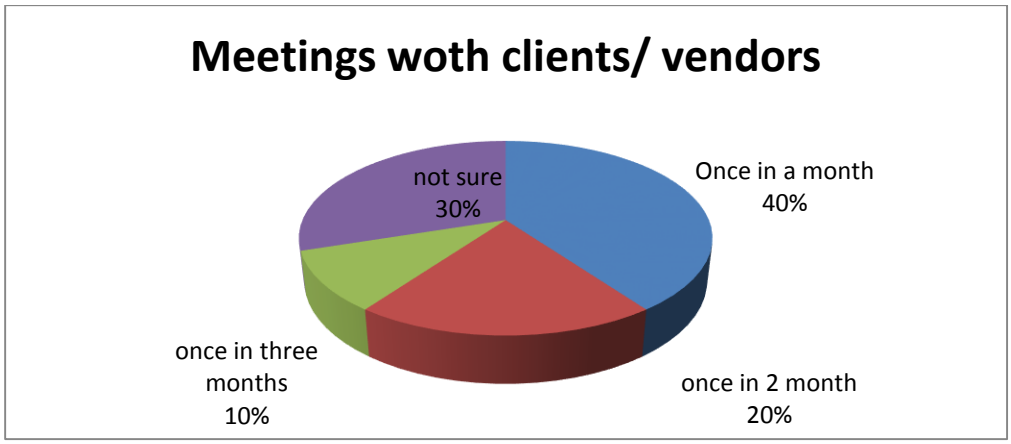
Question sixth inquires information about the process of supply chain management that the organization adopts. The question reveals information about the organizational arrangements for

meetings with clients, vendors, and sessions of team building. The process identifies the importance of communication between organizations and the vendors. The responses depict that majority of participants belonged to organizations that had regular meeting (at least once in a month) sessions with the clients and vendors (40%). The other respondents identify the meetings once in two months (20%), once in three months (10%) and others are not sure about the duration of the meeting (30%).

Table 6.7 Responses on client/ vendor meetings

Once in a month	20
Once in two months	10
Once in three months	5
Not sure	15

Figure 6.6 Responses on vendors/ client meetings



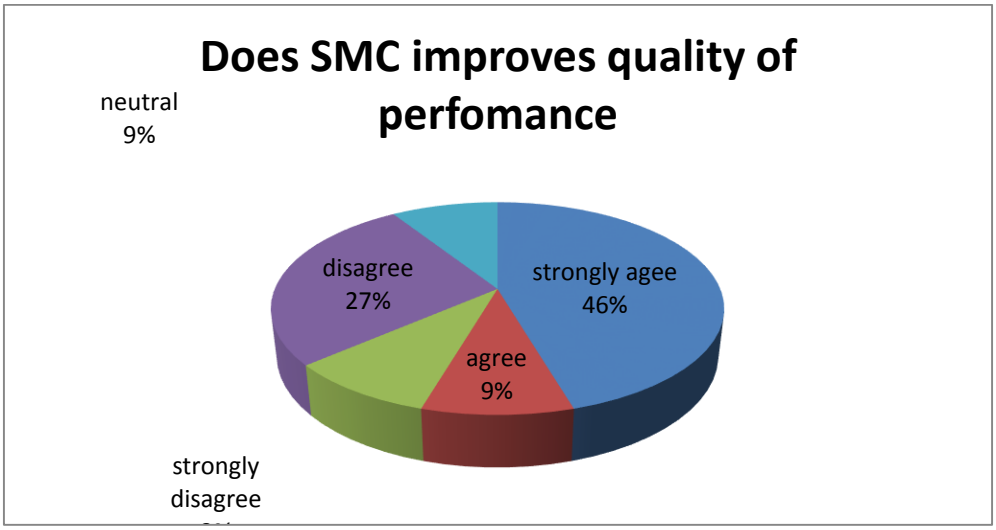
Question seven inquires information about the enhancement of project after the adoption of supply chain management, and the questions ask participants: do you think the quality of project improves under SMC and does it saves the production time and does it saves management's

time. The responses of the participants reflect that majority (50%) strongly agrees, and others disagree (20%).

Table 6.8 Responses on quality of project and SMC

Strongly agree	25
Agree	5
Strongly disagree	5
Disagree	15
Neutral	5

Figure 6.7 Responses on project quality under SMC

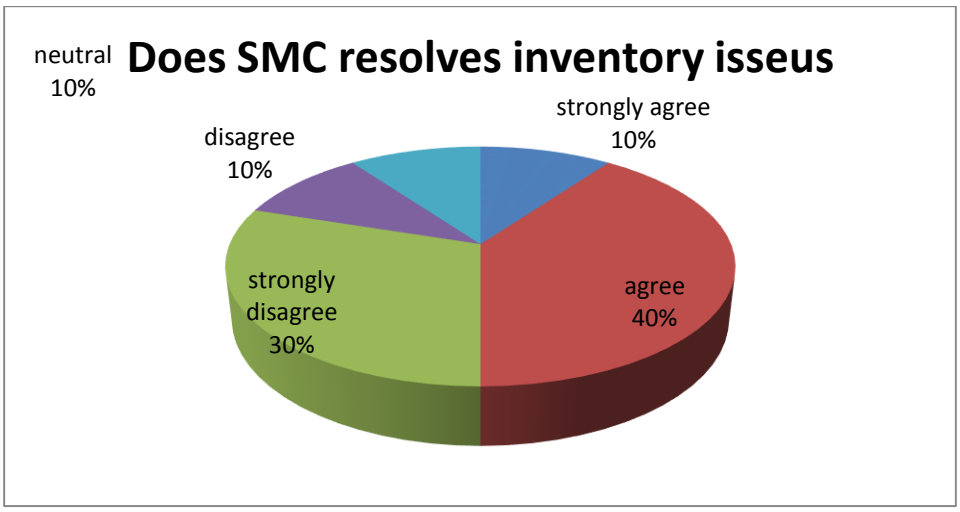


Question eight seeks information about the impact of SCM on organizational relationships with the customers. The participants are asked do you think that SMC resolves the inventory storage issues and leads to a long-term relationship with customers. The majority of the respondents agree only with the statement (40%). The other responses include a strong agreement (10%), strong disagreement (30%), disagreement (10%) and neutral opinions (10%).

Table 6.9 responses on SMC and inventory

Strongly agree	5
Agree	20
Strongly disagree	15
Disagree	5
Neutral	5

Figure 6.8 Responses on SMC and inventory

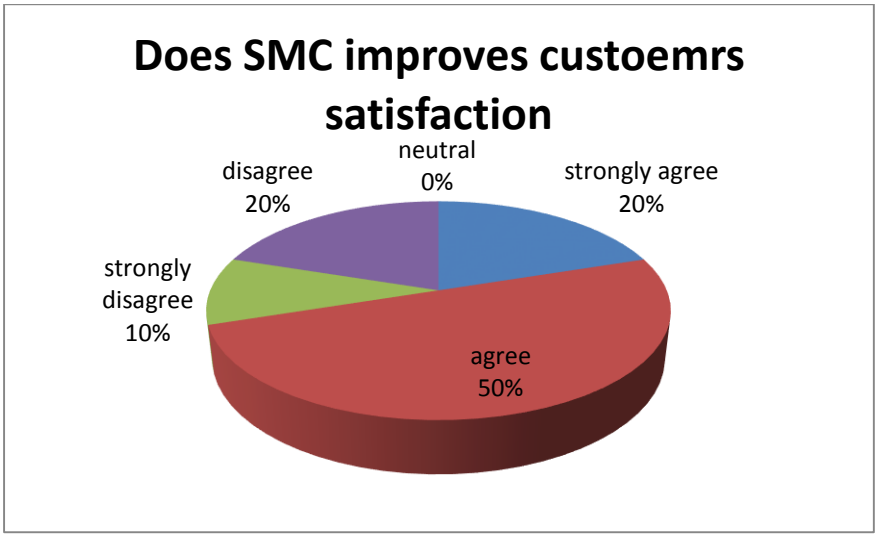


Question nine seeks information about the impact of SMC on customer's satisfaction and quality. The questions ask do you think that the adoption of SMC results in high-quality service that leads to high customer satisfaction. The responses reflect that most of the participants agreed with the statement (50%). The other responses generated include a strong agreement (20%), a disagreement (20%), a strong disagreement (10%) and neutral opinion (0).

Table 6.10 SMC and customers' satisfaction

Strongly agree	10
Agree	25
Strongly disagree	5
Disagree	10
Neutral	0

Figure 6.9 Responses on improvements of SMC and customers' satisfaction

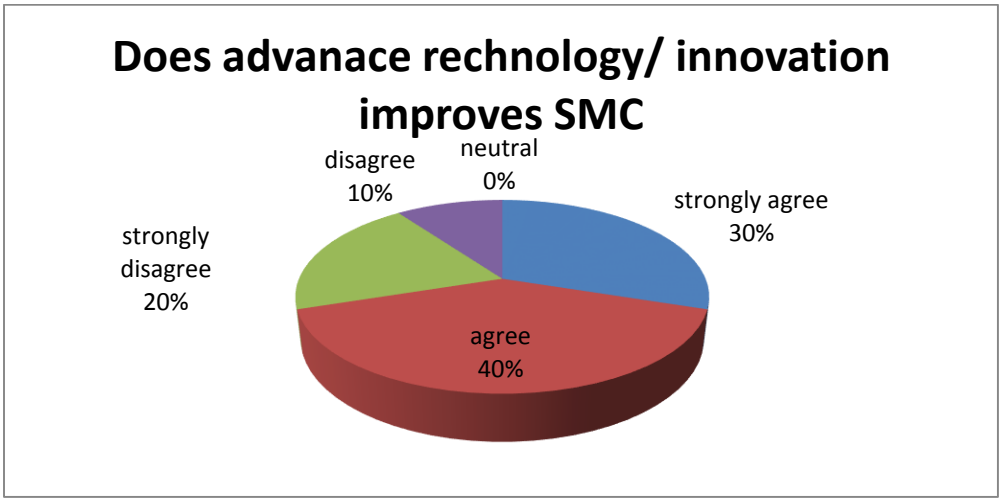


Question ten targets the role of innovative technology in SMC and asks the participants do you think that advanced technology and innovation improves supply chain management that leads to the cost effectiveness. The responses depict that most of the participants agreed on the role of technology (40%). The other participants reflect different responses that include strong agreements (30%), strong disagreement (20%) and disagreement (10%).

Table 6.11 Impacts of technology and innovation on SMC

Strongly agree	**15**
Agree	20
Strongly disagree	10
Disagree	5
Neutral	0

Figure 6.10 Impacts of technology/ innovation on SMC



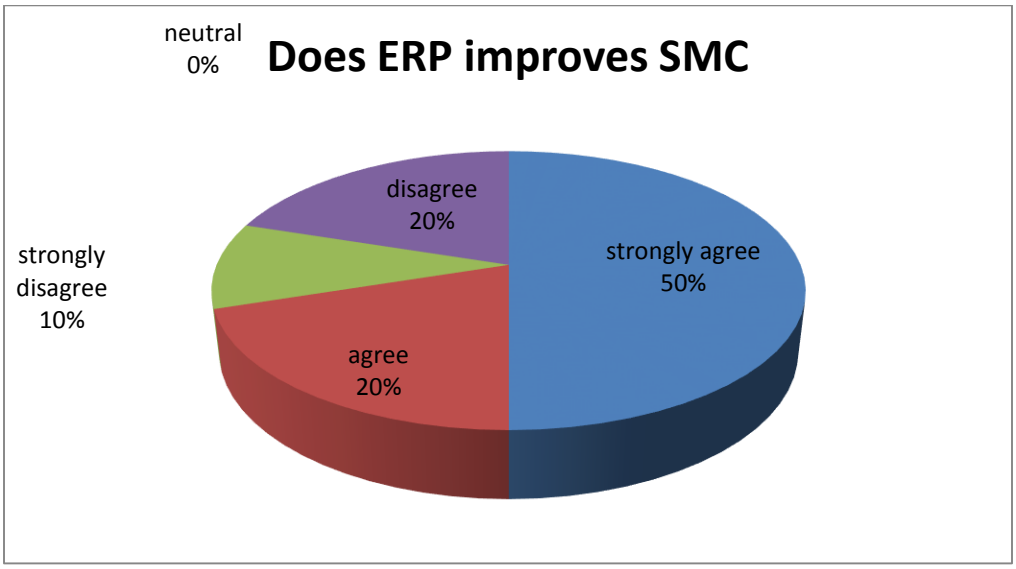
The nest question seeks information about the technologies enterprise resource planning and its impacts of SMC. Most of the employees reflect strong agreement on the statement (50%).

Table 6.12 Impacts of ERP on SMC

Strongly agree	**25**
Agree	10
Strongly disagree	5
Disagree	10

Neutral	0

Figure 6.11 Impacts of ERP on SMC

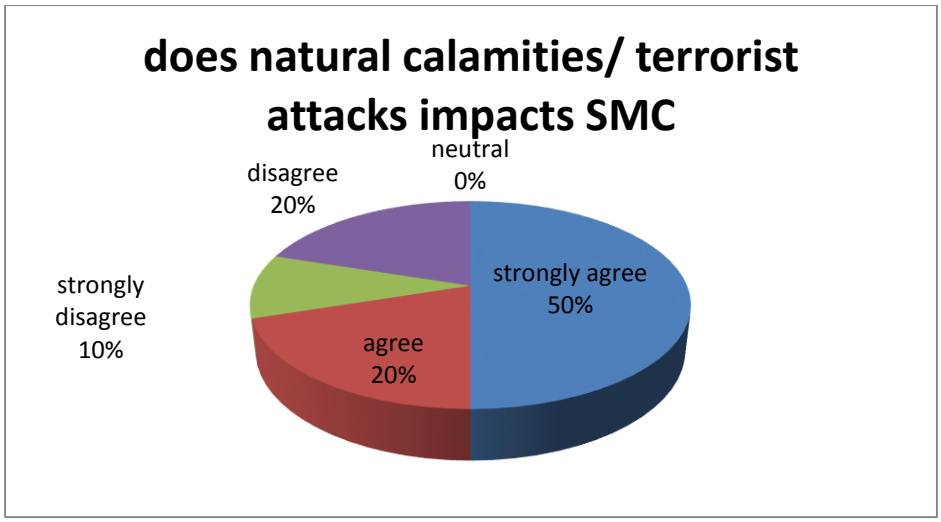


The eleventh question inquires information about the role of natural calamities and terrorists' activities on SMC. The question asked do you think terrorist attacks, natural calamities and economic crisis influences' the SMC. The majority of participants agreed (50%), and fewer disagreed (10%).

Table 6.13 Impacts of natural calamities/ terrorist attacks on SMC

Strongly agree	**25**
Agree	10
Strongly disagree	5
Disagree	10
Neutral	0

Figure 6.12 Impacts of natural calamities/ terrorist attacks on SMC

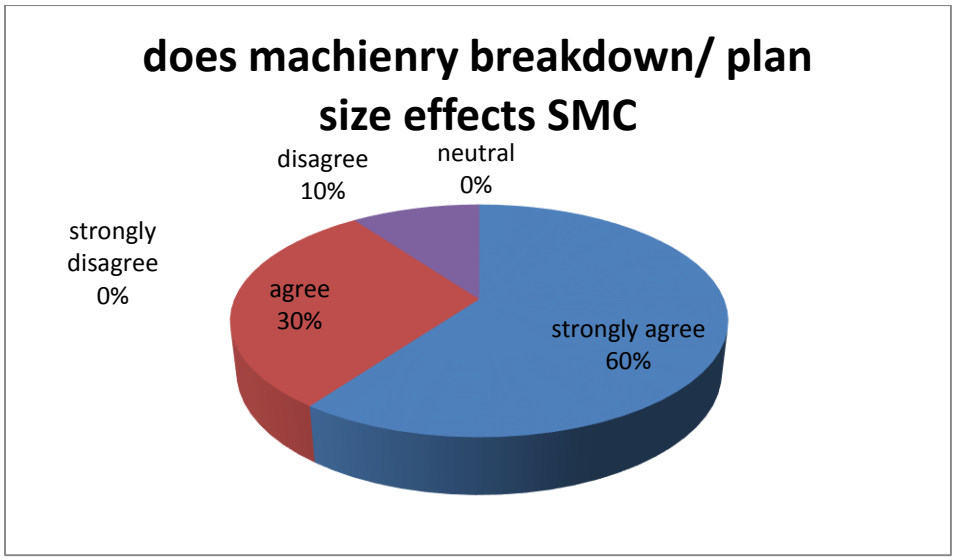


The next question seeks information about the risks of equipment and plant size that asks respondents do you think that machinery breakdown and inappropriate plant size effects the SMC operations. The majority of respondents agreed with the statement (60%), and fewer disagreed (10%).

Table 6.14 Risks of equipment and plant size on SMC

Strongly agree	**30**
Agree	15
Strongly disagree	0
Disagree	5
Neutral	0

Figure 6.13 Impacts of equipment and plant size on SMC

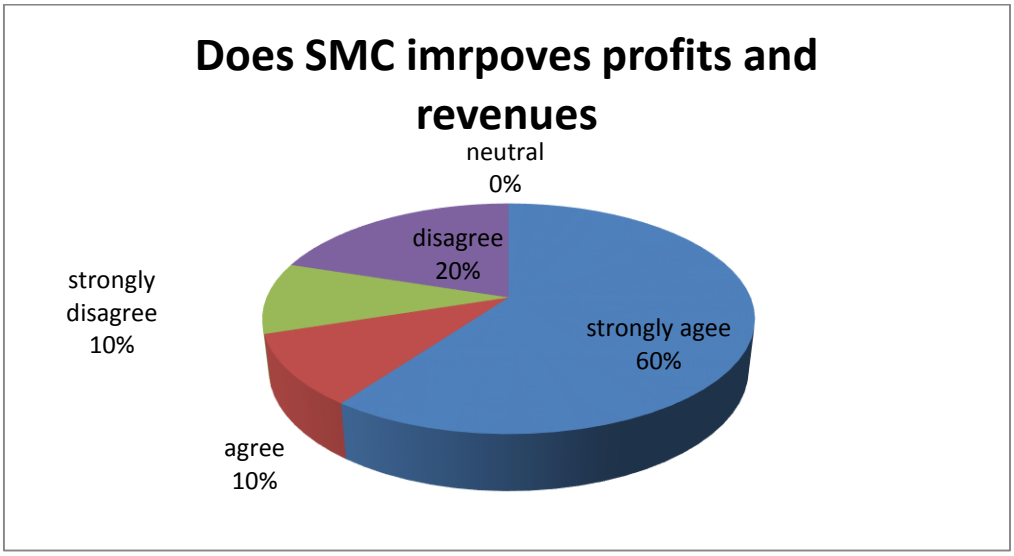


The next question asks do you think disruption of SMC causes revenues and profitability loss to organizations and responses depicts that majority respondents strongly agree (60%) and fewer disagrees (20%).

Table 6.15 Impact of SMC disruption on revenues/ profitability

Strongly agree	**30**
Agree	5
Strongly disagree	5
Disagree	10

Figure 6.14 Impacts of SMC disruption on revenues/ profit



6.2.3 Questionnaire Part III

The part highlights the role of supply chain officers in risk mitigation. It also identifies the responsibilities of supply management and enterprise management in risk mitigation.

The next question determines the role of chief information officer and asks respondents if Chief information officer has an effective role in risk mitigation through maintenance of effective information flow networks in SMC. The majority of the respondents strongly agreed (70%).

Table 6.16 Role of CIO in risk mitigation

Strongly agree	35
Agree	5
Strongly disagree	5
Disagree	5
Neutral	0

The next question determines the role of a chief security officer and inquires if Chief security officers have an effective role in risk mitigation through maintenance of effective security of SCM. The majority of the respondents (70%) strongly agreed on the statement.

Table 6.17 Role of CSO in risk mitigation

Strongly agree	35
Agree	5
Strongly disagree	5
Disagree	5
Neutral	0

The next question seeks to the role of It vendors in risk mitigation and asks if IT vendors have a role in improving the technical issues related to hardware, software and IT services of SCM. The majority of the respondents (60%) agreed with the statement.

Table 6.18 Role of IT vendors in risk mitigation

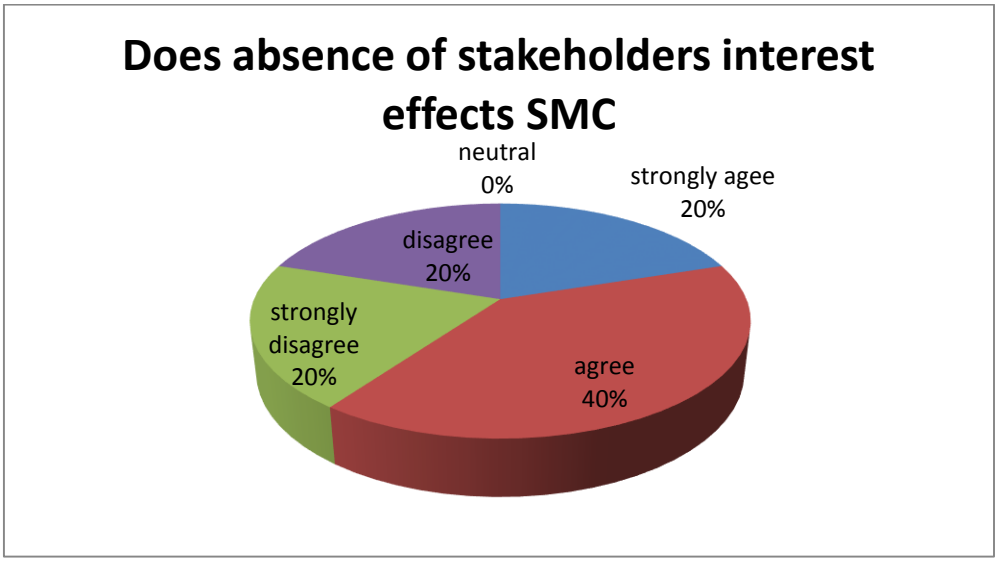
Strongly agree	30
Agree	10
Strongly disagree	5
Disagree	5
Neutral	0

The next question asks do you think the enterprise management and supply management have roles in improving stakeholders' interests, distribution process and pulled overstock inventory. Most of the respondents agreed on the facts (40%) and (20%) disagreed.

Table 6.19 Role of enterprise management in stakeholders' interest and ineffective SMC

Strongly agree	10
Agree	20
Strongly disagree	10
Disagree	10
Neutral	0

Figure 6.15 Ineffective SMC depends on stakeholder's interest

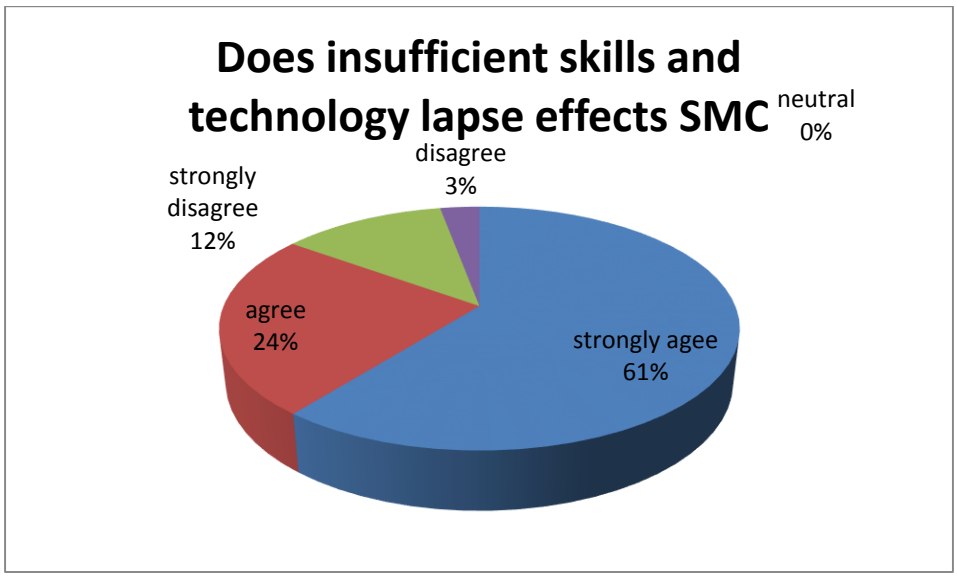


The next question asks do you think the enterprise has a role in the management of insufficient skills and technology lapse to resolve issues of poor performance of SMC. The respondents replied with the strong agreement (30%), strong disagreements (20%) and agreements (30%).

Table 6.20 Role of enterprise management in handling insufficient skills and technology lapse

Strongly agree	25
Agree	10
Strongly disagree	5
Disagree	10
Neutral	0

Figure 6.16 Impacts of insufficient skills and technology lapse on SMC

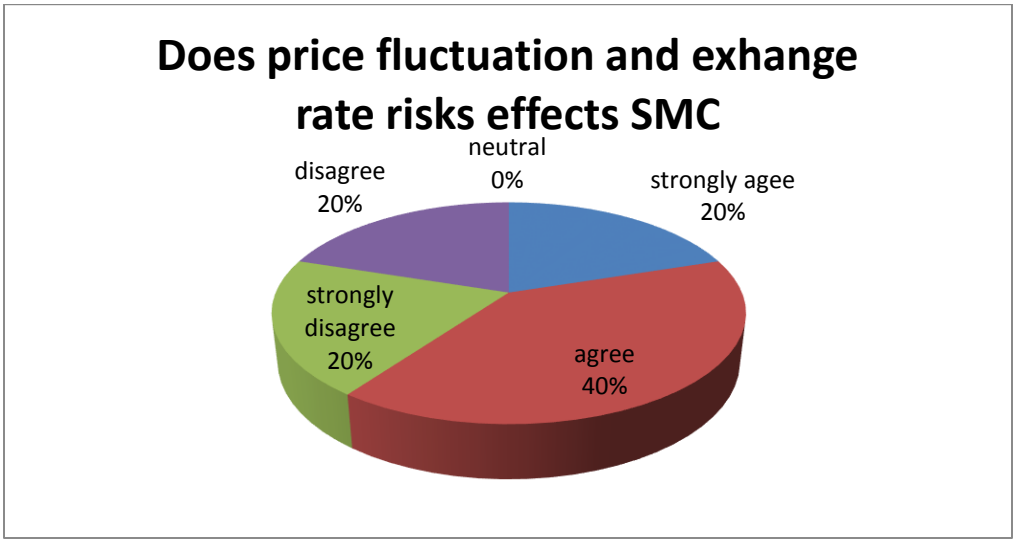


The next question asks about the enterprise's role in the identification of unpredictable risks such as price fluctuations and exchange rate risks. The respondents agree on the relationship between unpredictable risks and poor SMC (40%). The other responses reflect a strong disagreement (20%) and a strong agreement (20%).

Table 6.21 Role of enterprise management in price fluctuations and exchange rate risks on SMC

Strongly agree	10
Agree	20
Strongly disagree	10
Disagree	10
Neutral	0

Figure 6.17 Impacts of price fluctuations and exchange rate risks

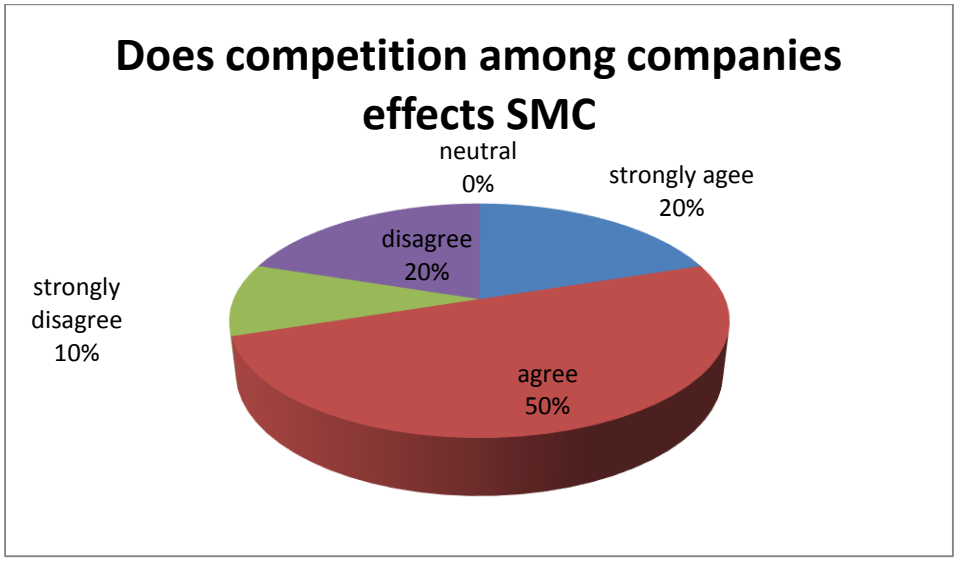


The next question asks participants do you think that intense competition among companies in the automotive industry influences' and enterprise management has an effective role in managing competition. The responses of respondents depict that majority (50%) agrees on the fact and 20% disagrees.

Table 6.22 Role of enterprise management in Intensive competition and SMC

Strongly agree	10
Agree	25
Strongly disagree	5
Disagree	10
Neutral	0

Figure 6.18 Role of enterprise in managing competition

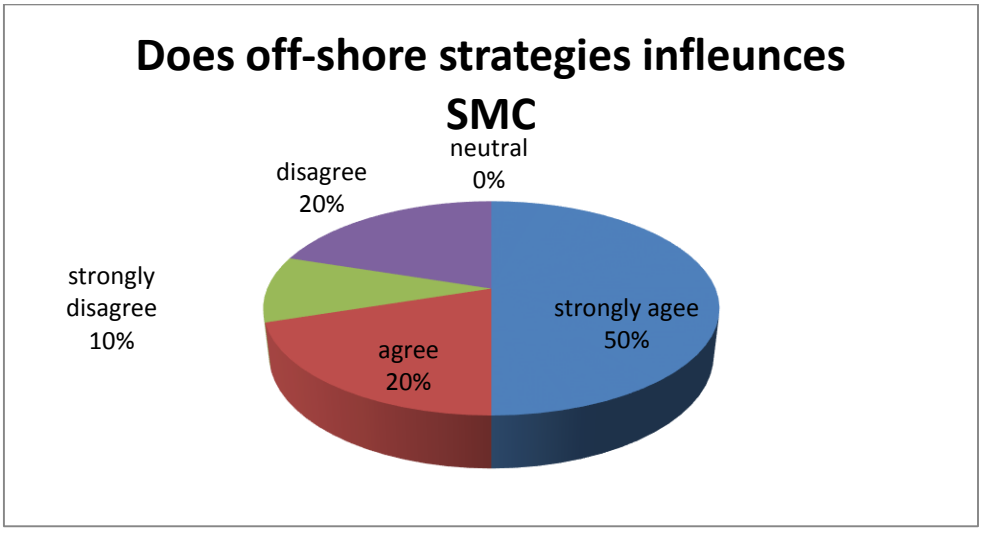


The nest question seeks information about the organizational involvement in offshoring strategies and its impacts on operational effectiveness; the respondents accept the relationship of organization with offshoring strategies and effective SMC. The majority of the respondents strongly agreed (50%), and fewer strongly disagreed (10%).

Table 6.23 role of enterprise involvement in off-shoring strategies

Strongly agree	25
Agree	10
Strongly disagree	5
Disagree	10
Neutral	0

Figure 6.19 Impacts of off-shoring strategies on SMC

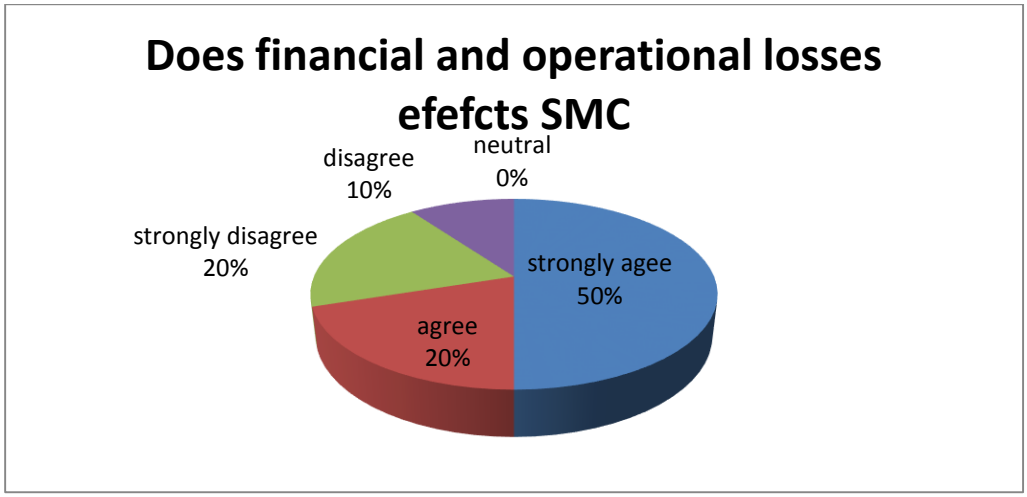


The next questions ask do you think that organizations and enterprise resolve issues of financial and operational losses to the company. The responses of the respondents reflect that most of the participants strongly agreed (50%) and fewer disagreed (10%).

Table 6.24Role of enterprise management in financial/ operational losses on SMC

Strongly agree	25
Agree	10
Strongly disagree	10
Disagree	5
Neutral	0

Figure 6.20 Impacts of financial/ operational losses on SMC

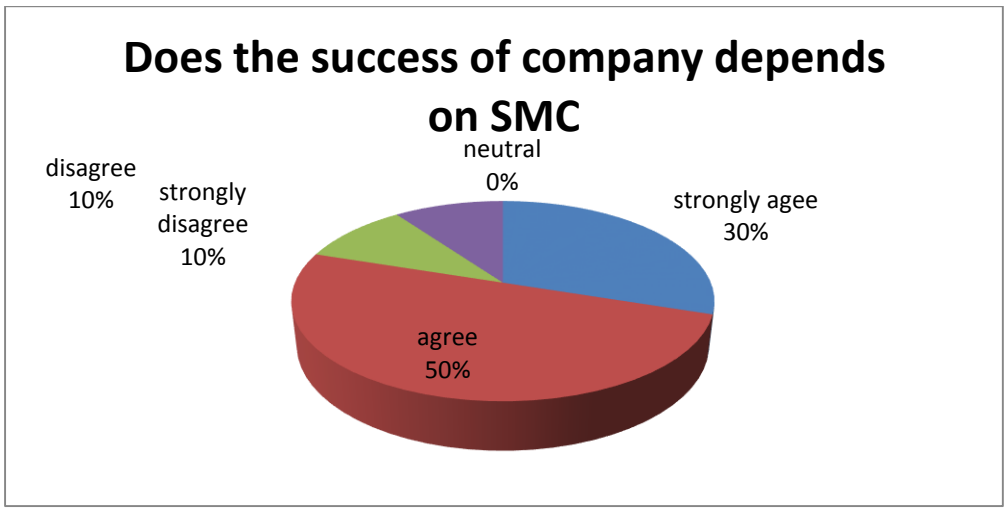


The next question asks participants the success of a company depends on effective supply management and enterprise management. The majority of the respondents agreed (50%), and fewer disagreed (10%).

Table 6.25 Role of supply and enterprise management on Success of company and SMC

Strongly agree	15
Agree	25
Strongly disagree	5
Disagree	5
Neutral	0

Figure 6.21 Impacts of Supply and enterprise management on company's success



The next question determines information about the role of supply management and asks if the effective role of supply risk management in collaborating between key actors declines the risks. The majority of respondents (70%) strongly agreed on the facts.

Table 6.26 Role of supply management on collaboration of key actors

Strongly agree	70
Agree	10
Strongly disagree	10
Disagree	10
Neutral	0

The final question asks information about the enterprise's and supply management's role in improved SCM. The majority of the respondents identified the role of enterprise in risks mitigation mechanisms (80%).

Table 6.27 Role of enterprise management on protection mechanism

Strongly agree	40
Agree	5
Strongly disagree	5
Disagree	0
Neutral	0

6.3 Correlation analysis

Pearson correlation estimates the degree of association between the variables. It assesses the nature and strength of the relationship between the variables. The correlation analysis depicts the relationship between the responsibility of chief information officer in information flow systems and improved SCM. The Pearson correlation between the variables is 0.747** that indicates a positive association between the variables.

Table 6.28 Correlation results in 1

Correlations

		the responsibility of chief information officer in information flow systems	improved SCM
the responsibility of chief information officer in information flow systems	Pearson Correlation	1	.747**
	Sig. (2-tailed)		.000
	N	50	50
improved SCM	Pearson Correlation	.747**	1
	Sig. (2-tailed)	.000	
	N	50	50

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

The Pearson correlation between the responsibility of chief security officer and improved SCM is 0.811** that depicts as a positive relationship. The involvement of chief security officer in security maintenance leads to improved SCM.

Table 6.29 Correlation results in 2

Correlations

		improved SCM	the responsibility of chief security officer in security maintenance
improved SCM	Pearson Correlation	1	.811**
	Sig. (2-tailed)		.000
	N	50	50
the responsibility of chief security officer in security maintenance	Pearson Correlation	.811**	1
	Sig. (2-tailed)	.000	
	N	50	50

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

The Pearson correlation statistics between the responsibility of IT vendors and improved SCM is 0.747** that indicates a positive degree of association between the variables. The results depict that the involvement of IT vendors in the management of hardware and software related issues leads to improved SCM in the automobile industry.

Table 6.30 Correlation results in 3

Correlations

		improved SCM	responsibility of IT vendors in hardware, software related issues
improved SCM	Pearson Correlation	1	.747**
	Sig. (2-tailed)		.000
	N	50	50
responsibility of IT vendors in hardware, software related issues	Pearson Correlation	.747**	1
	Sig. (2-tailed)	.000	
	N	50	50

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

The Pearson correlation statistics obtained in the case of the relationship between the role of enterprise and supply management in handling stakeholders' interest and improved SCM is positive 0.807**. The results indicate that the involvement of enterprise and supply management in the management of stakeholders' interest improves SCM. The Pearson correlation statistics between roles of enterprise in heralding insufficient skills and technology lapse is also positive with improved SCM 0.811**.

Table 6.31 correlation results 4

Correlations

		improved SCM	the role of enterprise management and supply management in stakeholders' interest	the role of enterprise management in handling insufficient skills and tech lapse
improved SCM	Pearson Correlation	1	.807**	.811**
	Sig. (2-tailed)		.000	.000
	N	50	50	50
the role of enterprise management and supply management in stakeholders' interest	Pearson Correlation	.807**	1	.925**
	Sig. (2-tailed)	.000		.000
	N	50	50	50
the role of enterprise management in handling insufficient skills and tech lapse	Pearson Correlation	.811**	.925**	1
	Sig. (2-tailed)	.000	.000	
	N	50	50	50

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

6.4 Regression analysis

6.4.1 Impact of enterprise and supply management on improved SCM

The regression analysis gives the value of R square that is 0.807 that depicts the improved SCM explains the variation of 81% in independent variables. The value of r square depicts it is a good fit model.

Table 6.32 Model summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.807[a]	.652	.637	.393

a. Predictors: (Constant), does the success of company depends on SCM, role of enterprise management and supply management in stakeholders' interest

6.4.1.2 ANOVA

ANOVA is used to assess the means of dependent and independent variables. ANOVA is computed in SPSS keeping improved SCM as the dependent variable. ANOVA confirms the hypothesis and the level of significance below 0.05 leads to rejection of the hypothesis. The significance level in ANOVA table in 0.000 that is less than 0.05 so we reject the null hypothesis that leads to the acceptance of regression model.

Table 6.31 ANOVA results

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.607	2	6.803	43.962	.000[a]
	Residual	7.273	47	.155		
	Total	20.880	49			

a. Predictors: (Constant), does the success of company depends on SCM, role of enterprise management and supply management in stakeholders' interest

b. Dependent Variable: improved SCM

The coefficients explain the relationship between the dependent and the independent variables. The constant variable is (improved SCM) and the impacts of two variables in observed on the constant. The independent variables in the regression model include the role of enterprise and supply management and company's success. The constant in the model is improved SCM (0.155) and the other variables are the role of enterprise and supply management (0.539) and company's success (-0.53).

$$0.155 = 0.539 - 0.53$$

Table 6.33 Coefficient results

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.155	.169		.920	.362
	role of enterprise management and supply management in stakeholders' interest	.539	.087	.838	6.188	.000
	does the success of company depends on SCM	-.053	.179	-.040	-.297	.768

a. Dependent Variable: improved SCM

6.4.2 Impact of Chief information officer on improved SCM

The value of R- square in the model is 0.747 that indicates that improved SCM explains 74% variation in the independent variable (role of CIO). The summary depicts that the model is the best fit.

Table 6.34 Model summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.747[a]	.557	.548	.439

6.4.2.1 ANOVA

The level of significance in ANOVA model is 0.000 that means the null hypothesis of rejected and the regression model is accepted.

Table 6.35 ANOVA

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.638	1	11.638	60.440	.000[a]
	Residual	9.242	48	.193		
	Total	20.880	49			

The regression model examines the relationship between the role of chief information officer and improved SCM. The results depict that constant is 0.158 and the independent variable is 0.437. There is a positive relationship between the role of CIO and improved SCM.

$$= 0.158 + 0.437$$

Table 6.36 Coefficients

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.185	.159		1.163	.250
	responsibility of chief information officer in information flow systems	.473	.061	.747	7.774	.000

a. Dependent Variable: improved SCM

6.4.3 Impact of chief security officer on improved SCM

The assessment of the R- square reveals that the value if 0.811 that means improved SCM explains 81% variation in the role of CIS. The model is a good fit model.

Table 6.37 Model summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.811[a]	.657	.650	.386

The ANOVA results depict that the significant relationship as sig is 0.000 that leads to rejection of the null hypothesis and acceptance of regression model.

Table 6.38 ANOVA

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.729	1	13.729	92.145	.000[a]
	Residual	7.151	48	.149		
	Total	20.880	49			

The coefficients results indicate that the beta for content if 0.434 and for the independent variable is 0.433. The results depict positive association between the variables that states the improved role of a chief security officer in security handling leads to improved SCM.

Table 6.39 Coefficients

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.434	.107		4.051	.000
	responsibility of chief security officer in security maintenance	.443	.046	.811	9.599	.000

a. Dependent Variable: improved SCM

6.4.4 Impact of IT vendors in improved SCM

The value of R- square for the role of IT vendors is 0.747 that indicates the model is the best fit as improved SCM explains 74% variation in the independent variable.

Table 6.40 Model summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.747[a]	.557	.548	.439

The level of significance in the ANOVA is 0.000 that results in rejection of the null hypothesis and acceptance of the regression model.

Table 6.41 ANOVA

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.638	1	11.638	60.440	.000[a]
	Residual	9.242	48	.193		
	Total	20.880	49			

The analysis of the coefficients depicts that the beta estimated for improved SCM is 0.185 and for the independent variable is 0.473. The relationship between the variables is positive that means an increase in the role of IT vendors leads to improved SCM.

Table 6.42 Coefficients

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.185	.159		1.163	.250
	responsibility of IT vendors in hardware, software related issues	.473	.061	.747	7.774	.000

a. Dependent Variable: improved SCM

Chapter 7: Discussion and Conclusion

7. Discussions and conclusion

The analysis if the results depict that the results are by the literature. The study uses small to medium sized organizations that provide more accurate result and data. The literary evidence and available researchers confirm the data results. The risks factors identified in the study are supported by literature available on supply chain management and automotive industry.

The results of the study depict that majority of respondents identify the role of supply chain management in organizational performance (70%). The responses reflect the organizations have awareness about the supply chain activities and organizational performance (Table 1). The responses generate the knowledge and awareness' of employees that depicts low resistance of employees towards SCM practices. Supply chain management results in more storage for inventory and helps to manage the operations at remote areas also (Wieland and Marcus 2012).

The results of the survey depict that high percentage of respondents (40%) recognize the role of supply chain activities in time reduction and the average estimated period of the project is 2- 3 years (Table 2). The responses generated by participants reflect the organizational knowledge about the role of SCM in declination of the period of production cycle that leads to increased productive networks. Results state that majority (50%) of respondents accepts the role of SCM in the improvements of project duration and identifies that it saves time.

The respondents reflect the practical implications of SCM on project quality and improvements (Table 8). The studies recognize the relation of SMC with effective production networks. The organizations with advanced supply chain systems lead to highly responsive production networks (Hofmann, Busse, Bode and Henke 2014; Chopra and Sodhi 2014).

The responses of participants on the importance of communication networks between organizations and network partners indicate the majority of respondents accept the relationship between both factors. Most of the organizations (40%) maintained communications with vendors and clients at least once in a month (Table 7) that depicts the awareness of organizations about the role of effective communication systems and effective SCM.

The literary evidence supports the association between effective supply chain and organizational improvement. The efficiency of a supply chain depends on the nature of the relationship between the organization and network partners. The effective association between the organization and network partners improves the performance of SCM. The effectiveness of the relationship between organization and partners depends on the trend of meetings and the number of meetings in a month improves the relationship the ineffective relationships between organization, logistics and network partners represent the risks of the supply chain. Operational uncertainties also influence the effectiveness of SCM that further raises the risks (Gaonkar and Viswanadham, 2014).

The survey results highlight that the respondents (40%) agree that the incorporation of supply chain management resolves the issues of inventory storage and also builds long-term relationships with customers. The responses indicate that employees recognize the role of SCM in customers satisfaction and inventory management (Table 9). The studies identify the impact of communications on supply chain management and effective communication systems between the organization and the network partners such as vendors and clients results in effective performance of the supply chain activities.

The software and hardware systems have impacts on the communication process and the effective software and hardware results in the improved efficiency of the supply chain management. The results depict that respondents identify the impact of effective supply chain activities on customers satisfaction that improves the organizational relationships with customers (Table 10). The customers level of satisfaction has a strong association with supply chain activities that states effective supply chain leads to high customer satisfaction and ineffective supply chain results in customers dissatisfaction (Wieland and Marcus 2012; Ambulkar, Blackhurst and Grawe, 2015).

The survey results state that majority of respondents (40%) accepts the role of technology and advancements in effective SCM. The respondents identify the incorporation of improved technology enhances the supply chain systems (Table 11). Respondents also recognize the role of enterprise resource planning in advancements of SCM operations (Table 12). Respondents recognize technology lapse as a risk factor for the effective supply chain management (Table 17).

The results indicate that respondents have knowledge about the significance of technology in SCM. The evidence from literary database confirms the relationship of supply chain management with on- time management of logistic operations. Advancements in the SCM improve the logistic operations of the organizations. Advanced technology and interventions in SCM have a connection with more effective SCM (Gunasekaran, Lai, and Cheng, 2008). The advanced technology that influences SCM involves the IS and enterprise resource planning.

Technological interventions have an association with improved SCM (Gunasekaran, et al...2008). the technological intervention that improves the operational ability of SCM involves

ERP and RFID. The incorporation of these technologies mitigates the risks of SCM (Vanany, Zailani, and Pujawan, 2006). IT infrastructure has an effective role in supply chain and effective infrastructure results in the effective supply chain (Juttner, 2005). Results of the study highlight that majority of the respondents accepts the role of natural calamities such as disasters and terrorist attacks on SCM. They recognize the natural calamities as potential risks for operations of SCM (Table 13). Studies identify the impact of natural calamities on SCM and results identify implications of the economic crisis, terrorist attacks and natural calamities on SCM. These factors are uncertain risks that deteriorate the activities related to SCM and logistics.

The disturbances' in the supply chain activities declines the trust of distributions that causes implications on the business activities. Business risks under SCM involve internal and external risks (Byrne and Heavey, 2006). The uncertain factors increase the risks of supply chain activities that include natural calamities and terrorist attacks (Gaonkar and Viswanadham, 2014). The natural factors such as earthquakes, hurricanes, and disasters influence the supply chain activities (Kleindorfer and Saad, 2005).

The results of the study depicted that most of the respondents (60%) have awareness about the relationship between plant size and operational efficiency of the supply chain. The appropriate plant size and inventory results in more effective supply chain activities (Table 14). The process of business production depends on SCM and delays in materials or unavailability of inputs results in ineffective supply chains that also affects the production process. Studies also confirm the association between SCM and plant size as larger size improves the operational capacity of SCM. The small plant size and breakdown of machinery presents risks for the supply chain activities.

Results of the study identify the impact of supply chain activities on company's revenues and profits as effective SCM leads to improved profits and revenues (Table 15). The literary evidence supports the relationship between disruption activities and the risks of supply chain management. The high disruption in SCM influence the supply chain activities that link to the profitability and revenues. The disruptions in the supply chain management decline the revenues of a company that declines the overall business performance. The risks factors of SCM involve the infrastructure risks, legal and regulatory risks. The poor performance of supply chain and quality of supply are identified risks of the SCM (Florian and Constanggioara, 2014).

The results of the study identify the dependence of stakeholders' interest in supply chain management as effective supply chain management leads to high stakeholders' interests (Table 16). Studies recognize relationships between supply Lucian and stakeholders interest and effective supply chain indicates high stakeholders' interest that is for the company. The ineffective supply chain leads to the decline of stakeholders' interest that causes implications on the business operations (Atwater, Gopalan, Lancioni and Hunt, 2014). The common risks of supply chain activities involved delay in the distribution process and pulled stock inventory (Wieland and Marcus, 2012).

The results identify intense competition between organizations as potential risks for supply chain activities (Table 19). The studies identify the role of SCM in effective business operations and absence of effective SCM leads to production loss and high costs of working. The absence of supply chain in business operations results in vulnerabilities and potential risks. The incorporation of the supply chain in operational activities results in effective outsourcing, product variations and globalization (Lamar, Galasso, Chabchoub and Lamothe, 2016).

The survey results confirm the impacts of price fluctuations and exchange rate risks on ineffective supply chain activities (Table 18). The results depict that the respondents accepts the impacts of financial and operational losses on SCM and recognize these factors as potential risks against supply chain activities (Table 19). The result reflects that unstable prices from risks for SCM.

The factors that enhance supply chain risks involve fluctuations in prices and exchange rates. Stability in prices and exchange rate improves the supply chain activities (Gaonkar and Viswanadham, 2014). The high taxes, exchange rate, and price fluctuations enhance the SCM risks (Crone, 2006). High financial and leverage risks deteriorate the SCM that influences the business operations (Hendricks and Singhal, 2005). The analysis of the results indicates that respondents recognize the relationship of supply chain activities and organizational success (Table 21). The results highlight that the improved performance of effective supply chain contributes to organizational success. Studies identify the association of SCM with improved performance of organizations that contributes to their development and success.

7.1 Conclusion

The study identifies the importance of supply chain management in the automotive industry of UAE and identifies the potential risks faced by automotive companies related to supply chain. The developed organizations adopt supply chain procedures to improve the operational capabilities of the company. Supply chain management provides huge benefits to a business organization that involves effective management of logistics, handling of supply chain issues accurately, and inventory control and production enhancements.

The adoption of supply chain management reduces the time duration of a project that takes longer period in the absence of SCM. The main reason for companies to adopt supply chain practices is to save time and improve the operational performance of companies. Supply chain management helps in resource planning and incorporation of advanced technologies that leads to the generation of high-end products for the supplier. Organizations incorporate supply chain management to develop long-term relationships with the customers as operations under SCM improves that leads to high customers satisfaction and responses.

The present study uses primary and secondary data that involved scholarly articles on supply chain management, and primary data is obtained through survey methodology. The results of the survey are analyzed through SPSS that provides the relationship of factors on supply chain management. The survey involves 50 participants from medium and large enterprises, and responses of the participants help to assess the practical implications of SCM on organizations and uncover the risks and potential threats that influence the supply chain activities.

The survey gathers information through a questionnaire that is divided into three parts, and the primary part reveals information about the general characteristics of organizations, the second part uncovers information about the significance of SCM in organizations and third party seeks information about risks and potential threats of SCM. The survey includes participants from different organizations that have different experience starting from 1 year and ending at ten years.

The results depict that all organizations have incorporated supply chain management systems due to the perceived benefits of such activities on business. The responses of participants reflect they have clear knowledge and awareness about the SCM and its impacts on the organization. They

accept the significance of SCM on improves logistics, decline project duration decline in productivity loss and improvements in operational performance. The participants have awareness about the possible threats and risks that SCM faces and common risks involve natural calamities, disasters, price and exchange rate fluctuations, terrorist attacks and thefts. The financial and operational loss also influences the operations of SCM.

The improved supply chain activities had an association with high customer satisfaction and improved productivity that leads to increased sales and profits. The effective supply chains have an effective role in business and improved technology such as ERP and are systems enhances the supply chain operations. The literary evidence supports the results of the study and relates the success of the company with enhances supply chain activities. The results highlight that the effective supply chain with the adoption of enhances technology is likely to improve the operations of and success of the automotive industry in UAE.

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Appendix I

Questionnaire

Part I

Q1. How many employees work at your organization?

a) Less than 50
b) 50- 100
c) 101- 300
d) Over 300

Q2. What is your work experience?

a) 6- 10 years
b) 3- 5 years
c) 1- 2 years

Q3. The annual turnover of the company in dollars?

a) 50 million
b) 30 million
c) 10 million

Q4. Do you think supply chain is important for the organization?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q5. Do you think that the adoption of SMC declines the overall period of a project and what is the length of the project under SCM?

a) 2- 3 years
b) 1- 2yeras
c) Less than 1 year

Part II

Q6. What is the trend of meetings of your organization with clients/ vendors?

a) Once in a month
b) Monce in two months
c) Once in three months
d) Not sure

Q7. Do you think the quality of project improves under SMC and does it saves the production time?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q8. Do you think that SMC resolves the inventory storage issues and leads to long term relationship with customers?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q9. Do you think that the adoption of SMC results in high-quality service that leads to high customer satisfaction?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q10. Do you think that advanced technology and innovation improves supply chain management that leads to the cost effectiveness?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q11. Do you think enterprise resource planning enhances SCM?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Part III

Q12. Do you think terrorist attacks, natural calamities and economic crisis influences' the SMC?

a) Strongly agree
b) Agree

c) Strongly disagree
d) Disagree
e) Neutral

Q13. Do you think that machinery breakdown and inappropriate plant size effects the SMC operations?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q14. Do you think disruption of SMC causes revenues and profitability loss to organizations?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q15. Chief information officer has an effective role in risk mitigation through maintenance of effective information flow networks in SMC?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q16. Chief security officers have an effective role in risk mitigation through maintenance of effective security of SCM?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q17. IT vendors have a role in improving the technical issues related to hardware, software and IT services of SCM?

a) Strongly agree
b) Agree
c) Strongly disagree

d) Disagree
e) Neutral

Q18. Do you think the enterprise management and supply management have roles in improving stakeholders' interests, distribution process and pulled overstock inventory?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q19 Do you think the enterprise has a role in the management of insufficient skills and technology lapse to resolve issues of poor performance of SMC?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q20. Do you think the enterprise has a role in the identification of unpredictable risks such as price fluctuations and exchange rate risks?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q21. Do you think that enterprise risk management has a role in dealing with intense competition among companies in the automotive industry influences' the SMC?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q22. Organizational involvement in off- shoring strategies results in effective SCM operations?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q23. Do you think that involvement of organization and enterprise resolves issues of financial and operational losses?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q24. Do you think the success of a company depends on effective supply management and enterprise management?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q25. The effective role of supply risk management in collaborating between key actors declines the risks?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral

Q26. The enterprise's and supply management involvement leads to improved SCM?

a) Strongly agree
b) Agree
c) Strongly disagree
d) Disagree
e) Neutral