



Risk Involved In Supply Chain

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Further this is to certify that the work is based on the investigation made, data collected and analyzed by her and it has not been submitted to any other university or institution for award of any degree. In my opinion it is adequate in scope and utility, as a dissertation towards partial fulfillment for the award of degree of **MBA-LOGISTIC & SUPPLY CHAIN MANAGEMENT**

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MBA (logistics and supply chain management) of university of petroleum & energy studies Dehradun

It is my original work and has not been submitted to any other organization for any purpose.

Saurabh Rai



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Abstract

The purpose of the research was to determine the effects of Supply chain risk management on organization performance. Previous studies have focused on risk management within the general context of an organization but little attention has been focused on how supply chain risk affect organization performance in terms of its bottom line profits and overall organization objectives. Particular attention was paid to the effects of supply chain risk management variables to the performance of the organization. Three main supply chain risk management variables were identified, namely, supply chain risk identification, supply chain risk sources and supply chain risk mitigation.

The population for the research included staff at Shri Ramswaroop Multi engineering solutions pvt ltd. The research methodology included both primary and secondary data, both interviews and questionnaires were used, questionnaires being the main instrument of data collection. The advantage of a questionnaire over other instruments include the fact that questionnaires are: Practical and large amounts of information can be collected from a large number of people in a short period of time and in a relatively cost effective way, they can be carried out by the researcher or by any number of people with limited affect to its validity and reliability and the results of the questionnaires can be quickly and easily quantified by either a researcher or through the use of a software package The researcher used questionnaire Tables, bar graphs and pie charts were used during the analysis using the statistical of science package software in order to come up with accurate analysis and presented in tabular and graphical methods.

The results obtained showed that there was a direct link between supply chain risk management and organization performance. It was concluded that supply chain risks affect organization performance in the event they materialize and therefore there was need for organization to identify risk exposure, analyze the risk exposure and have in place mitigation plans for the risk identified within their supply chain

Chapter-01 Introduction

1.1 Overview

According to Chopra *et al* (2004) risk in the concept of supply chains maybe associated with the production/ procurement process, the transportation/shipment of goods, and or the demand markets. In today's volatile era with businesses and, more specifically, supply chains becoming increasingly global, the industrial environment is heavily affected by uncertainty, which can potentially turn into unexpected disruptions. Economic and political turmoil, socio-cultural changes, highly fragmented and demanding behavior of consumers, rapid development and changeover of products, have seriously modified the economic and industrial environment in which companies act, bringing out new issues related to assuring the continuity of the business against potential disruptive events.

1.2 Background

The population for the research included staff at Shri Ram Swaroop Multi Engineering Solutions Pvt Ltd and logistics services. The research methodology included both primary and secondary data, both interviews and questionnaires were used, questionnaires being the main instrument of data collection. The advantage of a questionnaire over other instruments include the fact that questionnaires are: Practical and large amounts of information can be collected from a large number of people in a short period of time and in a relatively cost effective way, they can be carried out by the researcher or by any number of people with limited affect to its validity and reliability and the results of the questionnaires can be quickly and easily quantified by either a researcher or through the use of a software package The researcher used questionnaire Tables, bar graphs and pie charts were used during the analysis using the statistical of science package software in order to come up with accurate analysis and presented in tabular and graphical methods.

1.3 Purpose of the Study

The purpose of the research was to determine the effects of Supply chain risk management on organization performance. Previous studies have focused on risk management within the general context of an organization but little attention has been focused on how supply chain risk affect organization performance in terms of its bottom line profits and overall organization objectives. Particular attention was paid to the effects of supply chain risk management variables to the performance of the organization. Three main supply chain risk management variables were identified, namely, supply chain risk identification, supply chain risk sources and supply chain risk mitigation.

1.4 Research Hypotheses

The results obtained showed that there was a direct link between supply chain risk management and organization performance. It was concluded that supply chain risks affect organization performance in the event they materialize and therefore there was need for organization to identify risk exposure, analyze the risk exposure and have in place mitigation plans for the risk identified within their supply chain

Chapter-02 Literature review

2.1 Review Area Broad

There are many ways to identify and categorize risks, and each organization has its own way for developing its *risk register*: a list of identified risks with their importance rating. Possible reasons include helping us to understand the distinctions among these risks and to prioritize different risk mitigation investment decisions. According to Garvin and Levesque (2006) there are different ways of *risk identification* including identifying critical uncertainties in scenario planning. In identifying risks, supply chain researchers have used the terms *uncertainty* and *risk* interchangeably although economics researchers have attempted to narrow *risk* to only those situations where possible outcomes can be assumed to follow a known probability distribution. Developing an initial risk register, which is a one-time effort, is necessary to identify baseline risks. Too many organizations start a risk management program without knowing what threats the organization faces, or what consequence a disruption would have. As a result, they focus too much protecting against the wrong threats or too little protecting against threats that matter. Worse, they may fail to anticipate important threats, or fail to recognize the consequence an apparently minor threat may have.

Risk identification might begin with brainstorming sessions, previous risk assessments, surveys, or still other efforts to identify and list potential risks within supply-chain processes. Reference works that can help with identifying risks include those from the British Standards Institution (BS 31100:2008), which offers a code of practice for risk management, and from the ISO (ISO 31010:2009), which offers a compendium of risk assessment techniques. A business-impact analysis can help a firm evaluate the threats a firm might face and their consequences. Such analysis might start with a "worst-case" scenario focusing on the business process that are most critical to recover and how they might be recovered remotely. A business-impact analysis should identify critical business functions and assign a level of importance to each function based on the operational or financial consequence. It should also set recovery-time objectives and the resources required for these.

Zsidisin and Smith (2005) highlight the importance of early supplier involvement (ESI) for new product development by referring to a case study of Rolls Royce. The importance of interaction is well known in innovation research, ESI underlines interaction early in the design cycle of importance to risk management and risk reduction. 'With better exchange of information comes knowledge of the situations surrounding the dynamics of a supply relationship, and with that knowledge comes greater potential for detecting, averting, and managing supply risk' (Zsidisin and Smith, 2005, p. 51) The problem variables these authors identify and how to deal with them are the following: Manage Legal liabilities through determining intellectual property rights during initial agreements and Effecting sharing of expertise. Control Supplier capacity constraints by ensuring supplier production flexibility during pre-selection and Share future demand forecast information immediately with suppliers to improve the planning process.

Supply organizational issues, through providing clarity of supplier management structures and Obtaining knowledge of suppliers at both corporate and plant levels. One general rule that probably is applicable to most procurement projects is that potential risks in any phases of the procurement life cycle should be identified early or ahead of the actual execution of a procurement project (Zsidisin and Smith, 2005 and Osipova, 2008). The various kinds of process

risks potentially arising during the life of the project need to be borne in mind when planning the procurement, developing the contract and managing the project.

There are many different perspectives and knowledge domains that are relevant for risk management. Keizer et al (2002) discuss the use of a 'risk facilitator', an innovation expert who is not member of the project team and therefore independent and free from bias who can work with the project manager to diagnose risk. Several authors acknowledge the importance of including experienced co-workers for successful risk management Al-Tabtabai et al, 1997; Wade and Bjorkman, (2004). Risk management is an issue not only for project owners but also for potential contractors, where one result of such analysis could be to abandon a project Ward and Chapman, (1991). Risk reviews, contacts with subcontractors, research on persons or client, site visits, and financial considerations are also central elements in risk identification (Bajaj et al, 1997)

According to NWS (2006) when developing the risk identification strategies, the aim should be to enable the organization to create a comprehensive list of the possible risks, and document what each involves. Consider all risks, whether or not they are under the control of the organization. Compile a list of the possible events that could have an unwanted or unintended effect on the procurement. Consider the full life-cycle of the good or service, and include problems that may arise after the goods are received or the service performed. Different models of risk management exist which all have varying degrees of complexity. What many of these models have in common can be summarized as a process consisting of three stages include; firstly, Risk identification; that is, potential risks are determined; secondly, Risk assessment, that is, where the risks identified are evaluated and ranked and lastly is Risk response, that is, identification of the way risks are dealt with Orsipova, (2008).

2.2 Review Area Narrow

The following, according to C.I.P.S (2010) are some of the potential sources of risks in the in the supply chain: sources of risks from buyers; Clarity of definition of requirements, Presentation and approach to market, internal relationships and barriers to use particular suppliers. Other Sources of risks are from Suppliers, Production process capacity & supply chains, Competing demands from different buyers, Commercial and financial capability. Risks from existing buyer supplier Relationships; includes Contractual allocation of risks, Cultural fit and associated skill sets on both sides to manage the relationship Performance management arrangements. According to the findings of Miller/Lessard 2008 and Keizer, Halman and Song (2002), there are five different sources of supply chain risks. These are based on, technological risks, political risks, market risks, turbulence risks, financial risks and organizational and societal risks. These risks affect the performance of the supply to varied levels depending with the existing circumstances. Supply chain risk sources are any variables which cannot be predicted with certainty and from which disruptions can emerge. From an inter-organizational supply chain understanding, Mason-Jones and Towill (1998) suggested five overlapping categories of supply chain risk sources: environmental risk sources, demand and supply risk sources, process risk sources and control risk sources. Environmental risk sources comprise any external uncertainties arising from the supply chain such as disruption caused by political (e.g. fuel crisis), natural (e.g. foot and mouth

outbreak, fire, earthquake) or social (e.g. terrorist attacks) uncertainties. Compared with external, environmental risk sources, demand and supply sources are internal to the supply chain. Supply risk is the uncertainty associated with supplier activities and in general supplier relationships, i.e. “the transpiration of significant and/or disappointing failures with inbound goods and services” Zsidisin et al., (2000). Similarly, demand risk is any risk associated with the outbound logistics flows Svensson, (2002) and product demand, which can be caused either by inbound disruptions or, e.g. by seasonality, volatility of fads, new product adoptions or short product life cycles Johnson, (2001). Environmental risks can cause supply or demand risk for the supply chain, which means that the three sources overlap. For example, a fire caused by lighting in a supplier factory will trigger a supply risk for all parties further down in the supply chain. A number of empirical and conceptual studies investigating supply and/or demand risks from the dyadic perspective of the relationship between a focal company and/or its supplier/customer have been published (Kraljic, 1983; Smeltzer and Sifert, 1998; Zsidisin et al., 2000; Lamming et al., (2001) From our supply chain perspective, supply and demand risks describe the direction of potential disruptive effects (from supplier of raw materials to the end consumer or vice versa) and are not restricted to dyadic relationships between two directly related vendor and customer organisations.

Processes can either amplify or absorb the effect of risks in the supply chain and refer to the design and implementation of processes within and between the entities in the supply chain. Robust processes are built on a thorough understanding of variability, e.g. in manufacturing or forecasting, supply chain bottlenecks or dependencies on IT systems, and may need to have planned process redundancies or excess capacities where necessary Mason-Jones *et al*(1998). For example, the impact of supplier insolvency as a supply risk is either amplified or absorbed by the level of excess capacity held within the chain. Similarly, supply chain control mechanisms like decision rules and policies regarding order quantities, batch sizes and safety stocks can either amplify or absorb risk effects. For example, the effect of a sudden trough in demand is amplified in the presence of inflexible rules regarding order quantities.

It is suggested here that a characteristic of supply chain risk sources is that they can be inextricably linked to the supply chain structure. Supply and demand risk sources are supply chain specific and are likely to affect several interdependent parties in the Supply chain risk management Moreover, demand and supply risks, as internal supply chain risk sources, imply that any company in the supply chain can be responsible for SCRM implementation and become a source of risk to the supply chain at the same time.

2.3 Factors critical to success, of study

According to Chopra and Sodhi (2004) there are many means available to control risks within supply chains A fundamental strategy would be to try to do a great job in the fundamental supply chain performance measures of consistent fulfillment of orders, delivery dependability, and customer satisfaction. Of course, many effective organizations have failed when faced with changing markets or catastrophic risks outlined in the last section as external risks. Some strategies proposed for supply chains are reviewed

Chopra *et al* (2004) developed a matrix to compare relative advantages or disadvantages of each strategy with respect to types of risks. Adding capacity would be expected to reduce risk of needing more capacity of course, and also decrease risk of procurement and inventory problems, but increases the risk of delay. Adding inventory is very beneficial in reducing risk of delays, and

reduces risk of disruption, procurement, and capacity, but incurs much greater risk of inventory-related risks such as out-dating, spoilage, carrying costs, etc. Having redundant suppliers is expected to be very effective at dealing with disruptions, and also can reduce procurement and inventory risk, but can increase the risk of excess capacity. Other strategies had no negative expected risk impacts (increasing responsiveness, increasing flexibility, aggregating demand, increasing capability, or increasing customer accounts), but could have negative cost implications.

From a single organisation view, Miller (1992) distinguishes five generic strategies companies undertake in order to mitigate risk, four of which can be adapted to supply chain contexts:

(2.3.1) avoidance- Avoidance occurs when risks associated with operating in a given product market or geographical area are considered to be unacceptable Miller, (1992) From a supply chain perspective, avoidance can be related to products/geographical markets and/or supplier and customer organisations. A company could drop specific products, suppliers or geographical markets if supply is seen to be unreliable.

To avoid risk, remove requirements that represent uncertainty and high risk. Avoidance includes trading off risk for performance or other capability, and it is a key activity during requirements analysis. Avoidance requires understanding of priorities in requirements and constraints.

(2.3.2) control- Companies may seek to control contingencies from the various risk sources, rather than passively treat uncertainties as constraints within which they must operate Miller, (1992). Control is the deliberate use of the design process to lower the risk to acceptable levels. It requires the disciplined application of the systems engineering process and detailed knowledge of the technical area associated with the design. Control techniques are plentiful and include: Multiple concurrent design to provide more than one design path to a solution, Alternative low-risk design to minimize the risk of a design solution by using the lowest-risk design option.

(2.3.3) cooperation- Compared with control initiatives, cooperative responses involve joint agreements, rather than unilateral control, as a means of achieving uncertainty reduction Miller, (1992). From a supply chain perspective, the focus is on joint agreements among organizations in the supply chain to improve supply chain visibility and understanding, to share information on exposures to specific risk sources and finally, to prepare joint business continuity plans.

Cooperation is the deliberate acceptance of the risk because it is low enough in probability and/or consequence to be reasonably assumed without impacting the development effort. Key techniques for handling accepted risk are budget and schedule reserves for unplanned activities and continuous assessment

(2.3.4) flexibility- Unlike the strategic moves of control, which attempt to increase the predictability of contingencies from the various risk sources, flexibility increases responsiveness while leaving the predictability of factors unchanged Miller, (1992). One supply chain example is postponement, where companies delay the decision to make, configure, label or ship a product to a particular destination. Postponement reduces their dependence on forecasts and increases the ability to respond to variability or even disruptions in demand. A second supply chain example is multiple sourcing, which one manager classified as the traditional form of managing risk through spreading

2.4 Summary

While we have considered a comprehensive evaluation of SCRM work, our research is not devoid of limitations. There are three main limitations of this paper. First, we only reviewed international journal articles, while excluding the conference papers, master and doctoral dissertations, textbooks, book chapters, unpublished articles, and notes. Second, this paper is solely based on the analyses from the point of view of academics while failing to incorporate the views of practitioners. Third, the goal of this study was to present and categorize recent SCRM research and explore potential research gaps. With that in mind, an overarching question is not posed as usually done in more specific literature reviews. Using the categorization and summary results of this paper, further studies can delve into specific areas that have been under-researched and extend studies that have focused on mature areas of SCRM.

Chapter-03 Research Design, Methodology & Plan

3.1 Data Sources

This study employed a descriptive research design using a case study. According to Donald and Pamela (2006), a descriptive study deals with the what, how and who of a phenomenon which is the concern for this study. The study specifically analyzed the effect of supply chain risk management on organizational performance. The Purpose of descriptive research is to describe the characteristics of relevant groups to estimate the percentages of units in a specified population exhibiting certain behavior, to determine the perception of product characteristics, to determine the relationship between variables and to make some specific predictions (Ritchie, 2003).

3.2 Research Design

The design will provides a room for generation of findings in form of descriptive statistics such data coding, measures of central tendency, measures of dispersion, distributions and relationships to the problems .and also reliable data for presentation and analysis. The goal of the study is the acquisition of factual, accurate and systematic data to account on the problem as it exist on the ground.

3.3 Survey Questions

Practical and large amounts of information can be collected from a large number of people in a short period of time and in a relatively cost effective way, they can be carried out by the researcher or by any number of people with limited affect to its validity and reliability and the results of the questionnaires can be quickly and easily quantified by either a researcher or through the use of a software package The researcher used questionnaire Tables, bar graphs and pie charts were used during the analysis using the statistical of science package software in order to come up with accurate analysis and presented in tabular and graphical methods.

3.4 Interview Procedures

Sampling means selecting a given number of subjects from a defined population as representative of that population. Any statements made about the sample should also be true of the population (Mugenda & Mugenda, 2003). A sampling frame is a list of all items where a representative sample is drawn for the purpose of research (Orodho, 2002). In this study, the sampling frame was a list of fifty (50) employees at Andy services forwarders. The sampling frame was 50% of Shri Ram Swaroop Multi Engineering Solutions Pvt Ltdwork force. Mugenda and Mugenda (2003), states that a sample of 30% is considered representative for a population

less than 500. The study used a sample size of 50% of the target population since it minimized the duplicity and redundancy of the data to be obtained and the size was large enough to ensure collection of comprehensive data. Since the population of Shri Ram Swaroop Multi Engineering Solutions Pvt Ltd is small (100 staffs), the study used 50% of the entire population as the sample size.

3.5 Data Analysis Procedures

A systematic random sampling technique was applied to select the sample size. Systematic random sampling was considered appropriate since it gave every respondent in the target population an equal chance of being selected as a study respondent and thus it had no bias and eased generalization of the gathered findings.

Chapter-04 Findings and Analysis

4.1 Descriptive Statistics

RESEARCH FINDINGS AND DISCUSSION

Supply chain risk Identification

Method used for risk identification in the organization

The respondents were asked to indicate the method that was most preferred in the organization for risk identification. The figure below shows the results.

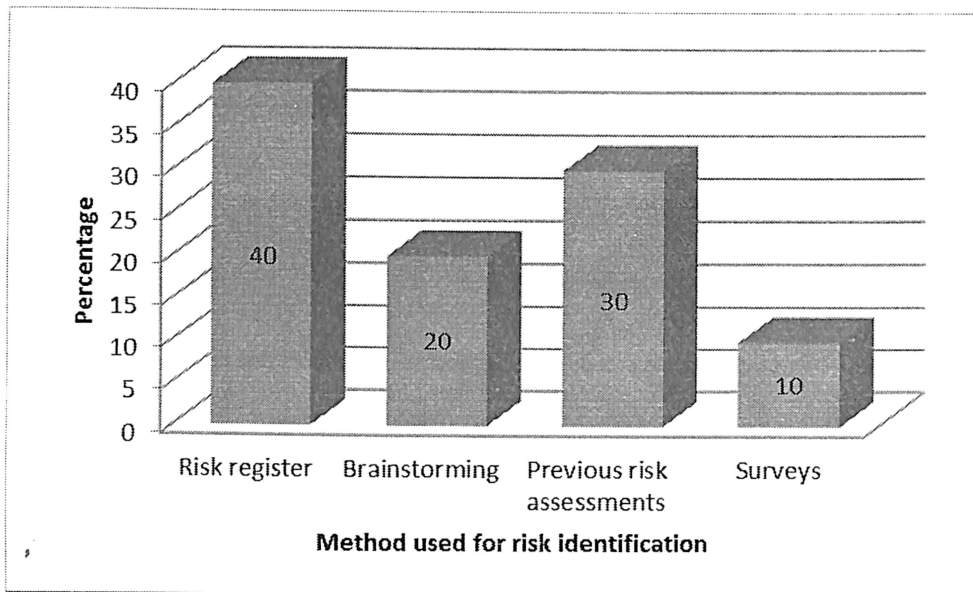


Figure 1: Methods used for risk identification

It was found that majority 40% of the respondents indicated that a risk register was used. This was followed by 30% who indicated that the method used in the organization was previous risk assessments, 20% indicated that the organization used was brainstorming while 10% indicated that surveys were used.

Factors on Risk Identification The respondents were asked to indicate rate the factors given on how risk identification affects organizational performance. The table below shows the results.

Table 1: Extent to which identification of supply chain risk affects organizational performance

	SD	D	N	A	SA
The organization has a formal risk identification process			2 (5%)	37 (87%)	3 (8%)
Supply chain risks are identified by Frequency of occurrence			1 (2%)	2 (4%)	39 (94%)
The organization ensure there is transparency on potential supply chain risks among the parties				1 (10%)	38 (90%)
A risk matrix is the main tools used in the organizations to record identified risks			2 (5%)	34 (80%)	6 (15%)

Key: SA (strongly agree), A (agree), D (disagree), DS (Strongly disagree), N (Neutral)
 Respondents rated the extent to which identification of supply chain involved. Majority respondents 87% agreed that there was a need for the organization to have a formal risk identification process. 94% strongly agreed the importance to identify supply risks by the way of frequency of occurrence and impact on business. 90% of the respondents strongly agreed the need for an organization to create awareness on risk identification and tools used in risk identification. 80% of the respondents agreed that a risk register is the main tool used by many organizations to record identified risks

Discussion

The study found that risk identification is the most crucial in the whole risk management process. We have to be aware that risks that are not identified and defined in the first stages of risk management are not later treated and therefore go unseen and unmanaged. A risk register is mainly used for risk identification since it serves as a central repository for the organization's risk information and allows for the information that results from the risk management process to be suitably sorted, standardized, and merged for relevance to the appropriate level of management. This is in line with a study done by Waters (2007), which states that identifying the risks is a key activity on which all other aspects of the process are based. However, in reality it is virtually impossible to list every conceivable risk, and identification will only cover the most significant in terms of their effect on the supply chain. Inter-

organisational actors usually have the most intimate knowledge of the organisation and its conditions, but do not necessarily have the capability to identify risks. Organisations cannot rely on personal knowledge and informal procedures, but need some formal arrangements Waters, (2007).

4.2 Correlation/ Regression Analyses

Supply chain Risk Sources

Types of risks and that affect organizational performance

The respondents were asked to rate the following factors on the types of risks and how they affect organizational performance

Table 2: Types of Risks

Factors Under Consideration	Mean	Std. Dvn
Technological Risks		
ICT disruptions	4.1100	0.6875
Infrastructure failures	3.9650	0.63722
Environmental risks		
Natural disaster	4.1708	0.62081
Extreme weather	3.0786	0.33903
Pandemic	3.2667	0.88581
Political risks		
Political instability	4.4708	0.63722
Trade restrictions	4.1100	0.6875
Theft and illicit trade	4.3100	0.6875
Market risks		
Demand shocks	3.9750	0.67178
Competition	4.4500	0.41966

Supply shocks	3.9001	0.53972
Financial risks		
Currency fluctuations	4.1002	0.65974
Price volatility	3.9000	0.61147
Lack of finances	4.3250	0.52819

The respondents were asked to rate the factors on sources of risks that affect organizational performance in each category of the sources of risks. It was found that on technological Risks the factors were rated to a great extent and these factors found to affect supply chain were ICT disruptions (mean of 4.1100) and Infrastructure failures (mean of 3.9650). On environmental risks it was found that the respondents agreed to a great extent that Natural disaster can affect organizational performance with a mean of 4.1708. The respondents were neutral on Extreme weather with a mean of 3.0786 and pandemic with a mean of 3.2667. On political risks it was found that the risks would affect organizational performance political instability was rated with the heist mean of 4.4708 followed by theft and illicit trade with a mean of 4.3100 and Trade restrictions was rated with a mean of 4.1100. On market risks completion was rated highest with a mean of 4.4500 followed by demand shocks with a mean of 3.9750 and finally supply shocks was rated with a mean of 3.9001. On financial risks the factors were rated to a great extent with lack of finances being the highest with a mean of 4.3250 followed by Currency fluctuations which was rated with a mean of 4.1002 and Price volatility was rated with a mean of 3.9000.

Factors on Sources of Supply Chain Risks that affect Performance in organization

The respondents were asked to rate the following factors on sources of risks in supply chain that affect performance in organization. The table below shows the results.

Table 3: Factors on Sources of Supply Chain Risks

	SD	D	N	A	SA
Supply chain risks emanate from both internal and external			2 (5%)	2 (5%)	38 (90%)

Timely data for consumption, inventory levels in the supply chain and stock outs can affect performance	2 (5%)	36 (85%)	4 (10%)	
Internal risks are within a business control since they emanate from the organizations operations	4 (10%)	2 (5%)	34 (80%)	2 (5%)

Key: SA (strongly agree), A (agree), D (disagree), DS (Strongly disagree), N (Neutral)

From table 4.4, respondents rated the extent to which Supply chain risks emanate from both internal and external sources. Majority of the respondents 90% strongly agreed. In addition majority of the respondents 85% agreed to the statement Timely data for consumption, inventory levels in the supply chain and stock outs can affect performance. Lastly the 80% of the respondent agreed that internal risks are within a business control since they emanate from the organizations on operations.

Discussion

The main sources of risks as identified during the study were technological risks, political risks, market risks, environmental risks and financial risks. Other potential sources of risks in the in the supply chain include: sources of risks from buyers; Clarity of definition of requirements, Presentation and approach to market, internal relationships and barriers to use particular suppliers. Other Sources of risks are from Suppliers, Production process capacity & supply chains, Competing demands from different buyers, Commercial and financial capability. Risks from existing buyer supplier Relationships; includes Contractual allocation of risks, Cultural fit and associated skill sets on both sides to manage the relationship Performance management arrangements. According to the findings of Miller/Lessard 2008 and Keizer, Halman and Song (2002), there are five different sources of supply chain risks. These are based on, technological risks, political risks, market risks, turbulence risks, financial risks and organizational and societal risks. These risks affect the performance of the supply to varied levels depending with the existing circumstances.

Chapter-05 Interpretation of results

5.1 Interpretation of Results

Supply Chain Risk Mitigation Strategies

Main mitigation strategy used The respondent were asked to indicate the main mitigation strategy used in the organization to minimize risks. The figure below shows the results

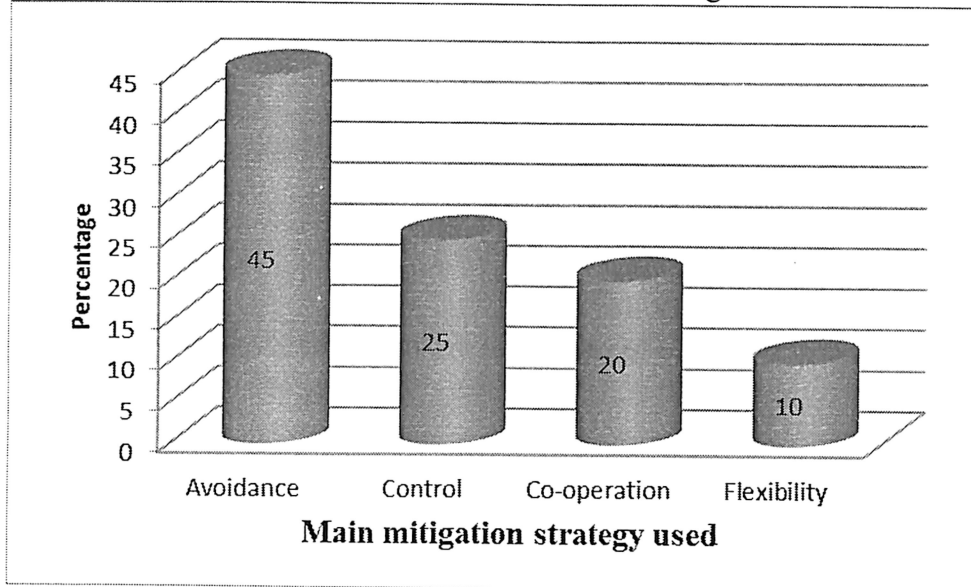


Figure 2

Main mitigation strategy used

The results show that the majority 45% of the respondents indicated that avoidance was the main mitigation strategy used. This was followed by 25% of those who indicated that control was used, 20% indicated that co-operation was used while 10% indicated that flexibility was the mitigation strategy used.

Risk avoidance measures

The respondents were asked to rate the following statements on risk avoidance measures taken that in the organization. The table below shows the results

Table 4: Risk avoidance measures

Factors Under Consideration	Mean	Std. Dvn
The best risk management strategy of all is avoidance	4.6029	0.6653

Avoidance strategies include the option of not performing an activity that could carry risk at all.	4.3658	0.8688
Avoiding risks also means losing out on the potential gain that accepting (retaining) the risk may have allowed.	4.0517	0.7541

The respondents strongly agreed that the best risk management strategy of all is avoidance with a mean of 4.6029. The respondents agreed that avoidance strategies include the option of not performing an activity that could carry risk at all with a mean of 4.3658 and they agreed that avoiding risks also means losing out on the potential gain that accepting (retaining) the risk may have allowed with a mean of 4.0517.

Risk control measures used

The respondents were asked to rate the following statements on risk control measures taken that in the organization. The table below shows the results

Table 5: Risk control measures used

Factors Under Consideration	Mean	Std. Dvn
Continuous Training On Risk Management	4.0001	.6551
Framework Contracts With Suppliers	3.9842	.1752
Contract Management System	3.9512	.1792
Compressive Record Keeping	3.9011	.1252
Insurance Of Supplies	3.7534	.1105

The results show that the respondents strongly agreed with the factors in following way; Continuous Training on risk management was rated with a mean of 4.0001, followed by use of framework contracts with suppliers mean of 3.9842 and Contract Management System was rated with a mean of 3.9512. Compressive Record Keeping was rated with a mean of 3.9011 and finally Insurance of supplies was rated with a mean of 3.7534.

Risk co-operation measures

The respondents were asked to rate the following statements on risk co-operation measures taken that in the organization. The table below shows the results

Table 6: Risk co-operation measures

Factors Under Consideration	Mean	Std. Dvn
Cooperative responses involve joint agreements	4.2154	0.6857
The focus is on joint agreements among organizations in the supply chain to improve supply chain visibility and understanding	3.1357	0.6648
Partners may provide the strategic alliance with resources such as products and distribution channels.	3.1544	0.7548

The respondents agreed that Cooperative responses involve joint agreements with a mean of 4.2154. The respondents were neutral on the following statements The focus is on joint agreements among organizations in the supply chain to improve supply chain visibility and understanding with a mean of 3.1357 and Partners may provide the strategic alliance with resources such as products and distribution channels (mean 3.1544).

Flexibility measures

The respondents were asked to rate the following statements on risk Flexibility measures taken that in the organization. The table below shows the results

Table 7 : Flexibility measures

Factors Under Consideration	Mean	Std. Dvn
Postponement is the method used in supply chain flexibility	4.2651	0.3271
Postponement reduces their dependence on forecasts and increases the ability to respond to variability or even disruptions in demand	4.0257	0.4567
flexibility increases responsiveness while leaving the predictability of factors unchanged	3.1779	0.8655

The results show that the respondents agreed that Postponement is the method used in supply chain flexibility with a mean 4.2651 and Postponement reduces their dependence on forecasts and increases the ability to respond to variability or even disruptions in demand with a mean of 4.0257. The

respondents were neutral on statement that flexibility increases responsiveness while leaving the predictability of factors unchanged with a mean of 3.1779.

5.2 Comparison of Results with Assumptions (Hypotheses)

How Risk mitigation Strategies Affect organization Performance

The respondents were asked to rate the factors on risk mitigation Strategies that Affect organization Performance. The table below shows the results.

Table 8:Extent to Which Risk mitigation Strategies Affect organization Performance

	SD	D	N	A	SA
Business impact analysis			2 (5%)	6 (15%)	34 (80%)
Business continuity plan			2 (5%)	6 (15%)	34 (80%)
Cost benefit analysis				38 (90%)	4(10%)
Risk appetite				40 (95%)	2 (5%)

Key: SA (strongly agree), A (agree), D (disagree), DS (Strongly disagree), N (Neutral)

From table 4.5, respondents rated the extent to which risk mitigation strategies affected organization performance in Shri Ram Swaroop Multi Engineering Solutions Pvt Ltd. 80% of the respondents strongly agreed that business impact analysis needed to be conducted in assessing the need for mitigation and that business continuity plan was the key to any organization in planning for disruptions. In addition, 90% of the respondents agreed that when choosing a mitigation strategy there was need to conduct a cost benefit analysis. Also 95% of the respondents agreed the need for an organization to clearly define its risk appetite and tolerance levels for the various risks its supply chain poses.

Discussion

Risk management mitigation strategies used in the organization include avoidance which is the main type of strategy used. The organization also uses risk control, cooperation and flexibility methods avoid risk, that is, do not undertake the activity, if the activity is essential the risk must be accepted and managed. The next strategy is to minimize risk through reducing either the impact or the probability (or both) for example, where appropriate requiring parent company guarantees and link financial distress provisions to the parent company's financial performance. Control means taking proactive steps to reduce the risk. Buffer inventories could be on such approach. Building penalty clauses into supplier contracts, linking pay to performance, and managing capacity can all help better control the situation. The extreme case is vertical integration, where the firm takes ownership of the supply

source. Another way is to Spread the risk, that is, develop 'insurance', For example, source from more than one supplier, although lowest price point may not be achieved. To be effective multiple sourcing requires knowledge of any supplier interdependencies like second or third tier supply base. The last strategy is to Accept risks, this is the best overall strategy, particularly if low impact or probability risks and alternative strategies are not deemed effective or efficient. It is recommended that risk reduction or impact mitigation measures and monitoring be employed in these circumstances,

as appropriate. Where the risk has to be accepted, minimize the likelihood of the risk occurring. Reduce the likelihood of risk by: clarifying the requirements, specifications and outcomes, revising procedures and specifying quality assurance and product standards, conducting product testing and inspection, specifying professional accreditation. Reduce the consequences through, contingency planning, contract terms and conditions, and inspections and checks to detect compliance.

Chapter-06 Conclusions, Scope for Future Work & Recommendations

Supply chain risk identification

The study sought out to determine the effect of supply chain risk identification process in Shri Ram Swaroop Multi Engineering Solutions Pvt Ltd. The results showed that 87% of the respondents agreed that there was a need for the organization to have a formal risk identification process which was in line with Christopher *et al* (2004) who introduces a common classification where supply chain risks are categorized into five sources. 94% strongly agreed the importance to identify supply risks by the way of frequency of occurrence and impact on business. 90% of the respondents strongly agreed the need for an organization to create awareness on risk identification and tools used in risk identification. 80% of the respondents agreed that a risk register is the main tool used by many organizations to record identified risks.

Supply chain risk sources

The study sought to find out the main supply chain risk sources and their effect on organizations performance in Shri Ram Swaroop Multi Engineering Solutions Pvt Ltd Services Ltd. The results showed that 90% of the respondents agreed that Supply chain risks emanate from both internal and external sources. In addition majority of the respondents 85% agreed to the statement that Environmental risk sources comprise any external uncertainties arising from the supply chain this was in accordance to Mason-Jones and Towill (1998) who categorized supply chain risk sources.

The results also indicated that 80% of the respondents agreed that internal risks are within a business control since they emanate from the organizations on operations.

Supply chain risk mitigation strategies

The study sought to find out the mitigation strategies in place to contain the supply chain risk identified in Shri Ram Swaroop Multi Engineering Solutions Pvt Ltd Services Ltd. The results indicates that 80% of the respondents strongly agreed that business impact analysis needed to be conducted in assessing the need for mitigation and that business continuity plan was the key to any organization in planning for disruptions which agrees with Chopra *et al* (2004) who developed a matrix to compare relative advantages or disadvantages of each strategy with respect to types of risks.

The result also indicates that 90% of the respondents agreed that choosing a mitigation strategy was needful to carefully conduct a cost benefit analysis. Also 95% of the respondents agreed the need for an organization to clearly define its risk appetite for the various risks its supply chain poses this is according to Sheffie (2002) who said that there is need for trade of decisions of the supply chain strategies.

Conclusions

The study concluded that risk identification strategies affected organization performance at Shri Ram Swaroop Multi Engineering Solutions Pvt Ltd. There was a need for the organization to have a formal risk identification process. In addition, risk mitigation strategies affected the performance of organization and the Study concluded that business impact analysis was needed to be conducted in assessing the need for mitigation and that business continuity plan was the key to any organization in planning for disruptions.

Recommendations

It's important for the Shri Ram Swaroop Multi Engineering Solutions Pvt Ltd to Identify and deal with risks proactively: As early as possible in the decision making process, the various types of risks have to be identified

.It's important to assess along the distribution chain cycle and procurement cycle, understand the key mitigation steps. This can be achieved through drawing functional requirements and moderate procurements requirement to standardize the procurement specifications and ensure that there exists a feedback mechanism through consistent supply chain audits and joint planning meetings.

In view of the key risk that affect organizations supply chain, organizations should come with robust risk management strategies to mitigate this risks affecting the effectiveness and efficacy of the organization supply chain. In addition, organization should develop a proactive risk management culture towards managing supply chain risk to ensure that contingent plans are put in place incase of adverse supply chain performance

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Appendix: Interviewer Script

Supply Chain Risk Questionnaire Survey

This survey aims to seek insights and opinions of experts from industry, the public sector, non-governmental organizations and academia, on prioritising and mitigating systemic risks in supply chain and transport networks.

The questionnaire consists of ten main questions and should take approximately fifteen minutes to complete. All responses will be reported in aggregated form and used for summary analysis only. Full confidentiality is guaranteed, and neither your name nor your organization will be revealed in conjunction with any aspect of this study.

1. Has risk management of supply chains and transport networks become a higher priority now than five years ago?

- Yes, it is a significantly higher priority
- Yes, it is a higher priority
- It has stayed the same
- No, it is a lower priority
- No, it is a significantly lower priority

Why?

2. What are the top five exogenous risks most likely to cause systemic supply chain or transport disruptions?

- Conflict and political unrest
- Corruption
- Border delays
- Export/import restrictions
- Shortage of labour
- Sudden demand shifts
- Commodity price volatility
- Energy shortages
- Water security
- Nuclear/biological/chemical weapons
- illicit trade & organized crime
- Terrorism
- Piracy
- Weather

- Natural disasters (e.g fire, volcano, earthquake) Currency fluctuations
 Ownership/investment restrictions Pandemic Information and communications disruptions
 Other (please specify)

3. Over the last five years, what public policies have helped manage and mitigate supply chain and transport disruptions?

Most Helpful

Least Helpful

4. Please give a rough estimate of the average annual financial impact of disruptions to your supply chain or transport network, as a percentage of your revenue

5. Does your organization formally track its resilience to and the financial impact of disruptions to supply chains or transport networks?

- Yes, at the board level
 Yes, at the executive management level
 Yes, at the operational level
 No

Please describe how