STUDIES IN MANAGEMENT OF RISK IN SUPPLY CHAINS OF SELECT SME CLUSTERS

By

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TO

FAI-S

CERTIFICATE

This is to certify that the thesis entitled "**Studies in Management of Risk in Supply Chains of Select SME Clusters**" being submitted by **Mohd Nishat Faisal** to the Indian Institute of Technology Delhi for the award of the degree of **Doctor of Philosophy** is a bonafide record of original research work carried out by him. He has worked under our guidance and supervision and has fulfilled the requirements for the submission of the thesis, which has reached the requisite standard.

The results contained in this thesis have not been submitted, in part or full, to any other University or Institute for the award of any degree or diploma.

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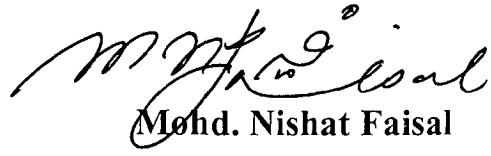

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ABSTRACT

Today businesses are focusing on how they can leverage their supply chain to minimize cost, reduce cycle times, provide better service, and achieve competitive advantage in increasingly heterogeneous markets. In the wake of this realization management of risk assumes importance for a supply chain to perform its intended function.

This research is aimed at examining the supply chain management practices in Indian small and medium enterprises (SMEs) with a focus on management of risk in supply chains. An extensive literature review has been conducted to identify the gaps in the area of management of risk in supply chains. A questionnaire-based survey has been conducted to gain insight into various issues related to the management of risk in supply chains of select SME clusters in India. This research has attempted to fill some of the gaps in the contemporary research in the area of supply chain risk management. Descriptive statistics, hypotheses testing, and case studies from the select SME clusters provide us useful information regarding the weak areas in the management of risk in supply chains. It was found that lack of metric is one of the major limitations in understanding risk in supply chains. This has led to the development of models which can help in quantification. Further, ISM based models were developed to understand the relationships among the enablers and also among the barriers of risk mitigation in supply chains. To select the best approach under risk in supply chains, ANP-SCOR framework was used.

The major contributions of this research can be summarized as follows:

- A literature review has been conducted with a focus on management of risk in supply chains.
- A questionnaire based survey was conducted to collect the primary data from the select SME clusters.

- Case studies were conducted to assess the occurrence and impact of risk in supply chains of select SME clusters.
- The aspects of risk mitigation environment were analyzed. This environment would be a major facilitator to risk mitigation in supply chains.
- Graph Theoretic Approach (GTA) was used to quantify issues like risk alleviation competency, customer sensitivity and agility in supply chains.
- Interpretive Structural Modeling (ISM) based frameworks were developed to understand the driving and dependence among the enablers and among the barriers of risk mitigation in supply chains.
- Strategies to mitigate risks were identified from the literature and analytic network process-supply chain operations reference (ANP-SCOR) model was used for the selection of best strategy.
- An integrated ISM-GTA framework was used to analyze the enablers of information risk mitigation and agility in supply chains.

The present research focuses on the issues of management of risk in supply chains. It provides a better understanding of variables impacting risk susceptibility and risk mitigation in supply chains. It presents models to quantify and understand the relationships among risk variables. Also the best strategy to mitigate risk is suggested using ANP-SCOR framework.

Keywords: supply chain management, risk, agility, graph theoretic approach, interpretive structural modeling, analytic network process, SMEs.

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