



Pathology of the Challenges of Evaluating Supply Chain Performance Processes and Risks (Case Study: Industrial Companies of the Islamic Republic of Iran)

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Abstract

The supply chain management is planning process, execution, and control of efficient flow of raw materials, inventories of work in process, target products, and also related information flow from the initial to consumption point; therefore, it influences on all activities of organization, company, etc. Therefore, attention to opportunities and threats in industry and business and evaluation of industries and companies' power are necessary in confrontation with uncertainties and risks, and supply chain management is so significant. This article has descriptive-applied method. Data analysis was based on analytical hierarchical process (AHP), and results of article showed that the risk of manufacturer is in the first rank as the most important risk of supply chain with 0.410 importance degree, then target customer risks with 0.269 importance degree, supplier risks with 0.212 importance degree, and finally distributor risks with 0.109 importance degree are in the second to fourth rank, respectively.

Keywords: Risks of Supply Chain, Risk of Manufacturer, Risk of Supplier, Risk of Distributor, Risk of Target Customer.

INTRODUCTION

Management of supply chain is one of the principal issues of economic agencies development that influences on all organizational activities to produce products and provides services which are their customers' needs. Factors such as political issues, demand fluctuations, technological changes, financial instabilities, and natural evidences increase uncertainties and bring risks in supply chain. Therefore, researcher in this article tries to study the various roots and factors of uncertainties in supply chain and a structure of risks and dangers.

Risk in supply chain refers to uncertainties and unpredictable events which can happen in any point in supply chain and influence on profitability negatively. Attention to opportunities and threats in industry, business and balance in manufacturing industries and companies' power are important and necessary in confrontation with the present risk and uncertainties, and management of supply chain is so significant. It is indicated that companies are vulnerable against the resulted risks by cutting supply chain. Therefore, identification and management of these risks for effective management of supply chain is vital and mandatory. Thus, the relationship among these actions must be checked to select proper decisions to manage risks. [7]

The following questions are answered in this article;

- Is there a significant relationship between risk levels of supply chain?
- Are the risk levels of supply chain equally important?

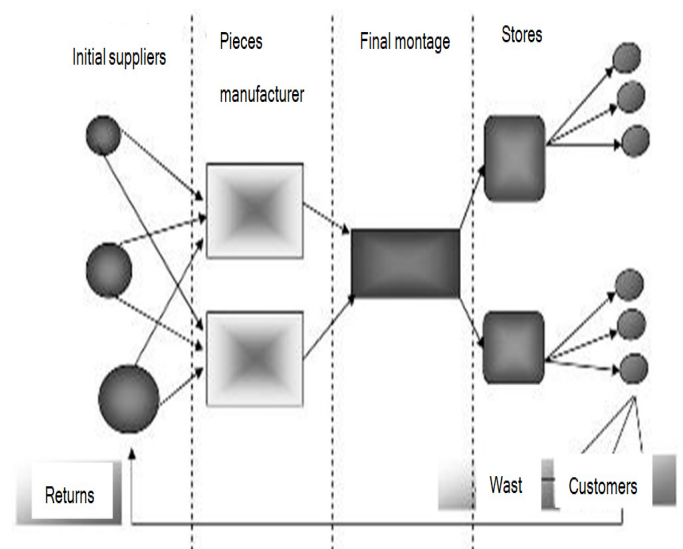


Fig. 1. A model of a supply chain (Taghavi, 2019)

MACRO PROCESSES OF SUPPLY CHAIN IN MANUFACTURING OR SERVICE PROVIDING ORGANIZATIONS

In each service providing/manufacturing organization, there are three macro processes in supply chain. Some explanations

about these macro processes that make the infrastructures of supply chain are as following:

Customer Relationship Management (CRM)

Customer relationship management is called to all processes and technologies used in organizations and companies to identify, persuade, develop, protect, and provide services to customers. Organizations shorten sales cycle and reinforce customers’ loyalty and income using CRM. [5] CRM can help to protect customers and attract new ones to organization products or services. [4]

Internal Supply Chain Management

This sector considers all related processes to the inside of supply chain. Cases such as strategic planning, demand planning, supply planning, field services, and orders completion are in this classification [5].

Suppliers’ Relationships Management

Suppliers’ relationships management is defined as a business activity to register and perceive the interaction of various suppliers that are necessary in profitability of economic agencies. Suppliers’ relationships management has duty of reducing good supply costs, services, and relationship with their suppliers and above all increasing profit. All related processes to interaction between organization and supplier are in this range. Cases such as sourcing, negotiation, purchasing, planning, and coordination with suppliers are in this sector. It is noticeable that interaction and integrity among three mentioned factors and coordination and cooperation among them is a proper field for success of supply chain. [3]

RISK EVALUATION

Based on Harland idea, risk depends on transactions in organization, as how much is actually risk level and profitability and organization tendency before risks. Some organizations and people hate risk and their behaviors are different based on their experiences and intellectual maturity. People, organization, or sectors searching for risks may be able to change risks along with their wishes to face with less losses. [6] Risk evaluation is one of pillar of risk management and its aim is measuring risks based on various indexes such as effect and probability of evidence and whatever results of this step is more precise, risks management is done by higher certainty degree.

Table 1. A summary of Studies

| <i>Research/ researchers</i> | <i>Year</i> | <i>Issue</i> | <i>Used method</i> |
|------------------------------|-------------|---|--|
| Yazdani et al. | 2020 | Ranking risks of green supply chain management using DEMATEL method (study on PARS Automotive Co,) | DEMATEL |
| Hayati et al. | 2024 | Offering a model to evaluate supply chain risks using multiple attribute decision making technics | Pearson correlation and averaging method |
| Taghavi | 2019 | Designing to identify and prioritize risks in manufacturing field of supply chain with certainty approach | DEMATEL |

IMPORTANCE OF RISK IDENTIFICATION IN SUPPLY CHAIN

Today, intensive competitiveness in global markets, arrival of products with short life cycle, and customers’ needs increase obliged business organizations to invest on their supply chain and its management. In addition, the incidence of factors such as political issues, fluctuations in demand, technological change, financial instability, and natural disasters have increased uncertainties and risks in supply chain and formed risk management of supply chain [7]. Identification and management of internal supply chain risk and using coordinative approaches along with supply chain members are proposed to reduce total vulnerability of total supply chain as supply chain risk management. The goal of risk management is identification risky situations and preparation strategies to reduce risky events and incidences. [8]

ANALYTICAL HIERARCHICAL PROCESS (AHP)

This process let decision makers modulate management of a sophisticated problem and show in a structure with definite hierarchy; thus, it shows the relationship between the main goal and criterion with secondary and alternative goals. AHP is based on three principles: analysis, comparison based on judgment, and combination of hierarchy between synthesis and mixed priorities together. The principle of analysis is related to the structure of a sophisticated problem in a hierarchy related to branches, sub-branches, and lower orders from sub-branches. The principle of relative or comparative judgment according to a clustering model to combine comparison of all the elements. Of course, this is pairwise comparison to extract local and unique priorities of a group. The next principle is combination hierarchical process that is used manifold in local priorities of classified elements in global level. Actually, making a global hierarchy and then adding elements of this global priorities to the alternative priorities, of course in its lowest level, are two main and principal features of this method that enable decision makers to separate priorities from different scale and weight. In addition, this method is considered as a decision with the ability to compensate, because the alternative goals in this design can get the place of the main goals by modification and can compensate defects [9].

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| | | | |
|-------------------------|------|---|-----------------|
| Mazaheri et al. | 2021 | Identification and prioritization risks of supply chain in manufacturing organizations | AHP |
| Ardakani et al. | 2021 | using multiple attribute decision making technics | TOPSIS Taxonomy |
| Halikas and Lentukankas | 2022 | Buy and supply: checking risk management performance | Regression |
| Weingarten et al. | 2020 | risk, risk management methods, and success in integration of supply chain | Regression |
| Moghaddam et al. | 2023 | Risk, placing decision, routing, and assets to remove designing bi-objective supply chain by considering risk | AHP |
| Levastar et al. | 2022 | Supply chain management in French companies | Regression |

RANKING RISKS OF SUPPLY CHAIN

This sector studies and rank criterions for risks of supply chain using AHP. Criterion for risk of supply chain is shown in table (2).

Table 2. Criterions for Risks of Supply Chain

| Row | Criterion for risks of supply chain | No. of questions |
|-----|-------------------------------------|------------------|
| 1 | Supplier risks | 1-14 |
| 2 | Manufacturer risks | 15-26 |
| 3 | distributor risks | 27-31 |
| 4 | Target customer risks | 32-35 |

After studied in EXPERT CHOICE 11 and ranking criterions for risks of supply chain by participants, the output is as following:

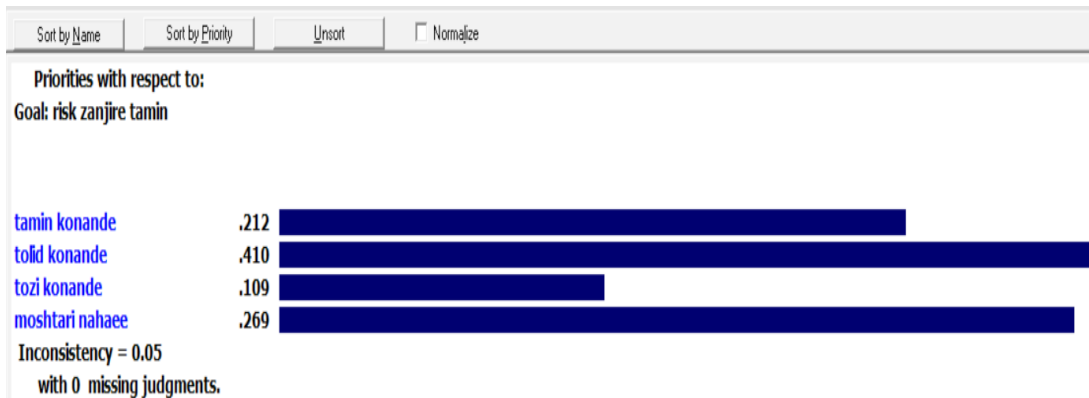


Fig. 2. Ranking Criterion for Risks of Supply Chain

As it is seen, manufacturer risks with importance degree of 0.410 is in the first rank and distributor risks with importance degree of 0.109 is in the fourth rank. Table (3) shows importance degree and rank of criterions for risks of supply chain.

Table 3. Ranking Criterions for Risks of Supply Chain

| Criterion | Sub-criterion | Weight | Rank |
|-----------------------|-----------------------|--------|------|
| Risks of supply chain | Supplier risks | 0.212 | 3 |
| | Manufacturer risks | 0.410 | 1 |
| | distributor risks | 0.109 | 4 |
| | Target customer risks | 0.269 | 2 |

Description: Inconsistency factor was 0.05 show consistency confirmation of comparison in criterions for risks of supply chain.

CONCLUSION

The supply chain management is planning process, execution, and control of efficient flow of raw materials, inventories of work in process, target products, from initial point to consumption. Therefore, attention to opportunities and threats in industry and business era and evaluation of

balanced industries and companies' power are necessary in confrontation with the existed risks and risks of supply chain management. Execution this studying idea is functionalized in Shiraz petrochemical company for the first time by emphasis on determinant role of processes risks in performance of supply chain and emphasis on model of the reference article

that is innovation point of this article. Finally, questions of this article are answered according to studies.

First question: Is there a significant difference between risk levels of supply chain?

As it was stated previously, supply chain risks have 4 main criteria of supplier risk, manufacturer risk, distributor risks, and target customer risk. Studies in EXPERT CHOICE 11 showed that risks levels of supply chain with inconsistency coefficient of 0.05 had different weight coefficient and manufacturer risks in this ranking with importance degree of 0.410 was in the first rank, target customer risk with importance degree of 0.269 was in the second rank, supplier risk with importance degree of 0.212 was in the third rank, and distributor risks with importance degree of 0.109 was in the fourth rank.

In this regard, it can be concluded that “there is significant difference in risks levels of supply chain” and the first secondary hypothesis is confirmed.

Second question: are risks levels of supply chain equally important?

After studies in EXPERT CHOICE 11 and ranking risk criterion of suppliers by participants with coefficient of 0.04, quality of raw materials with importance degree of 0.199 is in the first rank and price of raw materials with importance degree of 0.175 is in the second rank. In addition, bankruptcy of supplier with importance degree of 0.012 was in the last rank. Studies in EXPERT CHOICE 11 and ranking criteria of manufacturer risk by participants with coefficient of 0.02, technology transfer with importance degree of 0.341 was in the first rank, and designing and engineering product with importance degree of 0.02 was in the second rank, and correlation with supplier with importance degree of 0.031 was in the last rank.

Studies in EXPERT CHOICE 11 and ranking criteria of distributor risk by participants with coefficient of 0.01, product quality with importance degree of 0.282 was in the first rank, and product price with importance degree of 0.221 was in the second rank, and product return by customer with importance degree of 0.087 was in the last rank.

According to the obtained results from AHP, it can be concluded

that “risks levels of supply chain aren’t equally important” and the second secondary hypothesis is confirmed.

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