



# THE BEST RISK MANAGEMENT METHODS FOR THE MANUFACTURING INDUSTRIES-DETAILED ANALYSIS

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## ABSTRACT

*In a manufacturing process consideration needs to be given to the potential risks associated with ongoing day-to-day activities. Risks can arise due to the nature of the materials in use, the equipment, the people, etc. Depending on the individual perspective the focus of a risk management program can be to minimize injury to staff, to customers, or to the local community. To deal with these risks, an organization needs to implement an appropriate risk management process, which is what this paper aims for. In this connection, we have developed a conceptual model that describes the generic approach of risk assessment and outlines the gaps in the assessment steps that may hinder the successful implementation of risk management. Whatever the reason for wanting to understand and control risks, in every manufacturing process there will be a need for comprehensive risk identification, risk assessment, risk measurement, risk minimization, and risk monitoring program. Such a program will need to encompass all aspects of the business to ensure all key areas of risk concern are captured.*

**KEY WORDS-** *Manufacturing Process, Risks Management, Conceptual Model.*

## INTRODUCTION

The automobile sector is one of the world's most dynamic and impactful industries. The automobile sector has revolutionized transportation and significantly impacted the global economy. With advancements in technology and innovation, automobiles have become an essential part of modern society. As the demand for vehicles continues to rise, the industry is constantly evolving to cater to the ever-changing needs of consumers. The automobile sector is at the forefront of technological advancements, from electric cars to autonomous vehicles. From the invention of the first automobile in the late 19th century to the cutting-edge electric and autonomous vehicles of the present day, the automotive industry has undergone tremendous evolution and innovation. As a cornerstone of modern transportation, automobiles have revolutionized the way people travel, enhancing mobility, convenience, and productivity. Moreover, the automotive sector has played a pivotal role in shaping global economies, providing employment to millions and contributing significantly to national GDPs.

## RISK

It is of two types:

1. Traditional View- The focus is on understanding and managing an organization's risk appetite.
2. Contemporary View- It is about acknowledging future dangers with uncertainty in whether they will actually take place or not and, at the same time, acknowledging future benefits with uncertainty in whether they can be gained or not.

## Types of Risks

1. Market Risks- The risk of losses on financial investments caused by adverse price movements. Example- changes in equity prices or commodity prices, interest rate moves.
2. Credit Risks- It is the probability of a financial loss resulting from a borrower's failure to repay a loan. For example business or consumer does not pay a trade invoice when due.
3. Health and Safety Risks- It is the possibility that harm might occur when exposed to a hazard. Examples- are lung disease, stress, and musculoskeletal disorders such as back pain.
4. Environmental Risks- Factors that negatively impact the environment through air pollution emissions, toxic waste disposal, and water contamination.
5. Fire Risks- These can be defined as the likelihood of a fire occurring, multiplied by the severity of the fire. The harm potential and consequences in terms of loss of life, fire spread, damage, etc.
6. Bomb Threats- It is a threat to denote an explosive or incendiary device to cause property damage, death, or injury, whether or not such a device actually exists.
7. Computer Risks- It is anything that can harm a user's information on a computer.
8. Theft and Fraud- It involves the direct physical taking of property, whereas fraud relies on manipulation, deception, or misrepresentation.



## RESEARCH METHODOLOGY

The research methodology adopted here includes:

- i. A literature survey to identify the key perception of risk and risk management.
- ii. Developing a corresponding conceptual risk assessment model to demonstrate major gaps.
- iii. Multiple case studies to discuss the model.

## LITERATURE REVIEW

In 2012, Toyota suffered a loss of USD 5 billion due to the disruption in the supply of gas pedals and floormats for vehicles (Kayis & Karningsih 2011). Likewise, supplier performance has also been recognized as a significant risk in the supply chain as it can affect the performance of a company dramatically.

Globalization has also helped to provide a favorable impression of supply chains given they can help reduce costs, penetrate new markets, and facilitate communication and networking opportunities supported by innovative technologies. However, there are also several factors that cause supply chain disruptions and exposure to certain risks. For instance, supplier bankruptcy, political instability, natural disasters, and machine/equipment breakdown will make supply chains more susceptible and vulnerable to risks. Based on a study by Diabetic et al. (2012), supply chain risks are divided into five categories, namely; product or service management risks, macro-level risks, demand management risks, supplier management risks, and information management risks. According to Juttner et al. (2003), the consequences of risks can multiply and often overlap (e.g. operational risks, human resource risks, and customer and service level risks), hence, often becoming significant events. The impact of supply chain disruptions on company performance has increased over recent times (Kern et al. 2012). Consequently, supply chain risk management (SCRM) is important to assess given the impact of risks but also given the significant negative effect on companies and consumers. Given the rapid development of many industries (including the technology industry) over the last few years, it has attracted the interest of many researchers to focus more on supply chain performance measurement (Balfaqih et al. 2016). Nevertheless, this is primarily due to supply chain risks increasing in parallel with the advancements and progress within the various manufacturing industries. As mentioned, this impacts company performance, creating an adverse effect such as excessive costs (including overheads) and expenses. For example, in the automotive industry, the risk of production disruption will cause a loss of more than USD 100 million per day (Kirilmaz & Erol 2016).

Increasing disruptions within supply chains have led companies to place greater emphasis on SCRM in order to deal with the problems that arise as a result, (i.e. maintaining performance). In manufacturing industries, SCRM is increasingly widespread as it is used to detect, predict, and reduce the impact of supply chain disruption risks, such as the disruption of suppliers, inaccurate demand forecasting, and machine downtime (Blome & Schoenherr 2011). The manufacturing environment and different activities within the industry will also influence different types of supply chain risks (Kayis & Karningsih 2011). Kersten et al. (2007) mentioned that potential damage to the supply chain and adopting a risk-based approach, (i.e. risk bearing, risk transfer, and risk-avoidance) needs to be considered and planned. The study was based on a survey of 50 manufacturing plants and 39 logistics service providers.

Similarly, in a study by Thun and Hoenig (2011), they analyzed supply chain risks and the impacts based on a survey of 67 manufacturing plants in the automotive sector in Germany. Their study highlights two distinct approaches: (1) reactive and (2) preventive, each giving different impacts such as bullwhip reduction and flexible safety stocks respectively. Accordingly, Blos and Miyagi (2015) identify the disruption of interdependent supply chains and introduce a model that incorporates nodes (transitions and places) that allow decision-makers to appropriately respond based on the type and nature of the risk. Recently, Salleh Hudin et al. (2017) revealed the external and internal risks associated with the supply chain. Accordingly, the study aimed to clarify the main risks of three selected automotive companies in Malaysia. The main problems that occurred were mainly due to the quality of raw materials, late delivery of imported components, and insufficient skills of employees. Employees also play an important role in leading the success of the company.

In view of this, Satar and Md Deros (2008) implemented a Quality Control Circle (QCC) at a production company in Malaysia. As a result, the top management plays a crucial role in the development of workers' capabilities, otherwise, it might lead to a gloomy environment and contribute to the downfall of the company.

Studies have also been conducted by researchers on risk-mitigating strategies, such as in the areas of communication and the exchange of information, reduction, and rationalization of suppliers, helping suppliers towards improving their performance, the accuracy of demand

forecasts, and reward schemes in the presence of little to no risk in the industry (Lavastre et al. 2011). However, the advancements also make the industry more vulnerable and susceptible to supply chain risks and disruptions. Disruptions can occur due to transportation problems, poor product quality, and delivery time.

Accordingly, these disruption risks will negatively impact the efficiency and robustness of supply chain operations. Therefore, our study aims to assess the key factors, the frequency, and mitigating strategies related to supply chain risks in the manufacturing industry in Malaysia.

## A CONCEPTUAL MODEL FOR RISK ASSESSMENT

There are two categories of risk in a system, residual risk and entropic risk. Residual risks are those that are inherent in a system, whereas entropic risks are those that are caused by the degradation of system factors. To deal with the residual risks of



some manufacturing systems, which are potentially harmful to the environment on their failure (such as nuclear power plants, chemical process industries, or oil storage facilities), scientific studies based on probabilistic statistical measures have been developed, refined and practiced over the years.

Gap1- Development of clear perception about operational risks-Business and Technical Knowledge

Gap2- Formulation of strategy to deal with perceived risks-Prioritization

Gap3- Implementation of formulated strategies- Available resources.

Gap4- Recognition and resolution of risk determinants- Immediate business needs

Gap5- Assessment of operational risks associated with disturbances-Scientific Knowledge

### Experience from Case Studies

In this section, key findings of case studies are presented. First, the current risk management practices in the studied organizations are discussed. Second, the results associated with the proposed model are presented. We carried out five in-depth longitudinal case studies over twelve months, which added a holistic and richer contextual understanding of the risk management practice in the organizations.

**Case organization A:** This organization is a manufacturer of steel-based fabricated products. It is located in East Tamaki, Auckland. Structural products for household and commercial purposes. Its main products are roll-formed building products including MSS purlins and girt produces some roofing products. It employs 25 full-time employees on its site.

**Case organization B:** This organization is one of New Zealand's leading manufacturers and installers of quality roll-formed roofing products has a wide range of quality roll-formed and folded color-steel and zinc aluminum products with profiles for roofing and cladding to suit all applications. Its Roofing and Cladding operation has manufacturing branches based in different locations. Its Auckland site employs over 75 employees and operates in two shifts from Monday to Friday. It is located in East Tamaki, Auckland. It supplies its products to local markets all over New Zealand.

**Case organization C:** This organization is a leading New Zealand manufacturer of reinforcing mesh and nails and a supplier of reinforcing rods, steel plates, and structural steel as well as a wide range of other steel and wire products for the engineering and construction industry. It is located in East Tamaki, Auckland. It manufactures reinforcing mesh of all standard sizes for tilt slabs, concrete tanks, commercial flooring components, and security purposes. It manufactures different types of nails (bright, galvanized, stainless steel, and silicon bronze). It also supplies tie wire coils and all tie wire products to the building, contracting, and engineering industries. It consists of 10 workstations, employs 50 full-time employees, and operates in two shifts per day from Monday to Friday.

**Case organization D:** This organization manufactures a wide variety of wood products including pre-nail framing and trusses for house building. It employs 25 full-time employees and operates one shift per day from Monday to Friday. It consists of several power saws, wood lathes, drills, router machines, groove cutters, power staplers, coating machines, and some testing facilities in four major workstations. Power cutting, manual cutting, power stapling, nailing, gumming, coating, aligning, and assembling are the main manufacturing activities in this organization.

### Operational Risk Management Process

- 1) Identification
- 2) Development
- 3) Measurement
- 4) Assessment
- 5) Analysis
- 6) Adaption and Improvement

### FINDINGS

Training for managers in up-to-date knowledge of new technology and new developments was found to be very limited. The managers' scientific or technical knowledge of risk and reliability assessment was found to be remarkably poor. Thus, weaknesses in risk perception lie in the organizational mental model. Indeed, managers tend to lead their organizations by applying their acquired experience and knowledge, which is found to be inadequate in the context of operational risks. They do not have cost information about past accidents. They do not record day-to-day operational disturbances, their resulting lost time, and other losses. In conclusion, a gap is found between risk perception and strategy formulation. Fact-based information collection is missing. The research identifies that detailed disturbance-related data are not collected by the organizations. Therefore, scientific judgments or estimations of actual or potential risks are not made, which is likely to produce erroneous prioritization. So, a gap is prevalent between strategy formulation and strategy implementation. The research also identifies that there are substantial weaknesses in the organizations, in terms of developing a healthy culture to manage and control operational risks.



## CONCLUSION

Risk management can be useful when it improves productivity in terms of safety, time, money, and operations. The firm can benefit from this in a number of ways. If the firm solves the risk and mitigates it then it can overcome the problem and crisis which may occur in the future. Moreover, it can save costs and money which might occur if the problem gets severe (Lam, J. 2001). The productivity of the firm is linked to risk management and it impacts the performance directly. If the risk and crisis are not managed then the productivity will decline and the firm will face consequences. The time will be wasted and costs will be incurred by the firm too.

Hence the risk is to be reduced so the employees can produce more, and they can perform at optimal levels and perform well too. In addition to this, the capital and assets will be efficiently utilized only when the risk is less and everything has been managed efficiently (Mohammed, 2016).

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