

# **Risks Management & Mitigation in Supply Chain Management: Literature Review and Reserch Oppurtunity**

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## **Abstract**

The application of supply chain risk management has a positive impact in the form of a competitive advantage for companies in facing business competition. Integrating aspects of supply chain sustainability in analyzing supply chain risks, especially agricultural products that are perishable, bulky, and of various qualities can provide an optimal supply chain. This results in increased time requirements, demand uncertainty and supply chain complexity. The problems the company is currently experiencing are the availability of raw materials, the quality of raw materials that is still inadequate and prices that continue to rise. This research can provide information related to supply chain risk management literature, especially on agricultural products and risk mitigation that must be carried out so that it can provide an overview of the limitations of supply chain risk management research on agricultural products in companies.

## **Keywords**

Risk Management, Supply Chain Management, Risk Mitigation, Mitigation Effectiveness, Supply Chain.

## **Introduction**

The industry's competition requires a study of its competitive advantage. Industry needs to have competitive priorities, including cost leadership, quality, responsiveness, and flexibility, to achieve this advantage. For this reason, it is necessary to optimize the entire supply chain network or in other words integrate the supply chain or supply chain management. Based on some literature supply chain management is planning, designing, and controlling the flow of goods, information, and money along the supply chain to efficiently meet customer needs both now and in the future. The function of supply chain management is to coordinate the flow of goods, information, and money between all companies related to the supply of goods, manufacturing companies that process the goods supplied, distributor companies, and retail companies.

When determining a supply chain system, it is necessary to make the right decisions for the sustainability of a company. In decision theory, risk is defined as the variation in the distribution of possible outcomes, their probability, and their subjective value (March and Shapira 1987). This definition also includes probabilities, i.e. positive deviations. Harland, Brencheley, and Walker (2003) define risk as the chance of damage, loss, injury, or other undesirable consequences. Many authors define risk as the probability of a particular event multiplied by its severity in terms of negative business impact (Christopher and Peck 2004)

The aim of this paper is to present a critical review of the previous literature relating to supply chain risk management. An in-depth analysis was carried out to identify influential information from the literature. This paper has identified gaps to be explored regarding supply chain management practices that can be used by researchers to enrich theory construction and practitioners.

Further explanation of this paper will be explained as follows. Sections 2 and 3 represent the classification of the resulting papers. Section 2 presents the literature on risk management and supply chain. This is followed by section 3 which presents previous work on supply chain risk management and prevention strategies. After that, section 4 discusses the gaps between the studies. And finally, the conclusion is presented in section 5

## **1. Supply Chain Risk Management**

Supply chains become longer and more complex as company competition intensifies. Peck (2006) refers to supply chain risk as anything that poses a risk to the flow of information, materials and products; the risk may lead to a mismatch of supply and demand, which in turn affects the cost or quality, i.e. deviation from the target value. Meanwhile, on the other hand, distributors regard information as an asset and obtain it at a cost, so this makes it difficult for the transfer of information from distributors to other parties in the supply chain (Huang and Yang 2016; Lei et al. 2015). Wagner and Bode (2008) also see risk as a negative deviation from the expected value of a particular performance measure. Chopra and Shodi (2004) and Craighead et al. (2007) define supply chain risk as an unplanned disruption or delay in a flow.

It is important for companies to plan for disruptions and develop contingency plans when they design or redesign their supply chains. Norman and Janson (2004) define business risk as the level of exposure to uncertainty that a company must understand and manage effectively when executing its strategy. According to Ritchie and Brindley (2007), risk exists in all business situations. Usually, organizations do not have the capacity to address all potential risks, so in certain situations only the main risks are addressed. Risk management refers to all aspects including planning, monitoring and controlling activities based on information generated by risk analysis activities (The Chartered Quality Institute 2010).

This makes the topic of risk identification and management a very broad and complex area. A truly comprehensive approach may even include risks with potential positive effects. To make the scope of this research more manageable, however, it is necessary to limit the focus. Because the goal of risk management is ultimately to reduce negative influences and ensure the success of the company. Literature related to supply chain risk management can be summarized in table 1 below:

Table 1. Literature review on supply chain risk management

<b>Author(s)</b>	<b>Dependent Variable</b>	<b>Independent Variable</b>	<b>Result</b>
(Norman and Jansson 2004)	Supply Chain Risk Management.	Serious Sub-Supplier Accident	<ul style="list-style-type: none"> <li>• Insurance companies might be a driving force for improved SCRM, as they now start to understand the vulnerability of modern supply chains.</li> <li>• Supply chain risks should also be put into the trade-off analysis when evaluating new logistics solutions to find the efficient level of risk and prevention</li> </ul>
(Peck 2006)	Risk and Supply Chain Management	Reconciling Supply Chain	<ul style="list-style-type: none"> <li>• More work is needed within the SCM discipline, the issue of supply chain risk and vulnerability should not be addressed solely from a functional SCM perspective.</li> </ul>
(Chopra and Sodhi 2004, Chraighead 2007)	Pharmaceutical Supply Chain	Nature and prevalence of risk	<ul style="list-style-type: none"> <li>• The risks identified are similar to those prevalent in industrial supply chains, regardless of the idiosyncrasies of pharmaceuticals.</li> <li>• The group consen-sus was that caution must be applied in how such risks are addressed, as there are aspects of the product that highlight its uniqueness e.g. criticality.</li> </ul>

(Ritchie and Brindley 2007)	Supply Chain Risk Management	An emergent framework for performance measurement	<ul style="list-style-type: none"> <li>• Supply Chain Risk Management Framework with the inclusion of the risk management influencers component provides a more robust description of the factors that affect the nature of the risk management responses in particular situations.</li> <li>• The need for the Operations Research discipline to evolve a more diverse set of risk management tools and approaches (ie both quantitative and qualitative) to effectively address the diversity of issues and contexts</li> </ul>
(Wagner and Bode 2008)	Supply Chain Risk Management	Researcher's Perspective	<ul style="list-style-type: none"> <li>• A definition gap in how researchers define SCRM</li> <li>• A process gap in terms of inadequate coverage of response to risk incidents, and</li> <li>• A methodology gap in terms of inadequate use of empirical methods</li> </ul>
(Huang dan Yang, 2016; Lei et al., 2015)	Information acquisition and transparency in a supply chain	Asymmetric production cost information	<ul style="list-style-type: none"> <li>• The retailer's incentive for the supplier's forecasting is a threshold policy</li> <li>• When the forecasting cost is high and the production cost variance is small, under transparent information acquisition, the high cost supplier's production quantity may be either upward or downward distorted</li> </ul>

## 2. Risk Management & Mitigation

Every activity that has a risk is always associated with unwanted losses, namely unwanted negative consequences, and uncertainty. Risk can be defined as the frequency of occurrence of a specified hazard and the magnitude of the occurrence. According to several authors who have defined supply chain risk (e.g. Choi et al., 2006; Zsidisin et al., 2000, 2004), supply chain risk is defined as an event that has an adverse impact on supply chain operations and hence a desired performance measure, such as the level of service and responsiveness across the chain, as well as costs..

Unpredictability risks can be reduced through proper calculations and advanced analysis that includes the economic, financial, legal and political complexities of the event (Caselli et al. 2009). According to C. Hsiao (2013) risks that are not managed properly can lead to cost overruns, schedule delays, wasted manpower and effort . Pengendalian risiko berupa mitigasi risiko dan rencana kontingensi melibatkan pengembangan tindakan risiko respon berencana untuk mengendalikan risiko (Schoenherr 2011).

Quality risk management is a set of leadership, business processes, culture, and technology made by an organization for creating collaborative approach to identify, quantify, and mitigate risk on products, operations, supplier, distribution, customer, and other risks which affect quality (LNS Research, 2013). Critical importance to include post-event restoration strategies for disruptive events impacting the supply chain, while specifically accounting for how unmet demand impacts the customers within the supply chain (He, J. 2018). Globalization, e-trade, advanced technologies and emerging production techniques have increased supply chains' efficiency and added value. However, despite numerous advantages, these factors make supply chains more fragile and vulnerable to risks. (Kirilmaz, O & Erol, S 2017)

Tabel 2. Literatur review on Risk Mitigation Strategy

Author(s)	Dependent Variable	Independent Variable	Result
Muchfirodin, M., & Yuliando, H. (2015).	Supply Chain Risk Management	Tobacco commodity in Temanggung, Indonesia.	<ul style="list-style-type: none"> <li>• The risk that were classified as avoidance risk at farmer level are weather, capital access, the price and quantity. the fit strategy to mitigate risk bothered by the development of seeding technology</li> </ul>

Hsiao, C. Et all 2013	Supply Chain Risk Management	Researcher's Perspective	<ul style="list-style-type: none"> <li>This study presents a more quantitative understanding of the relationship between a project state, the risks involved, and risk-mitigating actions taken during the project.</li> </ul>
Kırılmaz, O., & Erol, S. (2017)	Supply Chain Risk Management	Shifting orders among suppliers to mitigate.	<ul style="list-style-type: none"> <li>An initial procurement plan is obtained via a linear programming model, considering the cost criterion as the first priority then this plan is revised by including the risk criterion into the planning as the second priority.</li> </ul>
He, J. Et all. 2018	Mitigate Disruption Risk in the Supply Chain	A Real-Option Approach	<ul style="list-style-type: none"> <li>The results can be used by managers to decide on ordering quantities at the beginning of each period, which maximizes the expected profit, while also considering the disruption risk of the primary supplier and correlated demand and price uncertainty</li> </ul>

### 3. Analysis and Discussion

Research on supply chain risk management has been carried out by many researchers before. The majority of researchers use several methods that are almost the same. This mechanism is considered capable of overcoming problems between supply chains in order to maintain the balance of the supply chain network. Some researchers have also developed a similar method in this condition when a problem occurs. This supply chain risk is unavoidable, especially perishable agricultural products and the effects of uncertain climate. Therefore, several studies related to supply chain risk management in agricultural products have been developed by considering several other risk factors.

With this brief description, it can be seen that most of the research related to supply chain risk management develops by involving several internal and external factors, while most of the research related to supply chain risk management adds supplier and company behavior factors. So that it becomes an opportunity in the scientific field if the two topics are combined and results are obtained regarding the influence of supply chain risk management on competing companies where they have a target market that is sensitive to price changes. Mapping results related to research opportunities will be presented in Figure 1 below.

Mapping research opportunities can provide initial identification for supply chain research. This review literature and research opportunity paper makes it easier for researchers to find research gaps and does not rule out the possibility that research in this field will develop further in the future by adding several factors that can be considered such as weather factors, raw material capacity limits and other related factors. so that further research on this topic can develop and benefit many parties.

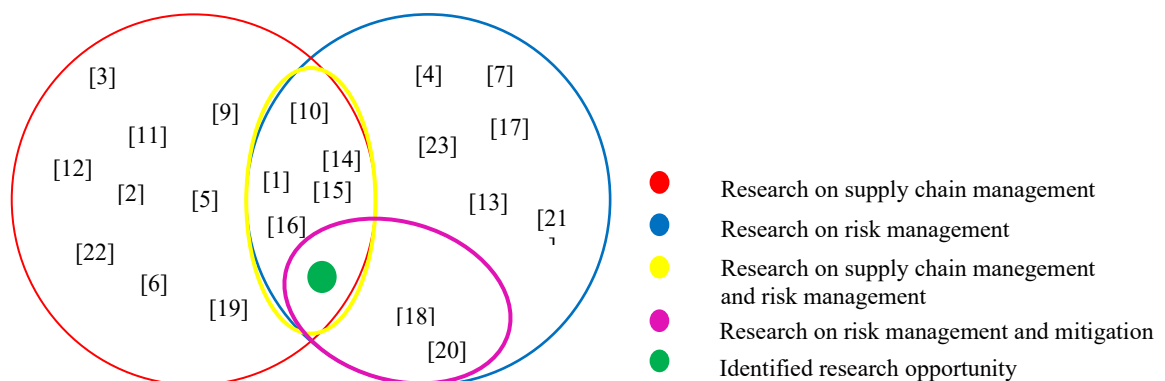


Figure 1. Research mapping and opportunity

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[1] Craighead, et all (2007)	[11] J. Jenkins, et all (2010)	[21] Wagner, S. M., (2008)
[2] Chopra, et all (2004)	[12] Lei, Q., Chen, et all (2015)	[22] Corominas (2017)
[3] C. Ganeshkumar, et all (2017)	[13] March, J. G., et all (1987)	[23] LNS Research (2013)
[4] Harland, et all (2003)	[14] Muchfirodin, M., et all. (2015)	[24]
[5] Caselli, S., et all. (2009)	[15] Norrman, A. et all (2004)	[25]
[6] Christopher, et all (2004)	[16] Peck, H. (2006)	
[7] He, J et all (2018)	[17] Ritchie, B et all (2007)	
[8] Hsiao, C., et all (2012)	[18] Schoenherr T et all (2011)	
[9] Huang, S. Et all (2016)	[19] Sheffi, Y. Et all (2005)	
[10] Kırılmaz, O et all (2017)	[20] The Chartered Quality Institute (2010)	

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#### 4. Conclusion

Through the presentation in this paper, we get an adequate initial overview of the supply chain risk management literature review on agricultural raw materials. Through this paper, there is also a research gap which becomes an opportunity for further research. This exploratory study was carried out by mapping previous literature on two topics, namely supply chain risk management for agricultural raw materials and prevention strategies to minimize risks for the company. Research in this field will be further developed by considering several factors that have not been explored in this paper regarding the effectiveness of implementing alternative mitigations.

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