

## A Supply Chain Risk Management Model Based on Both Qualitative and Quantitative Approaches

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**Abstract :** In today's business, it is well-recognized that risk is an important factor that needs to be taken into consideration before a decision is made. Studies indicate that both the number of risks faced by organizations and their potential consequences are growing. Supply chain risk management has become one of the major concerns for practitioners and researchers. Supply chain leaders and scholars are now focusing on the importance of managing supply chain risk. In order to meet the challenge of managing and mitigating supply chain risk (SCR), we must first identify the different dimensions of SCR and assess its relevant probability and severity. SCR has been classified in many different ways, and there are no consistently accepted dimensions of SCRs and several different classifications are reported in the literature. Basically, supply chain risks can be classified into two dimensions namely disruption risk and operational risk. Disruption risks are those caused by events such as bankruptcy, natural disasters and terrorist attack. Operational risks are related to supply and demand coordination and uncertainty, such as uncertain demand and uncertain supply. Disruption risks are rare but severe and hard to manage, while operational risk can be reduced through effective SCM activities. Other SCRs include supply risk, process risk, demand risk and technology risk. In fact, the disorganized classification of SCR has created confusion for SCR scholars. Moreover, practitioners need to identify and assess SCR. As such, it is important to have an overarching framework tying all these SCR dimensions together for two reasons. First, it helps researchers use these terms for communication of ideas based on the same concept. Second, a shared understanding of the SCR dimensions will support the researchers to focus on the more important research objective: operationalization of SCR, which is very important for assessing SCR. In general, fresh food supply chain is subject to certain level of risks, such as supply risk (low quality, delivery failure, hot weather etc.) and demand risk (season food imbalance, new competitors). Effective strategies to mitigate fresh food supply chain risk are required to enhance operations. Before implementing effective mitigation strategies, we need to identify the risk sources and evaluate the risk level. However, assessing the supply chain risk is not an easy matter, and existing research mainly use qualitative method, such as risk assessment matrix. To address the relevant issues, this paper aims to analyze the risk factor of the fresh food supply chain using an approach comprising both fuzzy logic and hierarchical holographic modeling techniques. This novel approach is able to take advantage the benefits of both of these well-known techniques and at the same time offset their drawbacks in certain aspects. In order to develop this integrated approach, substantial research work is needed to effectively combine these two techniques in a seamless way. To validate the proposed integrated approach, a case study in a fresh food supply chain company was conducted to verify the feasibility of its functionality in a real environment.

**Keywords :** fresh food supply chain, fuzzy logic, hierarchical holographic modelling, operationalization, supply chain risk

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