

## An Investigation of Quality Management within Frozen Food Chain: A Case Study in China

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### Abstract

As economies develop and the pace of life accelerates, there is an increasing demand for frozen agricultural products as well as for good quality and fresh products to enter the production chain. However, relatively little information is available regarding the management of this form of “cold chain” to ensure the quality of frozen food, especially within a developing country context. Therefore, this study aims to fill this gap in the literature and provide feasible guidance for frozen food manufacturers in developing countries to establish both internal and external quality management systems for their supply chains. Examining a frozen corn cobs manufacturer in China, it is found that internal quality management with preventative and traceability systems are closely related to product quality, while the effectiveness of supply chain quality management moderates the extent of such relationships. Furthermore, it is found that organizations in their early stages of development can enhance the quality level by effective management without investing additional capital.

*Keywords:* Cold chain, SPC, HACCP, traceability systems, supply chain quality management.

### 1. Literature Review: Cold Chain Management

The American and British researchers—Albert Barrier and J. A. Ruddich—first proposed the “cold chain” concept in 1894. However, the development of cold chains was not given adequate attention until the 1940s. Van Arsdel [21] suggested that the quality of frozen food is influenced by “3Ts”: time, temperature, and tolerance. More specifically, the stability of the majority of frozen foods exponentially increases with decreasing storage temperature. When the temperature is certain, however, for every type of frozen food, a definite relationship exists between the decline in quality and storage time; such quality decreases caused by time and temperature are cumulative and irreversible. Similarly, Montanari [12] suggested that time and temperature are two key factors influencing food quality and corruption along the cold chain; hence, not only a technical but also managerial solution should be sought to effectively monitor and control time and temperature. A structured framework was then proposed as the suggested approach to identify