Cold supply chain of leafy green vegetables: a social network analysis approach

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ABSTRACT

Purpose: Cold supply chain technology is critical for extending the shelf life of perishable leafy green vegetables. This study aims to investigate the concept of managing leafy green products using cold supply chain technology and visualise the findings. **Design/methodology/approach:** Using expert interviews and data visualisation approaches, this study examines how organisations deal with the complexity of cold supply chain processes and networks. Thematic data analysis was conducted. Two types of software were used to accomplish the research objectives. The first software used AntConc version 3.5.8 with word frequency (*N*-gram) analysis, whereas the second software, VOSViewer offered co-occurrence network visualisation and cluster analysis. **Findings:** The findings show that the appropriate design of cold chain technology is critical in ensuring the freshness and quality of leafy green vegetables. The primary goal of managing the complexity of the cold supply chain is to achieve product freshness and energy efficiency. Regardless of the importance of energy efficiency, cold supply chains require warehouse management solutions for transportation and storage. **Practical implications:** This study found that proper design and selection of appropriate technology in the cold supply chain have driven the companies to improve the firms' competitive advantage while delivering the best quality of perishable leafy green food products. In addition, the freshness, quality, safety, and health of leafy green vegetables will be determined by the company's capacity to handle long-distance transportation and select the appropriate distribution channels and storage. Warehouse management system technology was found to be secondary compared to cold chain technology, although distribution and warehousing practices are critical for supply chain performance. **Originality/value:** This study has established the conceptual indicators based on best practices and outcomes for the cold supply chain. This study argued that cold supply chain management and performance should be monitored independently. Furthermore, the theory of technological adoption can be expanded to include product nature as a driver. Finally, this study has established cold chain best practices based on a perishable supply chain perspective. The findings of this study can promote healthy foods to solve zero hunger and achieve sustainable development goals. Although this study demonstrates that technology improves supply chain practises, cold storage and logistics benefit the most from technological advancements. In contrast, non-cold supply chains benefit from technology-driven improvements in performance.

KEYWORDS

Leafy green vegetables; Cold supply chain; Cold chain technology; Social network analysis; Data visualisation; Sustainable development goals

REFERENCES

Abad, E., Palacio, F., Nuin, M., De Zarate, A.G., Juarros, A., Gómez, J.M. and Marco, S. (2009), "*RFID smart tag for traceability and cold chain monitoring of foods: demonstration in an intercontinental fresh fish logistic chain*", Journal of Food Engineering, Vol. 93 No. 4, pp. 394-399.

Accorsi, R., Gallo, A. and Manzini, R. (2017), "*A climate driven decision-support model for the distribution of perishable products*", Journal of Cleaner Production, Vol. 165 No. 1, pp. 917-929.

Affia, I. and Aamer, A. (2022), "*An Internet of things-based smart warehouse infrastructure: design and application*", Journal of Science and Technology Policy Management, Vol. 13 No. 1, pp. 90-109.