

Title Optimisation of fresh-food supply chains in uncertain environments, Part I: Background and methodology

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Abstract

The design of the supply chain, and in particular of the distribution phase, for fresh-food products, such as fresh and fresh-cut produce, fruit or meat, cannot be achieved without considering the perishable nature and the variability of the products entering the chain.

Motivated by these considerations, this paper presents a novel approach for the optimisation of fresh-food supply chains that manages a trade-off between logistic costs and some indices measuring the quality of the food itself as perceived by the consumer, such as ripeness, microbial charge or internal temperature. The supply chain and the behaviour of the product during its delivery are described using a hybrid model consisting of two specific parts. The first part takes into account event-driven dynamics (typically product handling) while the second one describes time-driven dynamics (the dynamics of some parameters characterising the food product in the supply chain). The performance of the supply chain, expressed in terms of both logistic costs and final product quality, are then enhanced using a specific optimisation algorithm that uses the model to assure the feasibility of the proposed optimal solutions.

In a companion paper [Dabbene F; Gay P; Sacco N (2008). Optimisation of Fresh-Food Supply Chains in Uncertain Environments, Part II: a Case Study. Biosystems Engineering, accepted], this new methodology is applied to a real-world example concerning meat refrigeration.