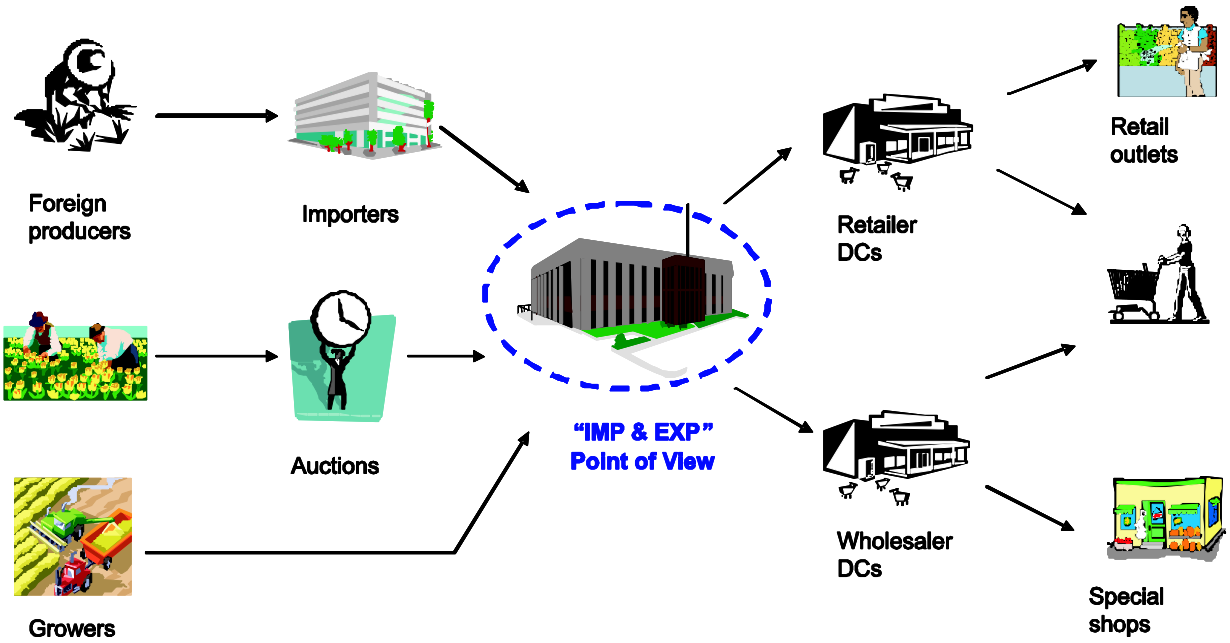
LogDynamics
International Graduate School

Evaluation of the Application of Automatic Conditions Monitoring of Produce in Fresh Food Warehouses



The rising life expectancy of the population, the increasing presence of double family income, and the consumers' wish for a larger variety of products have been changing the demand for food in terms of quantity, variety, quality and service. Thus, new socio-economic trends and technological developments challenge the supply chains, calling for better coordination of the logistic processes within companies and the other members of supply chains. The purpose of this integration process is to increase the added value along the whole supply chain. At the same time, the coordination of the supply chain is complicated by the high level of complexity and dynamics.

At present, the food supply chain uses conventional central control to operate logistic processes. This implies a relatively long lapse of time between receipt of information, information processing, decision making and the execution of the decision. In this situation the food supply chains need to be flexible to react in real-time to the dynamics and complexity of the environment.

Modern information and communication technologies enable the application of autonomy in food supply chains. These are for instance: Radio Frequency Identification for automatic identification and data capture; sensors to supervise, e.g., the processes, products and/or temperatures; satellites to localise the logistic objects.

With use of these technologies, for example, a pallet with fresh fruits can communicate with other units of the storage system and make intelligent decisions itself. For example, the pallet can identify the available spaces in store and decide on its optimal storage according to the compatibility of products, temperature, perishability, etc. Later, the pallet can decide on its rearrangement inside the store in order to facilitate access for the next delivery. Furthermore, the pallet can react to orders by offering itself to satisfy demands.

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Methodology

Analysis of the fresh food supply chain is necessary to identify the cause-effect relationships for the sales and storage processes. This implies clarifying the phases, relations and, at the same time, identifying services, equipment, company policies, variables of decision, etc. This analysis requires both academic investigation and practical experience to allow a more reliable understanding of the reality.

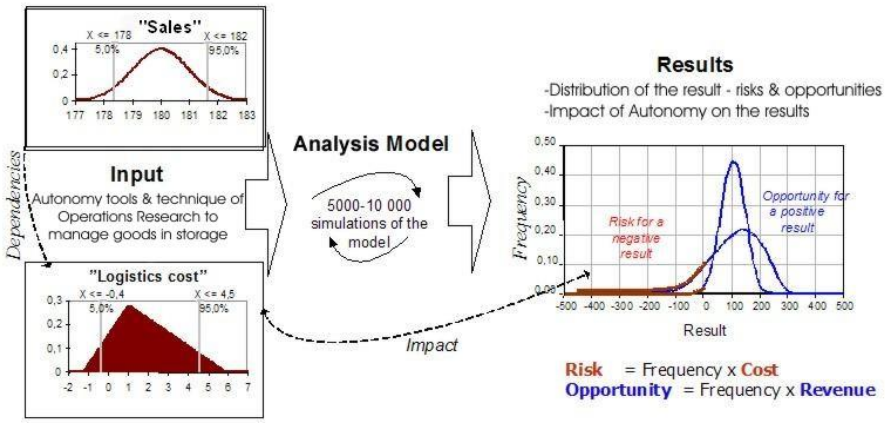
Modelling the conventional control will help to identify the principal problems of the current method of conventional control and preliminary solutions offered by the new concept of autonomous control. Modelling of an ideal autonomous control will be created that reflects the potential applications of the autonomous control concept without the current technical restrictions. The objective is to visualize a new ideal scenario for the sales and storage processes in the fresh food supply chain. This scenario would offer the required support to formulate answers to the following research question:

How to optimize the inventory rotation in a warehouse to reduce the high risk of obsolescence associated with the natural perishability of fresh food products?

By comparing the models of central and autonomous control, the requirements and priorities of various elements to increase the degree of autonomy for the sales and storage processes can be determined. This will help companies to focus their investments on those autonomous elements that have a bigger impact in the optimization of the sales process.

The main task of this research is to propose and to test a different inventory rotation method capable of guiding future changes in the fresh food supply chain. This task encompasses the management of sales and storage processes within the fresh food from “First In First Out” to “First Expire First Out”. In order to achieve this desired result there is a need not only for autonomous tools but also for the field of operations research.

Finally, the risks and opportunities generated by the alternative method will be identified and assessed. Using a simulation process will provide a practical possibility to measure the overall effects of the new method. Thus, the quantitative results from the simulation will be analyzed, assessing the potential of the new method.



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