

# New Eco-Design Packaging use in Fresh Product Supply Chains: a framework for performance assessment

ANR EcoFreshChain Project - Alimentation et syst emes alimentaires

Universit  Paris-Saclay, CentraleSup elec, Laboratoire G enie Industriel

*Opening position for a postdoctoral researcher in Supply Chain Management*

## **Project context and objectives**

The postharvest fruit and vegetable waste in the logistic chain and at home is a main issue in France (Ademe, 2016), in Europe and worldwide (FAO, 2013). The postharvest loss of fresh fruit and vegetable until the consumer, can become as high as 38% of the total produced volume (Wu and Defraeye 2018) due to very short shelf life and high perishability of the fresh fruits and vegetable. The main reasons are the non-optimal ambient temperature and humidity, inappropriate packaging, logistic organization and consumer behavior. As a game-changing, any sale of fresh unprocessed fruits and vegetables must be exhibited without plastic packaging from 1/1/2022 (French law n   2020-105 of February 10, 2020 relating to the fight against food loss/waste and to promote the circular economy, article 77). With reference to this law, the practice adaptations in the post-harvest chain of fruit and vegetable from production to home are unavoidable. Decreasing environmental burden of packaging while limiting food losses by the combination of refrigeration and new eco-design packaging (EDP) are the positioning of this project.

Several questions are raised related to the implementation of new EDP solutions to a real scale:

- How to eco-design the packaging in order to decrease environmental impact while better preserving product quality from postharvest to consumption?
- What are the operational costs, energy consumption of cold equipment and environmental impacts of the EDP in the local and long distance post-harvest chains?
- What are the impacts of using EDP in fresh product supply chains? What are the benefits on operations performance and environment as well as the costs associated?
- What practical suggestions can be proposed to operators and to consumers to preserve product quality and reduce losses, without implementing dramatical changes on the cold chain logistic?

## **Research objectives**

Innovative EDP would have different impacts on operations: better preserve products, extend its shelf life along the supply chain, reduce operations costs, etc. Thus, by using EDP, the performance of fresh products such as strawberry and salad supply chains may evolve positively (cost reduction, increased sales resulting from higher quality and/or higher shelf life products, decreased operations costs, ...). Besides, EDP may challenge the organization of the current product distribution schemes (decreased replenishment/delivery frequencies at various echelons, pooling of stocks among producers, ...). The objective of the research is first to evaluate qualitatively how actual pain points can be mitigated in strawberry and salad supply chains by using EDP.

Then, decision making tools will be developed to evaluate the supply chain performance of the EDP of strawberry and salad. The real cold chain from producers to consumers will be studied. The performance indicators to be considered are the product quality, consumer acceptance, operational cost and environmental impact. A challenge to overcome is the obtention of reliable and representative field data knowing that they may vary due to the operator and consumer practices, seasons. The objective is to develop ad hoc models to compare the performances of current supply chains (without EDP) and new supply chains (with EDP). Both discrete event simulation models and analytics decision aid models will be developed to represent supply chain operations and assess cost (transport, logistics,..), product loss rates, cost of using EDP. Model inputs would include current and new packaging materials characteristics, food loss quantity. These models will enable to assess the economic impact of using EDP on current supply chains and identify the most influencing factors related to this performance.

### **Candidate profile**

The candidate has obtained a Doctoral degree in at least one of the following fields: Industrial Engineering, Supply Chain Management, Operations Management, Operations Research, Computer Science, or in a related field. A multidisciplinary profile would be appreciated. He / She has a strong interest in supply chain, sustainability, computational tools, and new technologies. Great communication and presentation skills – in French and English – are required to collaborate and exchange with industrial partners involved in the project.

### **Location**

The position will be based at CentraleSupélec, Paris-Saclay University within the Industrial Engineering Research Department (Laboratoire Génie Industriel, LGI, located at Gif-sur-Yvette, 20 km in the southwest of Paris).

### **Duration and starting date**

Duration of the Project: 13 months, starting in fall 2021 (September/October)

To apply, send your resume and cover letter directly to Prof. Evren SAHIN.

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For more information, please contact Prof. Evren SAHIN