

Food Eco-design methodological guide and its application in plant-based snack development

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Introduction

The food industry has an important role to play in taking action on sustainability issues, since food production methods major affect the environmental performance. Most environmental improvement tools and methodologies establish general guidelines for action without actually setting out a specific application procedure for companies. For this reason, CNTA, in collaboration with EURECAT, has developed a food Eco-design methodological guide for the food industry, based on the IHOBE Practical manual of Eco-design, to assist and optimize the design of their products by integrating environmental considerations.



Figure 1. Food Eco-design guide

Aim

Aligned with the development of healthy and sustainable new food products, the current study has developed an Eco-design methodological guide to be applied by food manufacturers within the scope of the EU PRIMA SWITCHtoHEALTHY project. Specifically, a case study with Delafruit S.L.U., a healthy food manufacturer involved in the project, will be used to discuss Eco-design criteria applied in the new food product development process to optimize the design and mitigate the environmental impact of the industrial processes

Methodology

Eco-design can be defined as the set of actions aimed at environmental improving a product from its initial design stage. Figure 2 describes the 7 steps followed during the development of this real pilot project. For the present study, the focus was on the selection and integration of the Eco-design strategies (Step 3 of fig. 2) in order to improve the prototype profile.

The strategies applied were based on the Lifecycle Design Strategies wheel tool (fig. 3):

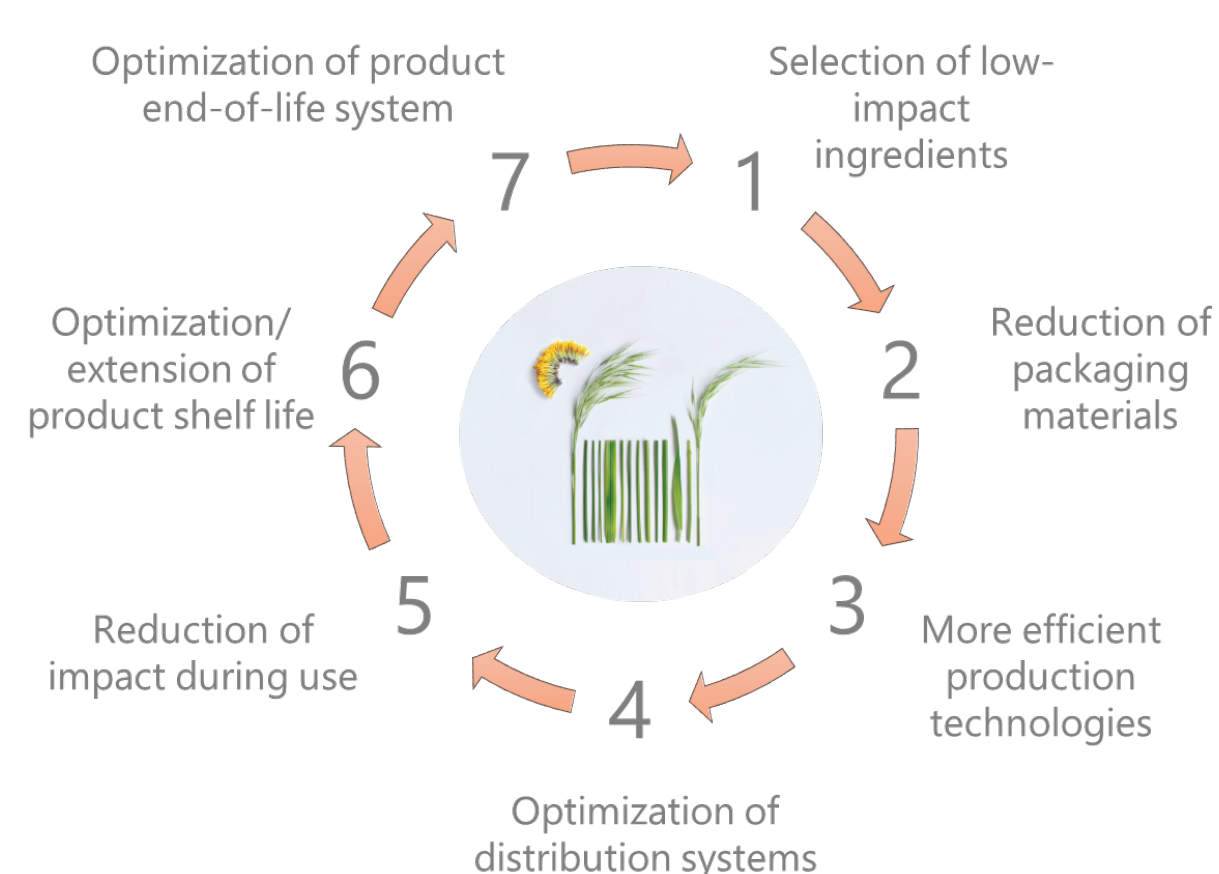


Figure 3. Lifecycle Design Strategies framework



Figure 2. Steps of the food Eco-design guide

Conclusions

- The food Eco-design methodology is in line with contemporary concerns regarding environmental responsibility that food companies must address, giving the rising regulatory measures and heightened consumer awareness regarding their food choices. The developed methodology guide will assist food companies in creating new food products while reducing the environmental impact associated with the manufacturing processes of these products.

References

IHOBE-Sociedad Pública de Gestión Ambiental (2001). A practical manual of ecodesign

Results

The specific Eco-design strategies applied in DELAFRUIT pilot case were based primarily on:

1 Selection of low-impact ingredients

The case study is a healthy, sustainable, and nutritious plant-based snack product ("Fruit juice blend") consistent with the Mediterranean Diet.

For that purpose, the recipe has been adapted to utilise locally produced and available foods aligned with consumers' preferences and trends (fig. 4), such as: switching coconut yogurt to Greek yogurt, promoting healthy ingredients with high content in phenolic compounds (sumac) and vitamin C (acerola), adding nuts and seeds (almond, linsseed, etc.) as a source of healthy fats, and rice, quinoa & chickpeas flour as a source of carbohydrates and proteins.



Figure 4. New food product developed by Delafruit

2 Reduction of packaging materials

- Shift from multi-material to mono-material pouches, which are fully recyclable, as all layer are made of the same type of plastic (PP or PE), which makes sorting easier and lads to cleaner recycling streams.

- Reduction of the amount of plastic material used by substituting the baby cap by a standard cap (fig. 5).



Figure 5. Standard cap (left) vs. baby cap (right)

- Moreover, Delafruit is currently implementing pouch integration in-house in order to reduce considerably ancillary material impact emissions. Concretely, pouch transport footprint contribution has been removed as it is produced in-house with materials nearby manufactory.

3 More efficient production technologies

- Solar panels. A 9% of the total energy consumption is directly consumed from the solar panels on the roof of the industrial building
- Efficient technologies of reduction of water is being used in the production of the Eco-designed pouch, more specifically in the pasteurization stage.

Finally, calibration of selected strategies via pilot scale and validation of corrective interventions are being carried out before scaling-up the strategies to industrial level.

Environmental impact

This dietary pattern have positive effects on both environmental and health outcomes, since MD is plant-rich but does not exclude animal-sourced foods and instead moderates them.

The environmental impact in the different impact categories is reduced, thanks to the use of locally produce raw material as well as the use of packaging produced inhouse. These strategies allow to reduce the emissions generated both in the manufacture of the packaging and of the product itself.

Economic impact

The Eco-designed pouch has a higher cost, due to the type of material, than the reference container.

It is estimated that the extra cost will be largely compensated by emissions, which has a positive long-term economic impact on the company.

Social impact

Higher consumer acceptance due to the minimization of environmental impact and the demand of this type of recyclable packaging. In addition, the image of the product and the company are improved.