

Developing a model of Sustainable Production and Consumption of Cantabrian Anchovies: a case study of Life Cycle Management in the Fish Canning Industry

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ABSTRACT

The aim of this work is to develop an organization, management and marketing model of Cantabria anchovy with environmental considerations in order to obtain environmental sustainability by improving the efficiency of use of raw materials, waste reduction and recycling, utilization and enhancement of products, energy efficiency and carbon and water footprint. This production and consumption model contribute to the Spanish Challenges according to the competitiveness of the fisheries sector in national and international markets.

The management model of Cantabrian anchovies allows to inform consumers about the environmental impacts associated with anchovy canning industry by means of Eco labels. In addition, the model allows transmission of knowledge about environmental and socio-economic impacts related to the life cycle of the product to those who make decisions on production, consumption and waste management product, in order to promote better management lifecycle for a sustainable production and consumption.

Keywords: Anchovy, Life Cycle Assessment, Canning Industry, Sustainable Production and Consumption

1. Introduction

The canning industry generates a lot of wastes. In this context, industrial waste management in the food industry is an important environmental problem that requires specific action draft through a comprehensive and coherent policy on the prevention and control of wastes. In addition, the European Thematic Strategy (SEC 2011 70 final) on the Prevention and Recycling of Waste and its relation to the life cycle approach, the Directive 2008/1/EC on Integrated Prevention and Pollution Control (IPPC), the Integrated Product Policy (IPP) (SEC (2009)1707 final) and the Strategy on the Sustainable Use of Natural Resources can help promote more sustainable production and consumption models based on the life cycle approach and the participation of stakeholders.

The fishing industry for Cantabrian anchovy (*Engraulis encrasicolus*) is one of the main economic resources of the fleet of the Cantabria Region. According to CONSESA (Association of Manufacturers of Canned Fish of Cantabria Region), in 2,012 there was a production of 13,267 tons of canned anchovy, equivalent to more than 91 million euros.

The Anchovy caught in the Cantabrian Region is intended for direct human consumption either in the form of fresh fish, or to production of canned anchovies in oil. The usable of the fish for food is between 60% and approximately 70%. An important amount of waste streams occurs mainly in operations heading, gutting and packing. Taking into account that 40% of the weight anchovy captured just as waste, it is estimated that nearly 9,000 tons of this resource are wasted and also a lot of waste effluents (mainly water and oils) are obtained.

According to this, it is necessary a sustainable Cantabrian anchovy industry taking into account local considerations for global development. In this sense, it is necessary to design and implement strategies for sustainable management of Cantabria anchovy industry under a life cycle approach. These strategies will be focused mainly on increasing the utilization of wastes from anchovy production to obtain co-products with higher added value that can be allocated to new green markets. This new development is based on the application of tested methodologies (Life Cycle Analysis, Best Available Techniques and Eco-labels).

The canning industry uses a variety of types of packaging of different sizes and materials. Packaging the final product requires metallic packaging or glass packaging, with or without secondary packaging. After consuming the product, the packaging (which contain one part oil) should be managed appropriately. Directive 94/62/EC aims to limit the production of packaging waste and promote recycling, reuse and other forms of recovery of waste. In this context, it is very important the prevention and proper treatment of all waste generated in the lifecycle of the canned anchovy, including packaging.

The European Commission Joint Research Center developed a new method to calculate the environmental performance of a product based on LCA methodology. It has also developed the Single Market for Green Products to ensure that consumers are not confused by the environmental unclear information. In this sense, the pre-

sented methodology has as one of its main objectives developing a Product Category Rules (PCR) for the creation of an Environmental Product Declaration (EPD), which establishes the principles for communicating the environmental performance, such as transparency, reliability, completeness, comparability and clarity of the product. According to this, it is possible to promote the supply and demand for more sustainable products.

2. Proposed Model

The mode will be based on the concept of "with science and society". The methodology will be focused on the needs of society. In this sense, will be consider to governments and their representatives, businesses, social organizations and citizens. Figure 2 shows the diagram of the proposed model and the Life Cycle Approach on the proposed model.

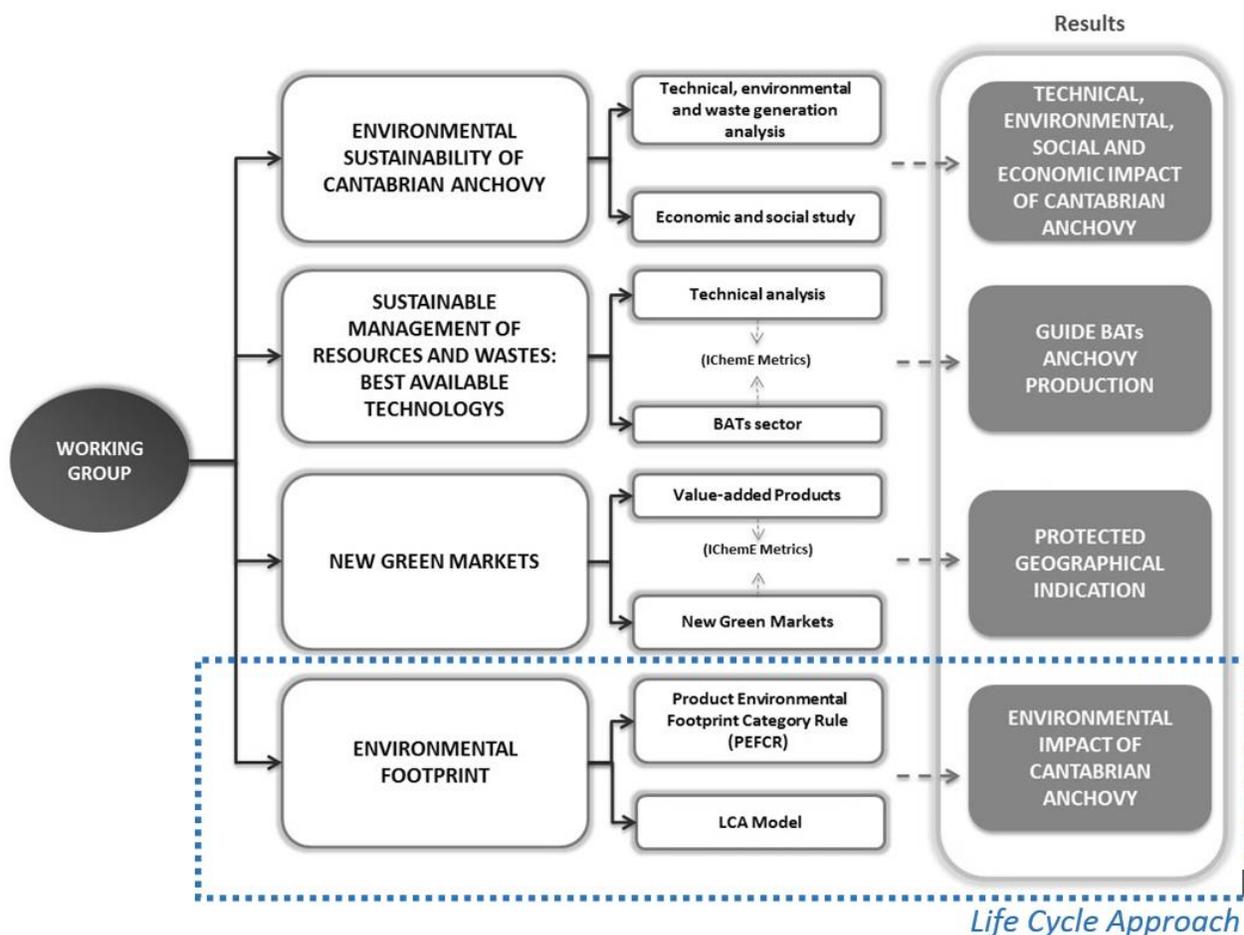


Figure 2. Diagram of the work methodology. Life Cycle Approach on the proposed model.

The main objective of the proposed model is to design and implement strategies for sustainable management sector of the Cantabrian anchovy under a vision of the life cycle. These strategies will mainly focus on increasing the use of generated waste effluents, in order to obtain co-products with higher added value that can be allocated to new green markets. The model will base on the application of tested methodologies (Life Cycle Analysis, Best Available Techniques, Ecodesign and Environmental Footprints) (Avadí and Fréon 2013; Ayer et al. 2007; Azapagic 1999; Pelletier et al. 2007). On the other hand, the methodology will base on the opinions and experience of industry representatives. This working method aims to apply the principles of the Integrated Product Policy (IPP) and the Politics of Sustainable Consumption and Production of the European Union, so that the conclusions reached in the process can be useful in a possible process to review these policies, both nationally and internationally.

The main objectives are:

- Contribute to the sustainable development of the canning industry of Cantabrian anchovy, by promoting the supply and demand for products that respect the environment throughout its life cycle.
- Promote the competitiveness of Cantabrian anchovy by promoting the efficient use of natural resources and exploitation of waste streams and using appropriate recovery systems for subvalue-added-products. This competition necessarily involves the application of Best Available Techniques in the fishing and processing of anchovy and proposed solutions to overcome barriers to implementation. The BAT's are necessary to evaluate in order to assess environmental, economic and social impacts. This work considered the environmental sustainability metrics developed by the Institution of Chemical Engineers (IChemE) that give a balanced view of the environmental impact of inputs-resource usage and outputs-emissions, effluents, and waste (Tallis et al. 2002).
- Disseminate to stakeholders (companies, government agencies, consumer organizations) valuable and updated information about the environmental impact and socio-economic development of fisheries and canned anchovy. In particular inform consumers about the environmental impacts associated with anchovy canning industry and its derivatives through the use of reliable eco-labels based on the methodology of Life Cycle Analysis (LCA).
- Optimize the final product packaging for marketing, analyzing the transformation process of the anchovy (sewage, oils, packaging waste and fish waste). It is necessary to develop the Product Environmental Footprint Category Rule (PEFCR) for the sector of anchovy, which would be used later to help consumers distinguish seafood and more respectful canners with the medium environment throughout their life cycle. Similarly, the development and dissemination of Footprint pursued.
- Monitoring and implementation of environmental legislation within a local and regional basis.

To achieve these broad objectives, will be held the following specific objectives:

- Coordination and Consultation Sector, including stakeholders.
- Environmental, economic and social Life Cycle Assessment of Cantabria anchovies. Updated and detailed analysis of environmental, social and economic sector.
- Sustainable management of resources and effluent canning Cantabrian anchovy: Analysis and Application of Best Available Techniques (BATs)
- New markets for canning Cantabrian anchovy.
- Environmental Footprint of Cantabrian anchovy.

3. Life Cycle Approach of the Proposed Model: Combining Type I and Type III Eco-Labels

Eco-labels are used by manufacturers and distributors to provide information about the environmental performance of their goods on a voluntary basis. When accurate and relevant, this information should help consumers to identify those products and services of the market with lower environmental impacts. In order to avoid impact shifts between different categories or life cycle stages, a life cycle approach should be applied when defining the rules for awarding eco-labels. Currently, only Type III eco-labels (or Environmental Product Declarations, EPDs) require that a LCA study of the product is undertaken following specific predefined calculation rules (named Product Category Rules, PCR). However, the technical and detailed contents of EPDs make them better suited for professional purchasers rather than final consumers, which may have the time and competence to understand their contents. On the other hand, Type I eco-labels are easier to understand, however the extent in which LCA methodology is followed in the definition of awarding criteria varies from one Type I scheme to another.

Within this context, the proposed model suggests that anchovies producers first develop an EPD of their products and then, by comparison to average market reference values of the different environmental impact categories (without aggregation), companies award an Eco-label Type I for their anchovies if they satisfy the threshold values. Such scheme, which may be applied to other product sectors, implies that the Eco-label Type I crite-

ria should be based on LCA results of individual products. To this end, average environmental impacts of product categories should be known in advance. Therefore, LCA case studies will be developed for a number of anchovy's producers of the Spanish region of Cantabria in combination with scientific literature in order to define the thresholds values for the Type I eco-label.

Figure 3 shows conceptual scheme of Life Cycle Approach of the proposed model.

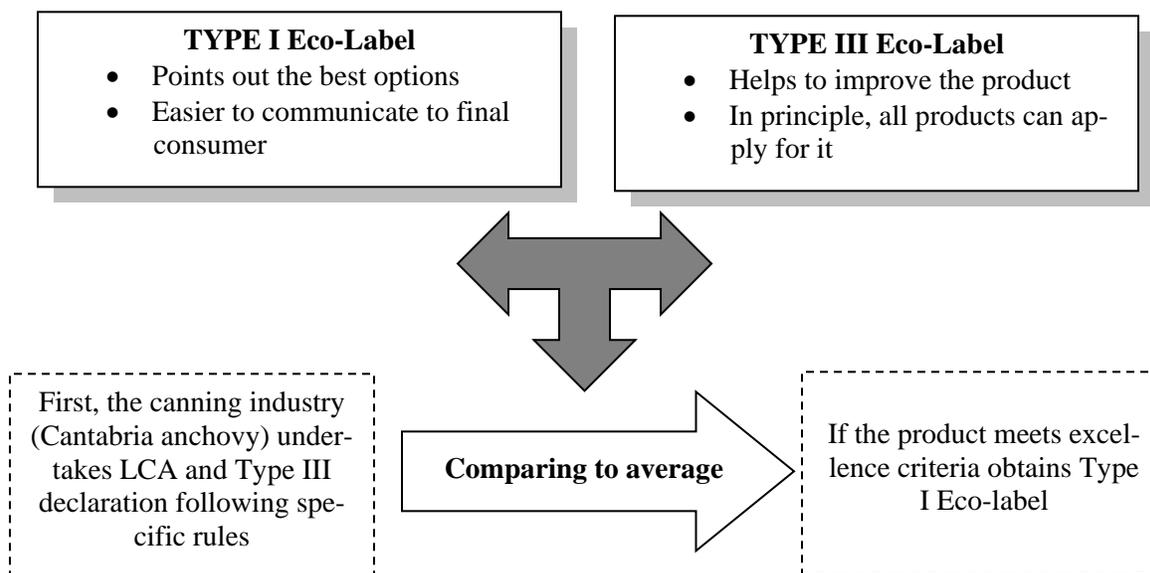


Figure 3. Conceptual scheme of Life Cycle Approach of the proposed model: Combining Type I and Type III Eco-Labels

3.1. Product Category Rules for development of Environmental Product Declarations of anchovy

The Type III environmental declarations, also known as “environmental product declarations” (EPDs), present relevant and quantitative environmental information about the life cycle of products. The information declared is based on an independently verified Life Cycle Assessment (LCA) study undertaken according to specific rules (i.e. Product Category Rules, PCR) developed in the framework of ISO 14040-44 and ISO 14025 standards. As stated in ISO 14025, the previous PCR document on fishery products will be taken into account, as well as previously published LCA studies on anchovies. In addition, we will be develop LCA studies of the products of local canning industries and the consultation with stakeholders of the Cantabria region that will allow gaining the required in-depth knowledge to develop a PCR document suitable for the Cantabria canned anchovies.

3.2. Definition of the environmental thresholds for the Type I eco-label

The Type I Eco-label requires a benchmark against which each applicant anchovy can be measured. For each impact category, average values can be defined based on the results declared through EPDs. These values should be updated periodically in order to foster the continuous reduction of the environmental footprint of anchovy.

Within the Project, pilot EPDs and LCA studies will be developed in collaboration with canning industries of the Cantabria Region. A comprehensive literature review of LCA studies of anchovies and related products in different parts of the world has been undertaken. Based on this available information, benchmarks will be identified for Cantabria canned anchovies for the following impact categories and indicators: global warming, water use and (fossil) primary energy consumption.

3.3. Expected Results

The development of the Product Category Rules and the definition of the environmental thresholds will be subject to external review by canning industries and other stakeholders belonging to the advisory group of the project. A number of seminars will be held with them to discuss key assumptions and methodological decisions, so as to achieve the widest possible agreement and contribute to the advancement of the state of the art in the LCA of canned anchovies.

Both the developed Product Category Rules and environmental thresholds for awarding the Type I eco-label will be tested for a reduced number of canning industries of the Cantabria Region. EPDs of Cantabria anchovies will be produced as pilot case studies within the Project. In addition, a PCR document will be available for its application in further cases.

With minor adaptations, the outcomes of the project could be transferred to other producing regions.

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