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A case study on the application of Product Social Impact Assessment to the agri-food sector: ready-to-eat beetroot.

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Abstract

The main objective of this study is to apply the Product Social Impact Assessment (PSIA) handbook to a case study. The method used to quantify the social impacts is to identify the stakeholders and the social topic, indicators, and then to apply the impact analysis method. Social studies identify the retailing stage as the phase with the greatest social risk in the life cycle followed by the product transformation phase. However, the infeasibility of focusing this study on the multiple companies involved in the commercialization, led the processing stage company to be chosen as the central part of the study. The preliminary evaluation of the social topics of the stakeholders, presents an average of +0.88 points on the level scale (-2 to +2), which positions the company beyond the generally acceptable situation, in continuous improvement.

Keywords: PSIA, Social LCA, employment, local community, sugar beet, food.

1. Introduction

Consumers are increasingly concerned about the conditions under which products are sourced and produced and whether their purchase leads to undesirable social and environmental impacts. This encourages companies to align their practices with the public's priorities [4]. To address these social issues, companies adopt the concept of corporate social responsibility (CSR), which in most cases is limited to complying with the obligations imposed by enforced laws [5].

This is why there is a need for techniques that provide effective and forceful impacts on the decision-making processes. One of them is the social life cycle assessment (S-LCA), which collects, analyses and communicates the current and potential social impacts associated with processes, products and services throughout their life cycle [6]. Another one that emerged from the Product Social Metrics Roundtable to develop a method and to align companies through a shared and collaborative process is the Handbook for Product Social Impact Assessment [7], which proposes a harmonized method that organizations can apply to assess the social impacts of products or services.

Both methodologies are applied in different studies to demonstrate the usefulness of social analysis, **Table 1** shows a scarce collection of studies on PSIA in different products and S-LCA in the agricultural sector.

Table 1. Key papers on Social LCA and PSIA.

References	Functional Unit	Methodology	Impact Categories evaluated	Results of the methodology evaluation
[1]	0.16 ha of agricultural products: Rice, Sugarcane and Cassava.	- The guidelines of S-LCA (2019).	- Social indicators wage and employment generation for worker stakeholder group.	- The proposed method is applicable to all crops studied although modifications are needed to provide more comprehensive results. For example, social aspects such as woman empowerment, cultural heritage and delocalization will be included.
[2]	One run-on-flat tire mounted	- PSIA developed by Roundtable (2013).	- Social topics indicators were assessed the worker stakeholder group.	- The implementation of the PSIA quantitative method illustrated the necessity to have a referencing step in order to interpret the results. The evaluation can be practical and feasible and can deliver meaningful results for supporting decision making processes in a company.
[3]	Preservatives for meat products used for Listeria control.	- PSIA developed by Roundtable (2019).	- Social indicators Health and safety for users stakeholder group.	- The PSIA provides a structured approach to identify the social impacts of a product on users. However, for a company like Corbion that deals mostly in the business-to-business segment, the Performance Indicators (PIs) for users were hard to apply for the origin of the product.

2. Methodology

This evaluation is based on the procedures described in the Product Social Impact Assessment (PSIA) [8]. This heading corresponds to the definition of goal and scope described in the PSIA Handbook.

2.1. Goal definition.

The goal of this study is to analyse the potential social risks and benefits of the value chain impact of the cooked and vacuum-packed vegetables.

2.2. Scope definition.

This research aims to assess the social impact of cooked (ready-to-eat) and vacuum-packed beetroot products, from the cultivation, the processing of the product to the use and end-of-life phase.

2.2.1. System description.

2.2.1.1. Materiality assessment.

The beetroot is a field-selected and conditioned product. Once in the processing plant, it is peeled, receives a gentle heat treatment and is vacuum packed, with a shelf life of up to six months. Nutritionally, it is characterised by its low calorie, saturated fat and salt content. It is an important source of folic acid, potassium and betaine [9].

2.2.1.2. Economic assessment.

Table 2 shows the distribution in percentage of the added value of the product provided by a processing company for the year 2021 for a 500 g beet package. The value of transport was not available from the company, so it was consulted in the observatory of road transport cost [10], being 2 cents per kg of product.

Table 1. Description of each stage and process of the beet life cycle with the agents involved in the value chain, and the percentage of economic contribution.

Stage of system	Organizations	%
Production of raw materials: **Beet cultivation**		11 %
Manufacturing / Processing: **Vacuum-packed cooked and peeled beets**		25 %
Packaging		3 %
Transportation: **Distribution to retailer**		1 %
Retailing: **Shops and supermarket sales**		60 %
Use phase: **User consumption**		-
End of life: **Composting & Recicling**		-

2.2.2. Functionality and functional unit (FU).

The FU is 1 kg of vacuum-packed cooked beetroot product, ready for consumption.

2.2.3. Life cycle structure and system boundaries.

Product category rules (PCR) 2019:10, for prepared and preserved fruit and vegetable products, including juice, is used as a guide to define the stages of the surveyed study.

2.2.3.1. Companies and organizations.

There is a network of companies composed of a growing number of independent companies that collaborate in a common project: the production of precooked vegetable products. The companies in the network operate together along the entire value chain, from the initial stages of cultivation, and farming, through the various stages of industrial processing, until the product reaches the point of sale (**Table 2**).

2.2.4. Social impact assessment methodology.

For an effective application of PSIA, a preliminary analysis is needed to recognize the hotspots in the studied system and to identify the stage that needs specific data collection. This preliminary analysis is performed with:
- The Social Hot Spot Database (SHBD), which compares the demand for goods and services to their social risks, based on several indicators measured in hours of average risk.

- The LCIA Social [11] Method 2 V2.00 / Standard. This method collects information on 18 social issues, classified into 5 categories: Vegetables, fruit, nuts; Food products nec; Chemical rubber plastic products; Transport nec and Commerce. Based on the economic analysis described above, the simulation was performed in SimaPro. Costs for each sector were converted from 2020 to 2002 (SHDB unit).

- The input-output analysis is characterized by assessing the relationship between economic activities and an indicator. In this study, a social indicator takes the entire production chain into account. It uses the economic inventory already described, the EXIOBASE 3.4 database and its social indicators: total hours of employment and vulnerable hours of employment.

2.2.5. Selection of stakeholder categories and social topics.

Social topics and stakeholders were chosen based on a previous social study which used economic data to focus the study on the stage of greatest social risk. Five Sustainable Development Goals (SDGs) from the 2019 sustainability report of the company in charge of product processing were linked to the social topics of the PSIA 2020 Manual, resulting in the selection of the following social topics per stakeholder group:

- Workers: Health and Safety, Fair Salary, Hours of Work, Discrimination, Freedom of association.
- Users: Health and Safety and Responsible communication.
- Local community: Community Engagement and Economic Development.

3. Results and discussion

3.1. Life cycle inventory.

The economic inventory was obtained from the collection of data from the processing company and from bibliographic sources. Table 2 shows that the retailing stage is the one with the highest economic contribution (60%), but also the most difficult to evaluate, as it involves a very large number of companies. The next stage with the highest contribution (25%) is the transformation carried out within the company.

3.2. Social input-output assessment.

Figure 1 shows that the stage that mobilises the most working hours is retailing (67%), followed by the production process (18%). These results are in line with the distribution of value added used for the definition of the economic inventory. However, if the focus is put on vulnerable working hours, the impact of retailing decreases significantly (to 43%), while the relevance of the processing stage increases to 40%. The highly insecure and vulnerable type of work increases at this stage due to the fluctuations of the economic cycles linked to the seasonality of the production rhythms in the processing plant.

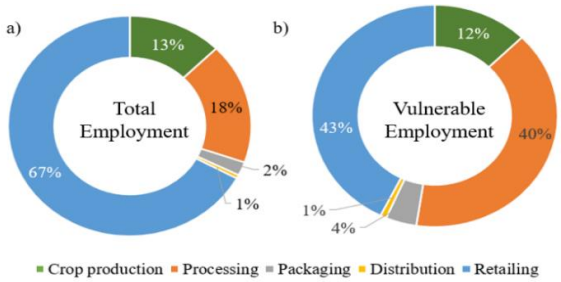

Figure 1. Contribution of the value added by each product to the labour hours employed (a) and the vulnerable labour hours (b), in each stage of the life cycle.

3.3. Social hotspot assessment.

As shown in **Figure 2,** again, retail, crop production and processing are the most socially risky stages in all impact categories. According to this assessment, the toxics and hazards, injuries and deaths, and migrant labour categories contribute the most to social impact risk throughout the product life cycles.

3.4. Social impact assessment.

Table 3 shows results of the social topic assessments of the company, using the methodology PSIA on workers, users and local communities, comparing the specific situation of the company with the general situation in the country (Spain).

3.4.1. Workers. The assessment of the health and safety category is established as +1, considering that the company has a management system for occupational health and safety compliance and risk. The monthly incident rate of accidents at work (National Institute of Statistics) is 83% lower in the company compared to the values reached in the manufacturing industry. Fair salary assessment is given a score of +1, because the salary conditions in terms of minimum wage in the company are 11.2 % above the minimum wage in its sector and the hourly hazard bonus is double what is established in the collective agreement for the sector.

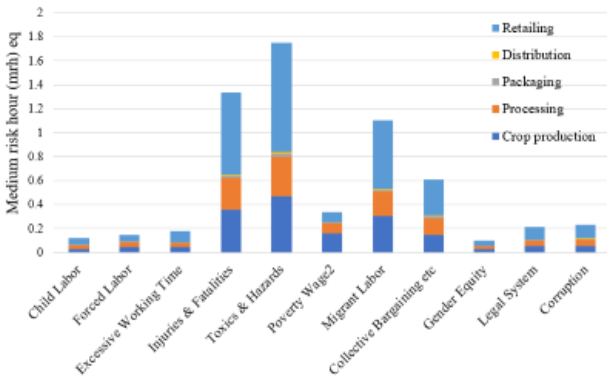

Figure 2. Medium risk hour for each social category at each stage of the life cycle.

The hours of work category score is 0. The company has a management system in place that promotes a healthy work-life balance but aspects such as the number of working hours per year is only 2 % lower than the number of hours laid down in the collective agreement (1776 h). Discrimination assessment is +1. The company complies with the requirements of the law and presents public reports with positive results from a non-discrimination management system. 64 % of the company's employees are women vs 37.5 % in the food industry nationwide. Regarding workers' freedom of collective bargaining assessment, it is +1, because the company complies with the law and no preventing freedom of association have been discovered.

3.4.2. Users. In the health and safety category, the following are considered: the product is sterilised; complies follow food safety requirements; they sell a vegetable product; they do not use additives with three approved nutritional declarations, and the product is easy to use and ready to eat, which facilitates its consumption and has a favourable influence on the health of the population. The company also holds the IFS and BCR food safety certifications. Therefore, the score in this category is +1. Responsible communication has a rating of 0, because it complies with the national labelling standard but claims made in marketing and product literature about performance and sustainability are not shown to be supported by scientific evidence and are not publicly reported.

3.4.3. Local communities. The company's economic development rating is +2 because there are reports and publications that describe the public private partnership, job creation and the investments in the local community. 100% of the main suppliers are national and promotes the development of the local economy through the organisation of events such as an annual national music festival held in the town.

4. Conclusions

- Although the economic inventory and the input-output analysis in terms of total employment indicate that the life cycle phase with the highest social risk is the retail

Table 3. Social topics assessment of the company.

Stake holders	Social Topic	Scale level	*Performance indicator	Reference indicator	Reference	Scale Level
Workers	Health and Safety	Working health and safety conditions are adequate, and risk prevention conform to the law.	• The company has a management system to improve the working culture, beyond an acceptable level and shows tangible results of these efforts.	Protection of workers health through risk prevention.	[12]	1
	Fair Salary	All workers are paid at least a living wage for a standard family.	• Audited statements from the company provide evidence that this condition is fulfilled.	Minimum salary 14929 euros per year.	[13]	1
	Hours of Work / work-life balance	The company has a management system in place to enforce the policy on work-life balance.	• Documents are available that explain and enforce the rules that provide a work-life balance.	1790 h per year	[14]	0
	Discrimination	The company has a management system in place to enforce the non-discrimination policy.	• The company has a management system in place that pro-actively promotes non-discrimination in its organization.	Right to equality and non-discrimination	[15]	1
	Freedom of collective bargain	The company informs workers of decisions, before they are taken and listens to the workers in negotiations.	• Statements from workers, unions and others show that the company put in practice a mechanism of communication with the workers.	Right to freedom of association.	[16]	1
Users	Health and Safety	The company has a dossier of the product successfully designed to create a maximum contribution to health and safety of the user.	• The product developers have a verifiable audit trail on the efforts and decisions to optimise the health and safety of the user.	Ensure food safety	[17]	1
	Responsible communication	Products information is made according to regulations in the country of sale and the company adheres to accepted principles.	• There is an absence of complaints in consumer reports or authorities that oversee consumer rights.	Right to guarantee adequate information	[18]	0
Local community	Economic development	The company invests in public private partnerships or invests in the local community, creating new jobs in the region.	• Reports or publications exist that describe the public private partnership and the investments.	-	[19]	2

+ 2 = Best in class, continuous improvement	+1 = Beyond generally acceptable situation, continuous improvement	0 = Generally acceptable situation	-1 = Unacceptable situation but improving	-2 = Unacceptable situation, no improvement

*Source: Company webpage and Sustainability memory 2019.	Average	0.88

phase, it was unfeasible to carry out PSIA at this stage due to the large number of different enterprises involved. However, the input-output analysis revealed that in terms of vulnerable employment, the transformation phase is a critical one, with a contribution of 40% despite being responsible for 18 % of total employment.

- The preliminary assessment of stakeholder social issues for the vacuum-packed cooked beetroot product indicates an average score of 0.88 on the PSIA level scale of. This score places the company ranking over the generally accepted level and is continuous improvement.
- With regard to PSIA as a new tool for social analysis of the sustainability of the value chain, the methodology makes it possible to detect and analyse the origin of points of social conflict and the actors involved, as well as to help determine the measures needed to improve the social impact of the company. The main difficulties encountered in the application of PSIA have been the establishment of the reference framework (national, provincial, sectoral), the selection of indicators and the availability of open company information, especially in some of the social topics.

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