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A sustainable business model to fight food waste

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ABSTRACT

Food waste is major problem in developed countries, with the latest studies pointing to one third of the food produced worldwide. This problem occurs throughout the food value stream and has economic, environmental and social consequences. This study focuses on a solution developed in Portugal for a specific type of waste, vegetables and fruits discarded by farmers due to aesthetic reasons. Although with the same quality, their appearance is not within the requirements set by the main retailers and therefore not commercialized and consumed. The project developed to tackle this problem is a non-profit co-op, called Fruta Feia (Ugly Fruit) that commercializes this type of products that farmers cannot sell through the conventional channels. Tested successfully in Lisbon region, is now being replicated in Porto region. This study aims at assessing the sustainability of this project and its business model regarding the three pillars of sustainability – economic, environmental and social. For this, Life Cycle Assessment, investment appraisal, Social-Life Cycle Assessment and Social Return on Investment methods are used and compared, aiming also at the discussion of the key success factors of Fruta Feia project. Results showed not only the sustainability of the project, but also the suitability of the methods applied to assess the sustainability of a business model.

1. Introduction

About one third of the food produced in the world every year is wasted. According to Food and Agriculture Organization (FAO), developed countries waste more than 1.3 thousand of million tons of food every year, enough to feed 795 million people that are starving worldwide (Gustavsson et al., 2011). The scale of the problem is attracting increasing attention due to its environmental, social and economic impacts. In fact, this waste is not only unethical but also carries environmental and economic consequences: it involves the unnecessary use of resources in its production - if less food were wasted, fewer resources would be required to produce food that is not consumed (Thyberg and Tonjes, 2016). Furthermore, depending on the waste management system, food waste may go to landfills where is converted in methane, a greenhouse gas with a global warming potential 25 times greater than carbon dioxide on a 100-year time scale. Economically, food waste has a direct and negative impact on the income of farmers and consumers. Improving the efficiency of the supply chain can reduce food cost, increase food security to consumers and create opportunities for new business fields (Papargyropoulou et al., 2014). From an ethical perspective, Cicatiello et al. (2016) emphasized the paradox of the excess of daily calories in countries like Italy, Poland, Portugal and Lithuania where, at the same time, there is a remarkable quota of the population living in poverty conditions. Parfitt et al. (2010) refers that the waste or diversion of food from human consumption is seen as immoral. Food waste is therefore a triple bottom line problem, affecting “people, planet and profit” (Elkington, 1997).

A comprehensive study by Papargyropoulou et al. (2014) analysed the food supply chain to understand the causes of food waste, defined the environmental, financial and social implications and suggested both the adoption of a sustainable production and consumption approach and the reduction of food surplus and waste throughout the global food supply chain.

Thyberg and Tonjes (2016) identified the main drivers for food loss and waste as infrastructure limitations, climate and environmental factors, quality, aesthetic or safety standards, together with decisions made by consumers and businesses. These latter two causes of food waste are connected, as the preference for “perfect” fruits and vegetables have fostered consumers and businesses to remove non-standard food from the supply chain, though that food is suitable for human consumption. Such preference results in a

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waste of about 30% of what's produced by farmers. Gustavsson et al. (2011) published a FAO report stating that significant food loss and waste occur early in the food supply chain and identified appearance quality standards as a cause. In industrialized regions, namely Europe and North America, the agriculture production phase dominates the losses in the fruits and vegetables commodity group. These losses are mostly due to the postharvest grading imposed by retailers, which, particularly supermarkets, out grade some food due to rigorous quality standards concerning weight, shape, and appearance. The quality and aesthetic standards are higher in developed countries with high living standards. Thi et al. (2014) reported that food waste per capita in developed countries is 107 kg/year, while in developing countries is almost half, 56 kg/year. Willersinn et al. (2015) also identified both consumer preferences and quality standards imposed in European countries as causes for food losses at the producers' level. In fact, EU has decreased the number of products with aesthetic standards from 24 to 10 in 2008 in order to invert this problem (Commission Regulation (EC) No 1221/2008). However, the main distributors still demand strict aesthetic standards to their suppliers. Although these standards are often cited as being responsible for high losses, very few quantitative studies were found. ADEME (2016) developed a study on food waste in each stage of the value chain, quantifying 32% of the losses at primary production. Berkenkamp and Nennich (2015) published the findings of interviews with Minnesota producers, identifying the problems of the industry standards regarding aesthetics and quantifying the problem in the producer's view.

Given the implications that food waste has in the three pillars of sustainability, sustainable business models can provide an answer to reduce the problem. A sustainable business model follows a sustainable economy, encouraging the minimization of consumption and maximizing societal and environmental benefit, rather than prioritising economic growth (Bocken et al., 2014). Boons et al. (2013) states that fundamental changes are required and value propositions need to be defined in categories other than purely economic ones. Sustainable development has recently fostered organizations to change added values, policies and practices, and Matos and Silvestre (2013) stressed “the need to address economic, social and environmental factors while preserving the needs of future generations”.

The scale of food waste implies that business as usual can no longer be an option. Although most studies are focused on waste management and households waste, some suggestions and recommendations can be found in literature regarding trends to follow for a sustainable food production and consumption. Parfitt et al. (2010) identified the consumers’ high expectations of food aesthetic standards and their increasing disconnection with the producers as aspects to tackle. Cicatiello et al. (2016) provided a literary review addressing the main strategies to follow, in which the creation of markets for sub-standard products and direct sales to consumers are the most stated. Mourad (2016) analysed several solutions for food waste in terms of prevention, recovery and recycling, pointing the problem of competing solutions and concluding on the importance of prevention as the most sustainable ones. In line with these strategies, a project developed in Portugal fights food waste since 2014 by adding value to edible fruits and vegetables that would be discarded from conventional supply chains due to aesthetic standards. With a sustainable business model, a co-op was created to buy “ugly” fruits and vegetables from local farmers and to sell them directly to consumers. This model has been successfully tested and replicated in the city of Lisbon, fostering a sustainable production and consumption in the three pillars of sustainability. This study analyses the economic, environmental and social impact of this project, called Fruta Feia (Ugly Fruit), and discusses the success factors of this case study. The first part of this paper presents the project and the business model sustaining it by using the Triple Layer Business Model Canvas (TLBMC). The economic sustainability is then assessed by the products life cycle cost (LCC) and profit margin, and by an investment appraisal of the project. In parallel, the environmental assessment is also presented for each of the “ugly” products using the Life Cycle Assessment (LCA) methodology. The social impact of the project is shown by analysing the project through the Social-Life Cycle Assessment (S-LCA) methodology. Finally, the project is assessed through the Social Return on Investment (SROI) method, which includes three dimensions of analysis by monetizing the economic, environmental and social value created. With these analyses some conclusions are drawn regarding the key factors that contributed for the success and growth of the project, along with the potential of this type of projects to reduce food waste in a meaningful scale. This approach with multiple methodologies also provides a comparative analysis on the advantages and disadvantages of each method at assessing the sustainability of new business models.

2. Means and methods

This section presents the means and methods proposed to assess the sustainability of Fruta Feia business model. The case study is described regarding the goals of the project and functioning of the business model, making use of a variation of the original Osterwalder and Pigneur (2010) business model Canvas, where the social and environmental layers are added to the economic one. This variation is called Triple Layer Business Model Canvas and allows extending the narrow profit-driven original business model approach to incorporate the other sustainability pillars. Following are described the methods to assess each layer of the Canvas in a quantitative way.

2.1. Fruta Feia case study

Fruta Feia is a non-profit co-op founded in 2013 by a group of individuals who became aware of the food waste problem in the production stage due to aesthetic reasons. Therefore, the main goal is reducing tons of good quality food that are thrown back to the land by farmers every year due to this reason. The co-op buys directly these products to the farmers and sells them in delivery points to consumers, associated with the project (associates). This prevents unnecessary use of resources on their production, such as water, land, energy and working hours. By changing consumption patterns, this project intends that in the future all quality fruits and vegetables are marketed equally, regardless of their size, colour and shape. In almost four years of operations and growth, the project has saved in Lisbon and Oporto around 600 tons of fruits and vegetables from being wasted. The project management is horizontal, with all partners participating in the main decisions.

Alongside this local impact, the project fosters the awareness of the population to food waste problem, as well as to the fact that “ugly food” can be of good quality. This enables people to have access to food that is cheaper and produced locally. The farmers increase their efficiency with the creation of value for products until now with almost none and thrown away. This is the key novelty of Fruta Feia - not only avoids waste, as other projects aim, but also creates value to “ugly” products. For a better understanding of the “ugly” products, some images are shown in Appendix A.

The qualitative and quantitative data required for the sustainability assessment of this project and its business model was gathered by means of observation of the co-op current activity and by accessing its documents and databases, together with interviews