

Transitioning to Circular economy: How do business models evolve? Comparing companies in the food industry

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Abstract

FAO has estimated that approximately one-third of global food production is wasted each year across the food supply chain, equivalent to approximately 1.3 billion tons of food, worth 1 trillion dollars. In addition to economic losses, food waste contributes to increasing global greenhouse gas emissions and unsustainable use of water, land, and energy. To respond to the societal need to reduce food waste along the supply chain, circular business models have emerged to replace the linear “take-make-dispose” models. As a result, many initiatives have been established to use resources and to prevent waste via optimizing residual streams.

The case presents evidence from the food industry. This seems an ideal setting, given the great need to minimize food waste and loss both for societal and economic reasons. The megatrends impacting the food industry are described, along with a presentation of the characteristics of the food supply chain and CE approaches in agri-food. This will serve as a basis to better understanding challenges and opportunities provided by the external environment leading to potential strategic decisions faced by industry managers. Then, six short cases with stories of companies in the food industry that have implemented Circular Business Models are presented. The short cases serve as a basis for reflecting on the main problem faced by managers willing to move towards such models: How can one plan for the best transition to the Circular Economy and, given the importance of working together, how can one set up a successful collaboration?

Introduction

FAO has estimated that approximately one-third of global food production is wasted each year across the food supply chain, equivalent to approximately 1.3 billion tons of food, worth 1 trillion dollars. In addition to economic losses, food waste contributes to increasing global greenhouse gas emissions and unsustainable use of water, land, and energy. To respond to the societal need to reduce food waste along the supply chain, circular business models have emerged to replace linear “take-make-dispose” models. As a result, many initiatives have been established to use resources and to prevent waste via optimizing residual streams.

The Circular Economy (CE) paradigm represents an additional goal for firms. On one hand, firms have to achieve greater efficiency, safety, and flexibility, which is important for their economic results in a globalized market; on the other hand, they need to move towards reaching ecological and social goals so their businesses can be developed more sustainably. These two goals are linked and tend to mobilize the same set of company resources, which makes the orchestration of resources more complex. The need to accomplish two competing goals at the same time – and the more complex orchestration of company resources – have led organizations to redesign their operations and their business models (BM), in order to be able to accentuate, create, deliver, and capture economic value. When shifting towards Circular BMs, organizations need to design business processes in a way to facilitate material flow throughout the supply chain and to close the loop of resources (Brown et al., 2018; Bocken et al., 2014). In this light, in order to achieve a combined set of goals, profitability and sustainability, organizations have to rely on external collaborations. The complexities of current markets and the collaborative inter-firm dynamics sustaining Circular BM (CBM) also require trust among parties, strong managerial commitment, and information sharing routines. These are the success factors for value-chain collaboration when it comes to the new circular economy paradigm.

In the following pages, the megatrends impacting the food industry are described, along with a presentation of the characteristics of the food supply chain and CE approaches in agri-food. This will serve as a basis for better understanding challenges and opportunities provided by the external environment influencing the potential strategic decisions faced by industry managers. Then, six short cases present the stories of companies in the food industry that have implemented Circular Business Models. The short cases serve as a basis for reflecting on the main problem faced by managers willing to move towards such models: *How can one plan for the best transition to the Circular Economy and, given the importance of working together, how can one set up a successful collaboration?*

Megatrends in Agri-food: the Need for New Business Models

The agri-food industry is headed for a radical transformation, following major global megatrends, i.e. demographic evolution, new geopolitical equilibriums, technological shifts, and the digital economy, GRIN technologies (Genetic, Robotic, Information and Nano processes), and environmental sustainability, which are having a certain impact on food supply and demand (see report of the Barilla Foundation, 2013):

- *Demographic evolution* is related to two main trends: on one hand, the growth of the world population in emerging countries, on the other, the fact that more developed countries are experiencing a shift with a progressive aging of the population and a lower birth rate. The UN Food and Agriculture Organization (FAO) has pointed out that the world's population is expected to grow to 8 billion by 2025 and to reach 9.7 billion by 2050 (FAO, 2013).
- These socio-demographic trends are driving changes on the socio-economic organization of different countries and are also impacting the need to manage resources to meet increasing demand and affecting consumer preferences and nutrition choices. First and foremost, population growth will require world food production to increase by 70% (Alexandratos & Bruinsma, 2012), which can be moderated by a significant reduction of food waste across the agri-food supply chain. Second, diverse population groups will dictate new trends in consumption choices, as in the case of the growing segment of consumers over the age of 65 requiring special nutritional options, or the increasing demand for organic foods.
- Migratory flows and urbanization are transforming countries, with a significant impact on *geopolitical equilibriums*: cities have come to play a crucial role. By 2014, 50% of the world population already lived in urban areas. By 2030, the UN projects that the percentage will rise to 60%, and, by 2050, it will reach 70%. Megacities (urban agglomerations having over 10 million inhabitants) have grown from 28 in 2014 to 33 today. The cities that are growing at the fastest pace are especially those in emerging countries, and some megacities are assuming a dominant role on a global level, gradually becoming centers of new development. This fast urbanization has driven issues related to infrastructures, food production, education, housing, employment, migration, and, last but not least, disease control as evidenced by the Covid-19 outbreak. It is also fair to assume that this will have increasing importance in determining eating habits and consumption needs.
- Over the last few decades, it was the dramatic *technological shift* that enabled steady and substantial development on the supply side, but also a shift in consumer preferences and demand. Beyond the spread of devices and connectivity providers, many other technologies lay the groundwork for new developments in the agri-food industry, such as the Information and Communication Technologies (ICT), Big Data Analytics (BDA), Cloud computing, Artificial Intelligence (AI), Cyber-Physical Systems (CPS, mechanisms controlled or monitored by computer-based algorithms), Internet of Things (IoT). In the future, GRIN technologies (Genetics, Robotics, Information, and Nano processes) will play a pivotal role.
- On the demand side, within the digital economy, physical and temporal distances are becoming more loosely defined in the light of “community effects” and “network logics”, pervading every

social and relational aspect. These effects are, nonetheless, mostly related to specific groups that are more apt to adopt technological innovations and whose choices can be influenced by data and information and then shared with others when getting together. Indeed, many opportunities for development in the food industry reside in the capability to diffuse, adopt, and support the development of technological innovations.

- Finally, a major problem has arisen due to this demographic evolution and changing consumption trends: some resources are ever more scarce, highlighting the need for strong *environmental sustainability* in the agri-food industry, ensuring proper quality and a balance in the use of natural resources. The accelerated consumption of non-renewable resources is determining serious risks of loss of biodiversity and the quest for sustainable agricultural paradigms. Water and land use are particularly relevant for the agri-food industry: global water demand is expected to increase by 55% by 2050, and urbanization, along with the need for areas dedicated to food production activities, such as cultivation and tending to livestock, will probably determine land scarcity.
- The industry will have to become more efficient in water and land use by reducing losses and enhancing effectiveness. Indeed, the issue of loss and waste of resources is pivotal. Food loss and food waste happen throughout the supply chain and require particular attention by the different players involved at the various stages. In terms of numbers, in the EU-28, around 20% of produced food is not consumed, due to loss and waste.
- Consumers are also becoming more attentive to environmental issues, asking companies in the industry to be ever more responsible when it comes to environmental protection and product quality.

Some trends have emerged from these forces of change that are impacting the strategies and business models of companies in the sector. Some examples include attention to health, the search for innovation that also respects tradition, the globalization of flavors, a focus on local products, and sustainability. More importantly, for this case study, one major trend is the shift from linear to circular business models.

The agri-food supply chain

The agri-food supply chain is generally defined as the “farm-to-fork” sequence, from upstream to downstream and involving the following actors: farmers, producers, processors, distributors, retailers, and consumers. It is, therefore, made up of a highly heterogeneous set of actors, and it also varies widely across different geographic areas. The agri-food industry, at large, comprises many subsectors, ranging from meat, fish and animal products to grains and seeds, just to name a few. As a further factor of heterogeneity, managerial, economic and technological characteristics vary across subsectors, geographic areas and actors playing at the different stages of the value chain.

Moving away from the supply-chain and looking to the ecosystem, firms involved in logistical, financial, and technical services round out those actors involved in the agri-food industry, along with institutions. Institutions include the relevant ministries, regulatory and administrative authorities (for each country/geographical area), but also international organizations (e.g. Food and Agriculture Organization). Altogether, these players carry out activities related to: (i) production and flow of physical materials (ii) financial flow, (iii) information exchange, (iv) energy flow, and (v) services and process (Matopoulos et al., 2007).

Additionally, the agri-food supply chain, has other unique characteristics, each requiring specific managerial capabilities (Matopoulos et al., 2007): (i) products mainly have a short life cycle, requiring specific operative and managerial arrangements, and are often seasonal. The quality of input varies over time and depends on geography; (ii) operative choices, such as transportation and storage, must be carefully crafted around the typology of product; (iii) traceability and visibility are needed for many product categories, putting pressure on companies to adopt related technologies; and finally (iv) the industry is highly regulated, due to safety and public health concerns, environmental issues, and policy needs.

The complexity of the agri-food set of actors creates a dynamic environment in which collaborations and strong strategic relationships are created. Nonetheless, players along the supply chain tend to have diverse powers, with “weak agents” such as small farmers and consumers being pressured by “strong agents” operating in more concentrated (industrial and retailing) sectors. For this reason, institutions represent a key governance factor of the industry, through the definition of policies that are able to mitigate such processes.

Circular Economy principles and practices in agri-food

Transforming the agri-food industry and improving its sustainability is a challenging task that requires a disruptive change within the system. So far, several innovative solutions have been offered to the industry, for example, the adoption of precision farming, through Information and Communication Technologies, Big Data Analytics and Artificial Intelligence and other digital solutions to enhance efficacy and decrease losses (Annosi et al., 2019); there is also a focus on energy and bio-based transitions to pick up on new opportunities to increase efficiency. Transitioning from linear BMs to circular BMs in the agri-food domain means greatly transforming organizations and their interactions within their supply chain as well as considering the involvement of players from other - distinct - organizations. Examples include the shift to reverse logistics, changing customer/supplier relationships and finding new ways to organize and to market products and services.

The food industry has already gained experience in recovering food processing by-products to create raw materials in other processes (for example: textiles, other foods, paper) and the enhancement of by-products for energy, cosmetics, or pharmaceuticals. Having common goals sets the stage for the adoption of CBMs. These goals are already a priority for farmers, producers, and distributors and are increasingly relevant also in the choice of the final consumer. Indeed, for regulatory and societal reasons, companies are increasingly committed to reducing emissions and the consumption of raw materials, reducing or recovering waste, increasing energy efficiency and the use of energy from renewable sources. The vision of the future is important especially at an early stage as it eases coordination among diverse actors. These commitments assume a strategic importance, as they may become positioning factors for companies and can be pursued in synergy with the other aspects of corporate management.

Many companies are increasingly investing in initiatives and projects based on the circular economy. The following archetypes of business model innovations are often considered (Bocken et al., 2014): (1) optimize material and energy efficiency; (2) create value from waste; (3) substitute with renewables; (4) deliver functionality; (5) adopt a Stewardship role; (6) encourage sufficiency; (7) repurpose for society; and (8) develop scale-up solutions.

Examples of circular business models in agri-food can be found in biogas plants, in which fermenting biomass produces biogas, a methane-containing gas that is generated by a substrate usually consisting of energy crops such as corn, or materials like manure or food waste; or environmental biorefineries, in which waste is added value or recovered, usually with a multi-product approach. These, and other circular BMs might differ in the way they create value and may require diverse organizational forms, but strongly depend on integration among partners and external conditions. Indeed, the integration and collaboration of players is key to the success of a CBM, especially in large eco-systems in which all players have a role: innovators, farmers, companies, consumers, and governments. Exchanges of resources in networks, is essential to closing the gaps, so the social dynamics of collaboration may affect the ability to realize a CBM if the following elements are neglected (i) cultural elements, such as trust development, (ii) collaboration elements, such as cross-functional activities within or between organizations and (iii) strategic elements, such as organizational support for a pilot project (Dania et al., 2018).

Examples of Circular Business Models in the Food Industry¹

The following section depicts six examples of food companies that have implemented a circular business model. Each of them has opted for a different approach, especially in terms of the types of collaboration and business models embraced. The cases illustrate different solutions for the objective of balancing the competing goals of economic growth and environmental protection. Companies that have been established fewer than ten years ago and have a small number of employees (between one and six employees). They all have invested greatly in research and development (R&D) activities to bring up the value of waste from food industry to become competitive products in the market. The product types offered by these enterprises are distinct, even though their range mainly includes the area of vegetables and fruits.

Each short case is organized as follows: a brief overview of each firm is given first to help understand the context and characteristics. Second, the value-creation elements of the BM are examined, focusing on partners (showing the main characteristics of collaborations), activities and resources. Then, the performance of the value chains are discussed in terms of the characteristics explained. For each company, a graphic synthesis of the business model is provided by using the Triple Layered Business Model Canvas (TLBMC, Joyce and Paquin, 2016). The cases also include quotes from interviews showing the managers' views about the realization of the CBM. Leaders most certainly play an essential role as the manager brings entities together, shares a common vision, facilitates effective coordination and communication with members in the chain, and renews and maintains their BM. These cases allow us to reflect upon the following questions: *How did these companies implement a Circular Business Model? If you were one of these leaders, how would you strategize for the future?*

1. The short cases are extracted from the dissertation of Daniel Daniel.

Company I

Company I is a chain cooperative that is committed to sustainable circular fruit cultivation and the development of its regional economy. Its mission is to restore local landscapes and to prevent food waste. Founded in 2016, Company I is managed by two part-time employees who are the founders, and they manage all the business. The company aims to grow with the hiring of a community manager, financial manager, and operational manager.

Its main products are apple cider and sparkling apple juice which are made from leftover apples from fruit growers. They are marketed as regional products and the profit is invested in planting flower hedges and for apiculture. Company I's apple cider is made from rejected (from retail due to aesthetic reasons) apples from the four fruit growers in the region. Twenty tons of apples were processed in 2017, resulting in 12,000 liters of cider and sparkling juice. Company I outsources the production to a brewer partner and the products are available at approximately 100 retailers in Central Europe.

Company I BM: a focus on partners, activities, and resources

Partners. The main partners in the development of apple cider are four fruit growers who supply apple waste, a brewer who manufactures the ciders, around 100 retailers who sell the products and 223 citizens who donate as subscription of annual membership. The governments include the province and local municipalities. Company I also benefits from collaboration with universities and social organizations.

According to Company I, trust and routine information sharing are essential collaboration factors, as well as expertise, to successfully implement this nature-inclusive farming program. "Not only in the technical way, but also in a way of trust. When I visit farmers, the first time they don't know me. I am a scientist and when I put my scientist side apart, the farmer is able to communicate, help me, stand beside me. Only then I'm able to try out, I'm able to experiment." Company I also indicated that commitment is important for a start-up company to survive in the competitive industry, for instance, by establishing and maintaining a good network and continuously innovating to create the desired value for market. "We need commitment and trust and build on trust (to) build a community... these processors, these food growers should be with our suppliers, are really our members, and they are committed to working in the program." "Innovators always have to face, when they start (a good initiative), the passion in it, the energy in it. The big thing is sometimes not too relatively difficult to start but it's really hard to go through. You always come to a period of trouble." Therefore, it can be implied that having a high level of commitment in the value chains may support the business activities and business relationship with partner and these lead to sustainable business performance.

Activities. There are two main key activities that are economic and social in nature. The economic side provides the income to help finance the social sides. In turn, the investment on the social side may lead to more sustainable nature and thus a resilient system that benefits the farming system and the economy in the region. *“We are a cooperative, actually we are a social enterprise. You know, social enterprises are divided in a, business part, making money and an impact part, making an impact on society. (...) for each kilogram of fruit, we use five euro cents on the biodiversity front. From that, we pay for the biodiversity activities.”* Nature-inclusive farming relies on a resilient system which leads to lower use of pesticides and minerals. Consequently, it reduces costs of production and, on the other hand, improves reputation due to better landscapes and more sustainable farming practices. *“When you’re convinced of getting back to nature, so you can reduce part of pesticides. Imagine if you can reduce your costs by only 10% 6,000 from 60,000 euros of costs of spraying pesticide and also minerals.”*

On the economic side, there are three main activities in the network: product and concept innovation, market development, and production scaling-up. First, product innovation entails leveraging fruit waste in the region and turning it into various high-quality products. There are also plans to further recycle the side streams of pulp from the production. *“We are now scaling up to other products. So, I expect this year to have other products, like other flavors of cider, in the zero percent cider. We already have a sample of the red sparkling water. We have apple cherry and blackberry.”* Concept innovation includes the ability to go beyond selling products to selling knowledge via a circular business learning center. *“The next part in our business, is that we are not only working on the product part, but we are trying to also on the circular business learning center.”* Secondly, market development involves identity creation to distinguish products in the market and the need to introduce new products in and outside the region. Thirdly, production needs to scale up to achieve cost leadership and a competitive price to improve market share. *“We don’t have volumes in the food industry. We don’t have the lowest cost price. So, we don’t have the most competitive price.”*

Regarding the social side, this entails planting flower hedges and keeping bees as natural pollinators to restore the landscapes and biodiversity in the region. It is known that bees help in pollination which is essential to farmers in growing fruit. Additionally, Company 1 is working on research in an effort to create a resilient system. It includes, for instance, precision farming and breeds. Consequently, this helps in reducing, if not eliminating, the amount of pesticides sprayed in growing fruit and may eventually reduce costs.

Resources. As described above, the key resources in the value chains include apple waste, brewery facilities, and organizational structure. Apple waste and brewery facilities are needed for production and to generate profit from sales. Additionally, Company 1 plans to invest in the bottling line in the cooperative with the brewer. By owning the bottling line, the production and logistics costs and also carbon footprint are expected to be minimized. What’s more, the structure of the cooperative is crucial in efficiently connecting all chain members, e.g. via general member meetings to better organize all activities that may bring profit to the members. Furthermore, the com-

pany relies on subsidies to finance the nature-inclusive farming project. The subsidies came from the province and other institutes. Performance of value chains

At the time of the interview, Company 1 had not yet lowered its costs, due to the low sales volumes of the products, which did not allow for achieving any cost advantage. What's more, they needed to diversify their products to cater to the wider consumer segment. The reputation of Company 1 was built on its concept through creating resilient fruit cultivation and valorizing fruit waste. As of August 2019, more than 77 tons of apple waste had been saved and processed, 4,500 m² flower hedges had planted, and countless wild bee populations had returned. In addition, Company 1 also improved the reputation of partners by mentioning their collaboration on billboards, offering products resulting from sustainable farming practices. *“But don't forget to put this in, because this is CSR for this company. CSR we'd like to use for reputation. We'd like to become a next level proud example in our region by having this kind of billboard, big billboards, small billboards, all over the place.”*

They produce beverages from the apple waste of fruit growers with the local brewer. Therefore, waste is minimized even though approximately 40% of apple pulp remains as a side stream from the production. *“We are still working with the waste of the waste. When you press the apple, you also have one-third of it. This could be paper, cellulose, other things, or we could make tea out of it.”* Company 1 is currently seeking innovative ways to turn the pulp into other value-added products. Moreover, the use of resources has been reduced by utilizing the partner's brewing facility in the season when they are not producing wine. This also leads to maximization of resources and lower production costs.

The Business Model of Company 1 is synthesized in figure 1, using the Triple Layer Business Model Canvas (Joyce and Paquin, 2016).

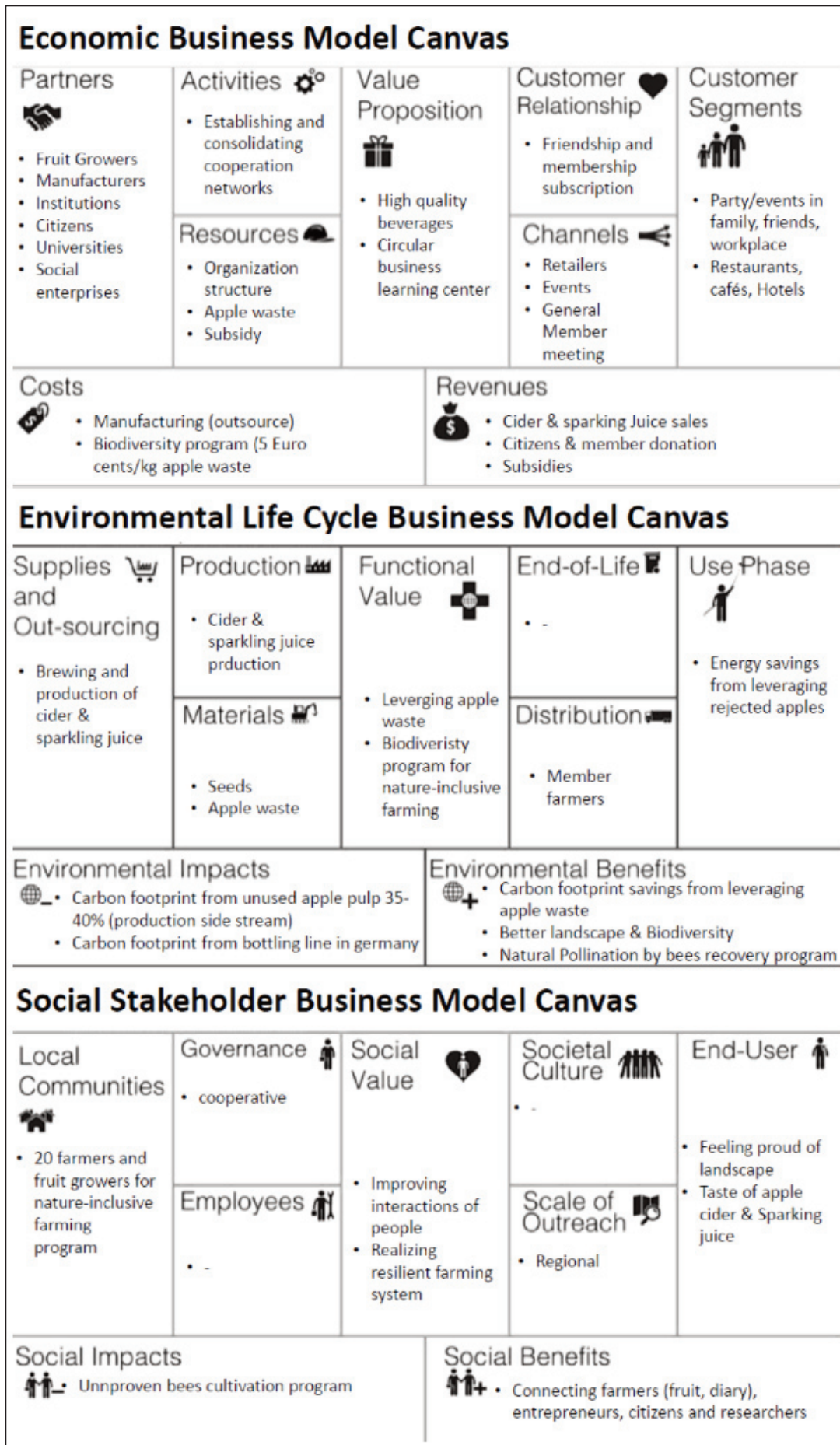


Figure 1 - TLBMC of Company 1

Company 2

Company 2 is a private company established in 2014 that sells variety of soups. This social enterprise offers soups to municipalities, government, companies, and institutions. It has a social goal to use its proceeds from the sale of soup to providing free soup to food banks. In addition, it aims to serve tasty and healthy soups based on rescued vegetables and made by people who are at outside of the labor market. One aspect has social impact by providing paid jobs while the other has an environmental impact by making the most of food waste.

The soups are divided into two types: Type A soups that are for commercial purposes and Type B soups that are donated to food banks for a social purpose. In other words, Type A supports the funding of Type B. Type A soups come in varieties that include tomato soup, pumpkin soup, and pea soup. While all the Type B soups are made entirely of rescued vegetables, Type A soups are only partly made of vegetable waste and the other part includes fresh ingredients. This is due to the nature of inconsistency of waste supplies and the stricter requirement to maintain the quality of the commercial products. The main ingredients i.e. fresh and waste vegetables are procured from several suppliers, which include a vegetable grower and vegetable/fruit distributors. Other soup ingredients such as cream and broth are supplied by multinational companies (also as a CSR partner). The production of all soups is outsourced to a manufacturer.

Company 2 BM: a focus on partners, activities and resources

Partners The key partners are multinational companies, vegetables suppliers and distributors, a manufacturer outsourcer, and food banks.

The elements of trust, commitment, and routine information sharing are vital for Company 2, in collaborating with partners and for its various activities. Information sharing, both to partners and public has been favorable as to deliver its message on reducing food waste to the public, thus making its products more attractive to potential and existing customers. *“There is very little information that we would not share. For example, we are eager to share our sales numbers because the higher they are, well, the more people will feel attracted ... we are on a mission and we will succeed. So, just join the club. ... It’s very important for us to share with the audience, that we have saved so many tons of good vegetables from food waste from being destroyed.”*

Furthermore, it can be implied that information sharing routine, to some extent, maintains the partnerships in the value chains by strengthening the commitment towards a common goal. *“So, it’s vital for us to share that information and to keep people on board, to keep people committed to our goal... And sometimes, we take people to the local food banks. They are providing soups for and to get acquainted. So, to keep them motivated.”* This relevant information is also beneficial to clients’ businesses as they can include this to communicate, for example, the CSR. *“So, they can, in the social year reports, they can add this is what we do for society. So, it’s pivotal for us to share all information concerning sales and donations to the food bank. That’s a reason for being for us.”*

Activities. The main aspects in the development of Company 2 soups are sales and securing side stream supplies. Sales is crucial in being able to give away soups to those who frequent food

banks, which will only be possible if sales volume is adequate. Consequently, the supplies of vegetable waste become important to continuously producing soups to eventually achieve the desired social and environmental impact. Company 2 guarantees supplies by entering into a mutual deal with the suppliers. In addition to routine activities like procuring supplies, Company 2 also acquires a certain amount of good vegetable waste from suppliers. From this deal, the suppliers will still be profitable and improve their public relations. “What we try to do always is to make a deal with suppliers. ... we will buy your tomatoes. That’s just a commercial transaction. And, as part of the deal, you will give us x amount of tomatoes - food waste for free - for the Type B soups. ... So, they will get good PR as well from the deal.” With regards to sales and marketing, they are carried out by Company 2 and supported by the multinational company partner, which provides services, sponsorships, and financial support for Type B soups.

Resources: There are several essential resources in the value chains, i.e. ingredients of both whole products and waste and also production facilities. Ingredients and production partners are indispensable for soup making. Additionally, outsourcing the production of soups results in less initial investment of building and machinery, reduced costs of maintenance and depreciation and improvement of product quality due to using their standardized good manufacturing practice (GMP). “We work with catering organizations and it’s very important for us, not only as a social company, but also because of the high quality, high standards of our soups. ... Because if you’re selling soup that is not tasty enough, not healthy enough or whatever, then they will do it once or they will do it twice, but they won’t make it a structural thing. So, it’s very important for us to have companies tell us and make statements about the high quality of our soups.”

What’s more, Company 2 has gained a brand. This mission of providing a Type B soup for every Type A soup has made it a micro enterprise of fine stature. *“If we wouldn’t have done that, then we would not have flourished, That’s our unique selling proposition. So, you know, most companies, soup companies spend 25% of their turnover on marketing activities. We don’t do that but spend our 25% marketing budget on our social unique selling point, and it works better. So that gives us more visibility.”*

Performance

Sales of Type A soups and not from Type B are what lead to turnover for this social enterprise. However, a majority of profits are dedicated to being able to give soups away to food banks. However, Company 2 would not have been successful without the Type B soup project. It implies that its concept or brand is the major reason that turnover has increased and with slightly less emphasis on the influence from partners. *“But it is essential that big multinational companies are with us, you know, are supporting us. Because if not, then we can’t pay fully for the soup for the food bank out of the earnings. That’s impossible. But we can pay for the process, we can pay for the packaging. So, it’s essential that those companies share our vision and share our mission. So, in that sense, without them, it wouldn’t have been possible.”*

The interviewee agreed that costs have been considerably lowered due to its participation in the collaboration. Furthermore, product quality has also greatly improved by starting up the business along with culinary experts. *“Over the years, yes, of course. Yes. We started out with a chef and participants. Now, we are up to the highest standards in food safety and packaging, and logistics. So yes, it has very much improved and professionalized.”*

Innovation has not improved due to the collaboration. *“If you look through the eyes of the customer, they now have less choice [of soups] than they used to have.”* However, soup quality improves by paying attention to the nutrition and healthy properties of the soups. *“But on the other hand, we have now control over everything. So, we know that the salt percentage is fairly low, and we are much better equipped to monitor things like health-related issues.”*

In terms of reputation, the interviewee does not believe that the collaboration has improved this area. Actually, it already had a reputation due to its concept and the realization of the Type B project after. *“No, it was from the start we were a favorite for the public, our audience, and I think we still are. ... So, you must be able to show results. Soon we will go to the media and we will celebrate that we have delivered a million bowls of soup to the food bank. So, it’s quite a number for a small company. I think that’s proof of evidence and proof of concept. So, I think that will help us to keep the reputation high. So, I don’t think that we have grown, otherwise, in reputation.”*

The interviewee agreed that the collaboration has led to a greater number of employees. Moreover, the company generates considerably less waste due to the utilization of vegetable side streams from suppliers and the processor. However, resources and energy consumption were only average as the issue of sustainable production has only recently been raised with the partners. *“I don’t think that the factory is really emphasizing that. Well, they are modern, they have all kinds of equipment, but there is not strong emphasis on sustainable production. So that’s the thing where we are looking at the whole chain. And also packaging. So, we are engaged in talks about how to approach those issues.”*

The Business Model of Company 2 is synthesized in figure 2, using the Triple Layer Business Model Canvas (Joyce and Paquin, 2016).

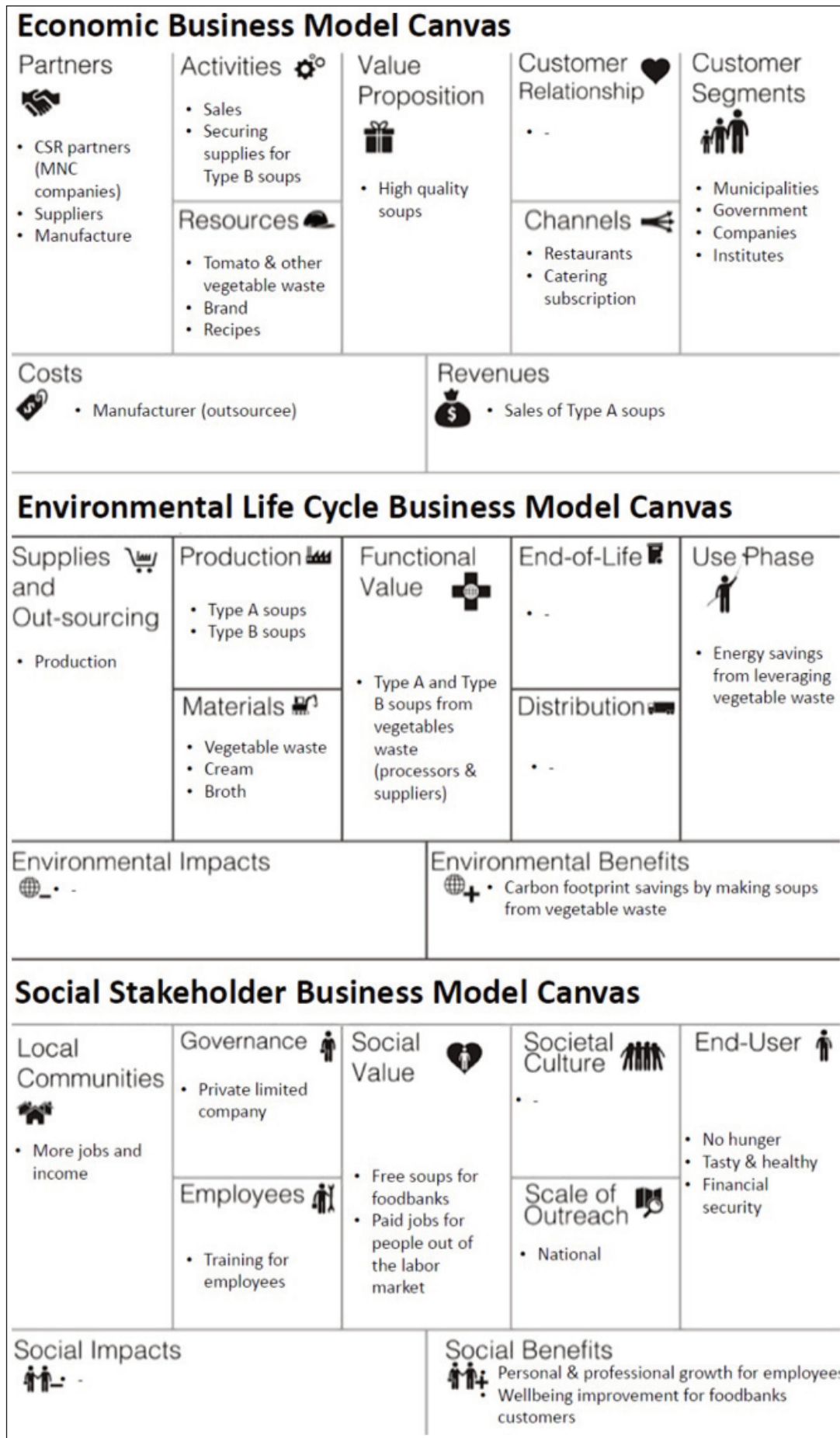


Figure 2 - TLBMC of Company 2

Company 3

Company 3 was founded in 2012. This private company is the result of the founder's passion for innovation, technology, wellness, and the environment, by developing a concept of food from side streams of the vegetable industry. This business-to-business company develops healthy plant-based finger foods and snacks to achieve its mission of making snacks responsible and environmentally focused while offering a healthier alternative to junk food. On one hand, the responsible aspect requires the food to be high in fiber and protein and made with no sugar and less salt and saturated fat – supporting the health of people. On the other hand, being environmentally friendly means transforming food waste into healthy, tasty and convenient snacks, such as Company 3 Sides and Meats. The Sides are snack products made of vegetables and legumes, which bring high fiber and protein content respectively. The vegetables (i.e. carrots and beetroot) that are used are the side streams sourced from a juice company. These ingredients are used to come up with product concepts that are made in the in-house R&D department. Trials are conducted for scaling up recipes and production process. The extensive trial phase is carried out with a manufacturer and production is outsourced to the same manufacturer.

In addition, Company 3's wide range of plant-based products address consumer concerns for animal welfare and carbon footprint. . Company 3's clients are restaurants, cafes, catering companies, and other food-service organizations.

Company 3 BM: a focus on partners, activities and resources

Partners. Company 3 interacts with a manufacturer and with suppliers. For them, trust and commitment are of utmost importance in doing business, in this case in the product-development phase, which is the main activity in value chains. This ensures the establishment of long relationships with business partners. “Trust is definitely important. Because everything you're making is something that they don't have. So, if you don't make agreements about that, if someone does something you need, [he may get the better part of the deal and exclude you]...” Trust is not only essential when it comes to with manufacturer but also with the supplier. In this way, Company 3 can expect to receive safe and high-quality materials as per previous agreements. Company 3 also uses an information sharing routine, which is perceived as important both in the product development and production stages with the manufacturer.

Activities. Creating recipes from vegetable side streams is the most crucial aspect in the development of the snacks. This supports Company 3's healthy and sustainable food concepts that will subsequently be translated into a pilot scale. This product-development phase is carried out by Company 3 itself and includes potential clients and also friends and family when it comes to sensory testing the prototypes. The most popular prototypes continue on with the scale-up phase. This phase is crucial in determining the feasibility of the recipe and with regards to the required steps and available machinery at the production stage. Production is also an important aspect in transforming concepts into products. “Building the recipe. That's the biggest activity. That recipe results from trial and error. So, when I get a side stream, I go work with it and I make few options,

and let clients or friends and family taste it... I get the feedback and then sometimes from two or four, they say this is a no, but these two are a yes. Then I go work on those two on the production location. And then I make a few samples. See how it works. And if it works, okay, I go with the sample to the client. If he says, yeah, I want this, then main production.”

Resources. The resources needed in developing the snacks are related to the key activities described above. They include vegetable side streams, recipes made in-house, and production facilities. Side streams include carrot and beetroot from a juice company, and this provides Company 3 with value-added products. The manufacturer is an important partner of Company 3 as it provides a production space, machinery and technical expertise that Company 3 does not own. In addition, according to the interviewee, it is the partners’ complementary resources that is the reason to include them in the value chain. Moreover, it leads to helping reduce the environmental impact by reducing food waste.

Performance

In terms of economic performance, the manager agreed that turnover had increased mainly due to sales and the way the products are being made. What’s more, the partnership has also increased the quality of the products. *“Yeah. I must say because we’re now producing like it should be, so I must see what the sales will do. But the sales have increased during the time I am working with them because quality increased as well.”*

At the time of the interview, the company was at the final stage of the trial phase. The manager felt positive about achieving the objective of having bigger market share by going into higher production volume and, most importantly, larger orders. Only by then, Company 3 can achieve cost advantages. *“I haven’t had such a big order yet because like I said, we’re still in a trial phase, but now we’re at the last trial, and it seems like it’s going to be 95% good. But then, we know the next time we can go big.”*

Due to the collaboration in the value chain, the quality of products had greatly improved as well as the number of innovations. This is partly contributed by raw material information, i.e. nutrition profile, functional properties and possible applications, that is provided by the juice company that supplies the side streams. Reputation also increased.

At the time of the interview, the company was managed by the owner/founder. As the business developed, additional personnel would be joining the company, allowing the owner/founder focus on the core aspect of R&D. *“I’m now a one-man business, but I’m going to be busy, so I’m expect to work with two other people: one financial, one operational. So, I can concentrate myself on the research and development..”*

The Business Model of Company 3 is synthetized in figure 3, using the Triple Layer Business Model Canvas (Joyce and Paquin, 2016).

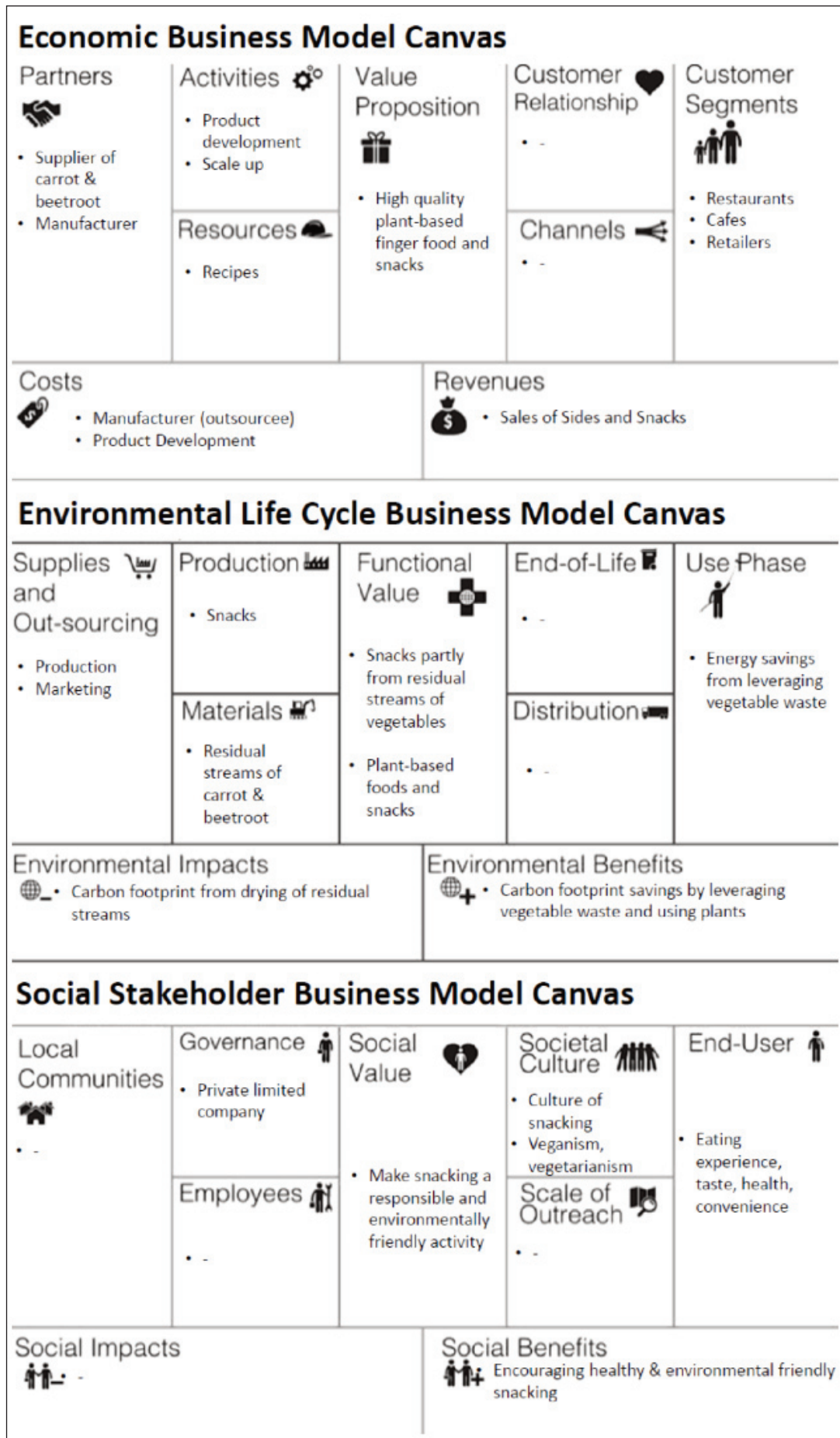


Figure 3 - TLBMC of Company 3

Company 4

Company 4 is a private limited company and was established in 2011. The founder came up with an interesting concept of repurposing organic waste from coffee plantations to cultivate oyster mushrooms while working on a research project in Africa. Company 4 uses coffee residue as a growth substrate to grow oyster mushrooms. The products are not only marketed as fresh mushrooms but also ready-to-eat mushroom-based meals and snacks, such as burger or chips. The Burger is a burger made of 50% oyster mushrooms and 50% beef and herbs. The chewy texture of oyster mushrooms resembles real meat, thus makes it suitable as a meat alternative. It is also considered nutritious, which ensures the burger contains fewer calories compared to a regular beef/meat burger. The products are developed together with culinary experts and top chefs. Consequently, this product appeals to non-vegetarians, thus they consume 50% less meat. Less meat consumption is correlated with saving water and reducing carbon footprint. The raw material of oyster mushrooms comes from the partner's growing facility and beef is supplied by a livestock farmer. Production is outsourced to manufacturers to guarantee food safety and quality. The mission of Company 4 is to reduce its environmental impact by creating foods from tasty, versatile, and circularly grown oyster mushrooms. This involves circular logistics practices by which distribution trucks deliver Company 4's products to clients and collect coffee waste from the same clients. In other words, the distribution trucks are fully loaded in both directions.

Company 4 BM: a focus on partners, activities and resources

Partners. Company 4 interacts with manufacturers, retailers, wholesalers, clients (which also play a role as suppliers of coffee residue), chefs, and marketing agencies. To them, trust is an important element in collaboration, for instance, in the product development phase with the chef. *"You always have that trust in the collaboration, otherwise you'd better not do it."* The same goes for commitment and information sharing routine as well. They are embedded naturally in the activity. *"I find this very logical. So, it's not even something I think about. It goes without saying."* However, when it comes to brand design or product packaging, trust, commitment, and information sharing routine do not play important roles. Instead, partner's capability is considered by the interviewee as more relevant. *"That's the job of the specialists like the chef or the agency or...everybody has its specialty."*

Activities. There are two main activities in the development of the Burger, i.e. (new) product development and marketing. The former includes the creation of product concepts and recipes together with culinary experts/chefs and the scaling up of those recipes for manufacturing by a production specialist. *"I asked the chef to create something, and then she creates it and then we taste it, and then we see whether we can produce this, and whether we like it. And then, we see whether we can produce it with the existing factories that we work with. So that it's a scalable product. But, usually, we start with the concept that, whatever we make has to be able to be scaled up to, you know, large quantities."* The latter entails the design of packaging and the brand to communicate the relatively new products towards the market and/or potential clients. This is carried

out in collaboration with a marketing agency. *“As far as retail is concerned, it’s more important to also find out how you can sell it and how you can present it because it’s a new product. So that is, you know, like the burger concept, people don’t know it. So, that’s a big, a big challenge. ... How to educate the people so that that they will buy it and they will choose it.”*

Resources. The most important aspect for Company 4 was concept. The innovative concept has created many new tasty, healthy and environmentally friendly products. This can be achieved through the participation of partners, i.e. the chef and her expertise in developing recipes; manufacturers for their production location, machinery, and equipment, technology and technical expertise in producing the products; the marketing agency for its market intelligence and technical expertise; wholesalers for their networks and fleet; and, last but not least, the clients to whom Company 4 sells the products and from whom it collects the coffee residue. In other words, the clients also play a role as supplier of the coffee residue that Company 4 uses as growing medium for oyster mushrooms. The coffee waste is given for free, but the collection and transporting costs are borne by Company 4. Therefore, Company 4’s concept has automatically reduced environmental impact in two ways. Firstly, by recycling coffee residue that otherwise would be wasted. *“That’s because of our concept is like that. It’s not because I’m looking to achieve that with the factories. It’s because of the products that we have, that there is an environmental impact.”* Secondly, in oyster mushroom cultivation, the water footprint has been considerably reduced as compared to livestock farming. *“That’s because we use the mushrooms instead of meat. ... The [water footprint of growing] mushrooms is the lowest of the lowest.”*

Moreover, the manager believed that Company 4’s concept creates a wider environmental and social impact that goes beyond the region where the headquarters is located. *“I do this nationally and we are also going out in [nearby countries]. So, we, you know, my vision is that if you want to create something and it has impact, it has to have size. Otherwise, it has no impact.”* In addition, the manager agreed that the primary reason to include partners in the network is to get access to the resources of partners. And these partner’s resources have contributed to Company 4’s economic performance as they support product quality and sales. *“Yes. That’s [partner’s resources] needed to further develop the product and to get it out in the market.”*

Performance

The manager highlighted how Company 4’s concept (repurposing coffee waste and facilitating the transition towards greener protein), high quality products and activities led to ever increasing turnover to the company. Besides, being able to acquire the major market segment has also contribute to its turnover. *“The turnover grows because of what we do, not who we do it with. We have a high quality product. ... it’s a concept that people want to work with - this circular economy, the whole concept of repurposing organic waste materials. That’s why they want to work with us. ... And the blended concept enables us to have 90% of the population as a, you know, a market, whereas vegetarian is only 10% of course. So, that’s why I think that that is a very important element to have this blended concept, to make it more mainstream, to make it more available for all people.”*

According to the manager, the collaboration in the value chains did not bring their costs down because Company 4 is a profit-oriented company and the fact that Company 4 is a social enterprise does not change the way members do business. As for product quality, it has greatly improved as the result of the collaboration with the chef and manufacturers and the utilization of their expertise and production facilities respectively. Furthermore, the interviewee partly agreed that the number of Company 4's innovations has greatly increased because of the existence of partners. It is partly its innovative concept that has created more innovations. Moreover, reputation has greatly improved. The number of employees working at Company 4 is six, not to mention tens of others who are outsourced to work in the growing and production areas. Company 4 also generated considerably less waste due to the participation in the collaboration. Resources and energy consumption were also considerably decreased.

The Business Model of Company 4 is synthesized in figure 4, using the Triple Layer Business Model Canvas (Joyce and Paquin, 2016).

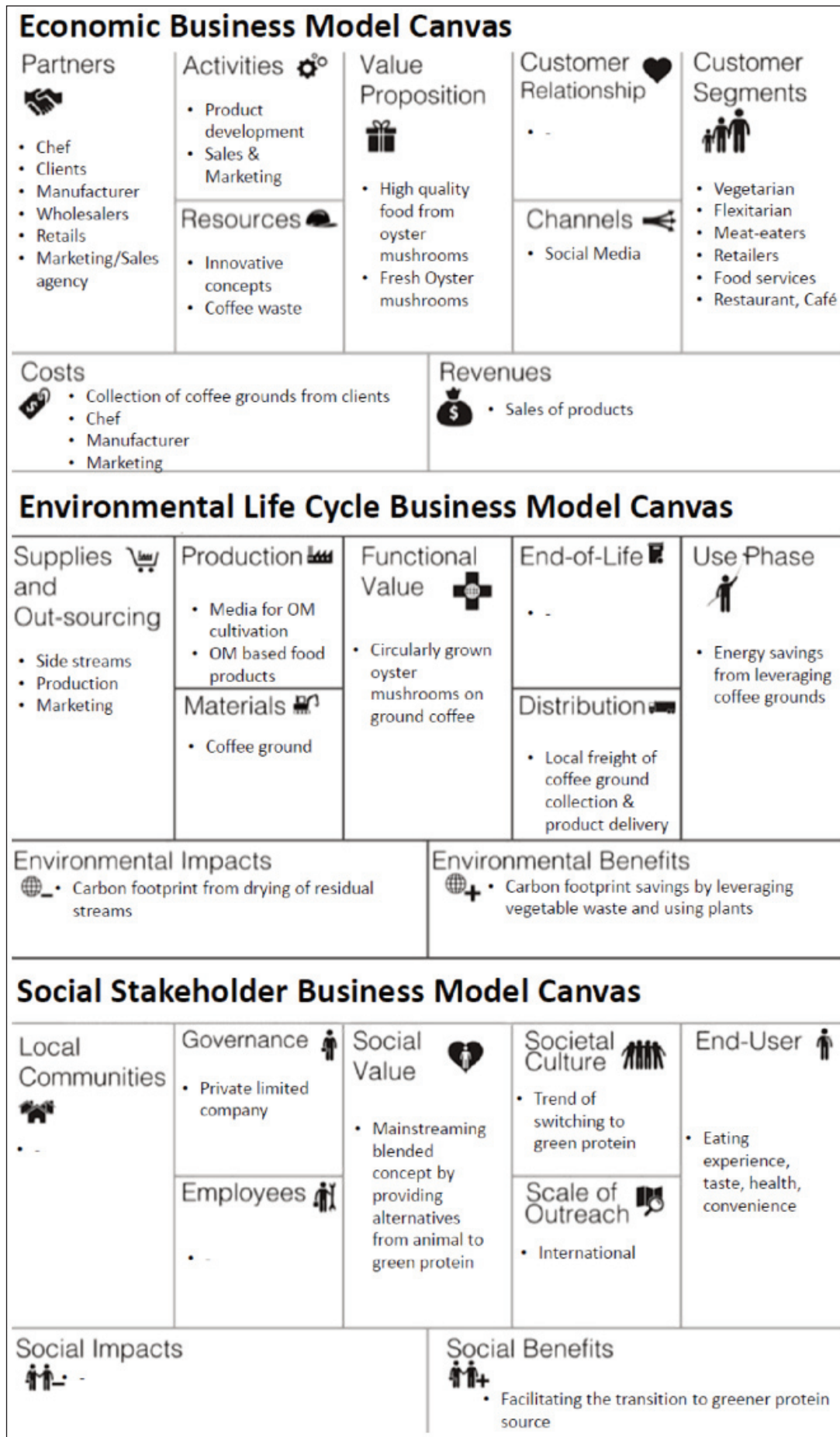


Figure 4 - TLBMC of Company 4

Company 5

Company 5 was founded in May 2014 with the mission of making an impact with food. It corresponds to the three of the Sustainable Development Goals, i.e. no poverty, no hunger, and responsible production and consumption. In achieving these goals, this social enterprise focuses on developing sustainable, inclusive, and transparent value chains in creating its products. This has included some breakthroughs, such as direct purchasing of ingredients from farmers, instead of via middleman. Moreover, they tend to produce locally as much as possible, thus preventing food waste, creating more jobs and income for farmers. The company's products include spreads, granola, crackers, and cashews. The spreads contain rescued fruits and vegetables (rejected for aesthetic reasons) from farmers, the granola contains dried fruits from rescued fruits, and crackers contain brewer's grains from the beer industry.

The three fruit and vegetable spread types are berries & strawberry, mango & pineapple, and raspberry and apple. These spreads are made in part by using the waste from fruit growers, and this can account for up to 40%. For instance, bruised bananas and/or oversized fruit that does not meet most of the standards of retail quality. These rescued bananas are then processed into banana puree and become one of the ingredients of Company 5's spreads. These products are marketed as a tasty and healthy choice for breakfast.

Company 5 BM: a focus on partners, activities and resources

Partners. Partners are pivotal and heterogeneous, such as fruit growers (independent or cooperative) as well as manufacturers and retailers (i.e. supermarkets, independent stores, webstores, and wholesalers). Companies in this supply chain are less dependent on trust and the information sharing routine due to the highly competitive nature of food industry, especially those who practice cost leadership strategy. Company 5 continuously looks forward to bringing in new partners or buyers in accelerating its impact.

Activities As part of its mission to bringing about more impact, Company 5's main activity lies in new product development. It entails developing new variants and also making sure most of its products are free of allergens, gluten, and GMOs. This means they will hold more appeal for consumers, and it will add up to bigger sales volume. The bigger the volume indicates more fruit waste is being used, thus leading to more carbon and water footprint savings. In addition to emphasizing its product content, Company 5 also invests in researching and putting into practice recyclable product packaging. This is aimed at helping reduce environmental problems. In addition, this may also bring positive effects towards the chain behind the consumer stage, i.e. retailers, manufacturer or producing partners, especially farmers. Company 5's direct purchasing policy has been leaving a greater margin for its business partners. In terms of its sales force, Company 5 does not have agents managing sales and marketing as it relies on its in-house dedicated sales personnel. *"We tried to develop products that are appealing to consumers and then we skipped the whole middle section of the food value chain and find farmers who are willing to cooperate with us. And then, depending on the products we are launching, find a processing partner and retail partner. Our main focus is on, launching products."*

resources. In its shorter value chain, its partners' processing equipment, logistics, sales spaces, and food side streams are considered important. These complement the resources and capabilities that Company 5 does not own. Processing equipment, manufacturing practice and space are provided by its producing partners to manufacture high quality and safe products, such as spreads, granola, crackers, and cashews. The logistics company is hired to efficiently explore logistic networks. Retailers shelf spaces are important for the visibility and sales of products in the market. Finally, fruit side streams from fruit growers are essential not only as part of the ingredients used in the products but also as a unique selling point.

Performance

When it comes to turnover, the interviewed manager found it difficult to answer and implied that turnover will increase if Company 5 found the right partners. Yet he strongly believed that the financial aspect will accelerate overtime. It can be concluded that, in the present, turnover has not increased. *“Of course, it increases if we find the right partners. And, since we are quite a principal focused company, I would say it’s more of the opposite.. So, yeah. I don’t know how to answer this question. I think it’s more a question of time. It will, of course, accelerate.”*

According to the interviewee, costs are lower. It is due to working together with partners that brings cost advantages. Using complementary resources from partners is the reason that the costs, e.g. production and logistics, have been reduced. *“But working with partners, we have cost advantages. That’s true. And, it makes sense, of course, to hire a logistics company that already has a logistics network in place and to work with a production company that has the equipment. So, yeah, it has a positive effect on my costs.”*

In terms of the quality of products, they have improved due to the participation in the collaboration and the fact that Company 5 is a small company. *“And, since we are very small, we need to work with partners, and, of course, we like to work with partners in order to have [high quality] products”*

As (new) product development is being carried out in-house, the number of innovations in Company 5 is not affected by the existence of its partners. *“Number of innovations not really because I think that’s what we are driving toward.”*

When it comes to increasing reputation, the interviewee mentioned that it really depends on the partner they are working with. One of their goals is eliminating poverty by encouraging more young farmers, thus creating more jobs. Instead, they are looking for more business partners to accelerate their impact. *“On our side, no. Not because of these partners. I think we are looking for partners. It’s not my goal to employ as many people as possible.”*

Moreover, the interviewee clarified that waste has been reduced not because of the partners. It is due to the mission of Company 5 and with its business models that valorize side streams from fruit growers. *“That’s one of the reasons we were formed, so it’s not because of the partners, but it’s because of the model we are pushing ourselves.”*

The consumption of resources has been kept to a minimum. Similar to the reasons behind costs being lowered, the use of the complementary resources of partners has proven crucial to achieving resource efficiency in Company 5. *“We consume considerably less resources, of course. If you can make use of partner’s processing equipment, et cetera, it’s a lot more efficient.”*

The Business Model of Company 5 is synthesized in figure 5, using the Triple Layer Business Model Canvas (Joyce and Paquin, 2016).

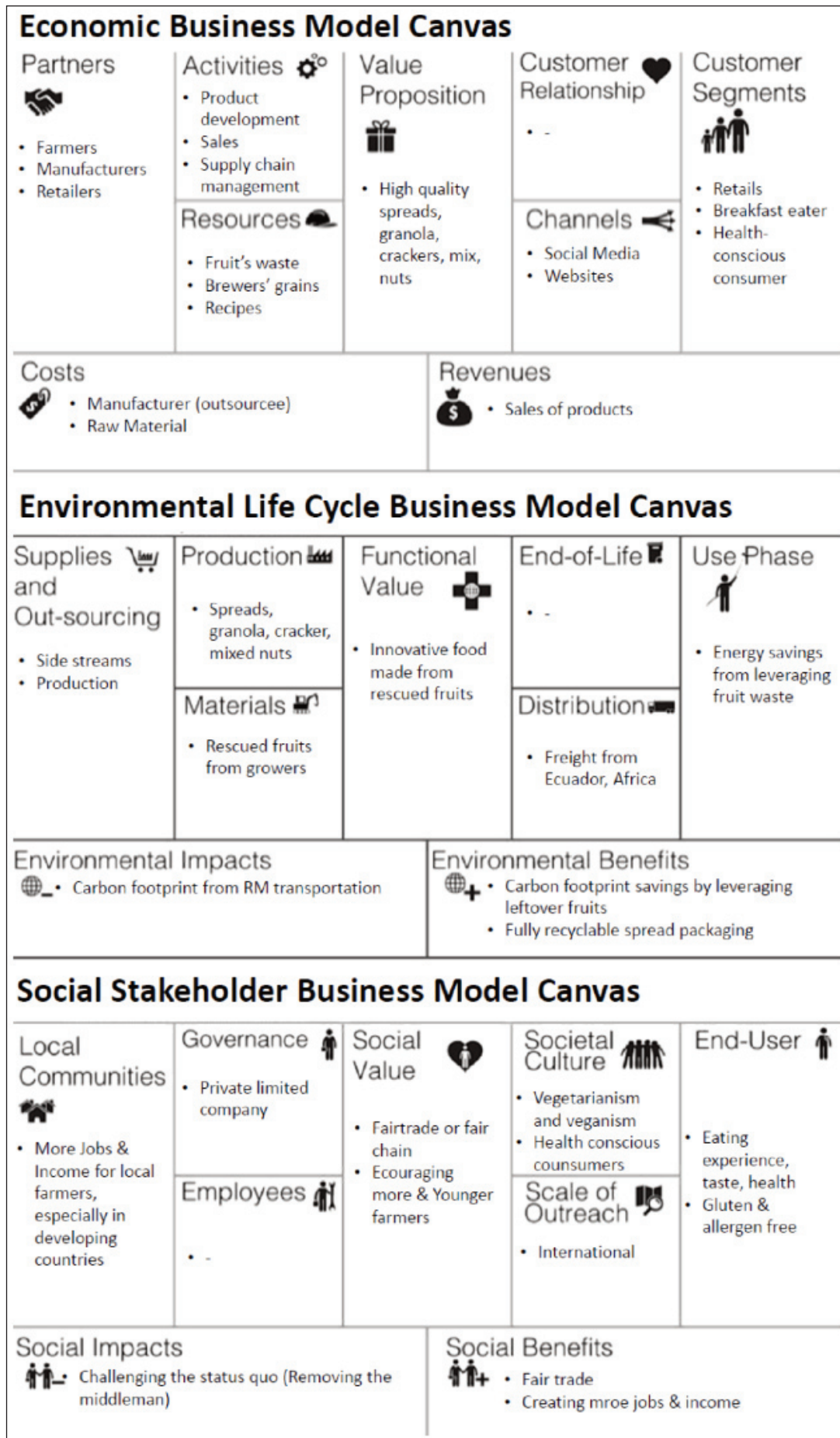


Figure 5 - TLBMC of Company 5

Company 6

Company 6 is a private family company founded in 2014. It is a leading company specializing in extruded food ingredients, having made a breakthrough in the saturated breadcrumbs market with a range of products. All products are made from vegetables, fruit, seaweed, fungi, insects, and their side streams. Company 6 is a business-to-business company offering value-added ingredients for clients to boost their profits in the market, indirectly catering to consumers, with healthy, tasty and crunchy products and improving the environment by incorporating side streams from the pea and vegetable industry. The development of food ingredients out of side streams was started early in 2010 as Company 6's market knowledge pointed out the future trends in food industry: more sustainable, tastier and healthier. The functional properties and nutrition of side streams encouraged Company 6 to start a foundation in 2013 aimed at transforming all components of food side streams into food.

Product A is an extruded crumb and is used to coat products meant to have a crispy texture. It is made primarily of pea starch and 20% vegetable products, with pea starch being the side stream from the pea industry. There are four different types: green bean, beetroot, tomato, and carrot, and each of these naturally gives the color to the crumbs. Other unique selling points include oven suitable preparation, no salt, sugar and E-numbers (food additives), high fiber and protein content, and low carbon footprint production. Continuous product development is the main aspect in Company 6's business and is carried out by in-house R&D. Firstly, the supplier provides the best cost price and value-added raw materials including the pea starch. Secondly, the manufacturer produces food-grade and high-quality ingredients with its extrusion processing line and quality assurance system. Finally, sales agents sell the products to clients worldwide.

Company 5 BM: a focus on partners, activities and resources

Partners Company 6 works with a manufacturer for the outsourcing, as well as with suppliers and sales agents. Partners are brought into the chains, i.e. raw material supplier, manufacturer, and sales agents to better serve the market and clients' needs and also successfully realize new and innovative products. The interviewed manager mentioned how he only relies on contracts between the two parties: all business-related activities are managed under written agreement, only via electronic mail, enforceable by law. *"We make these deals by email, that I want that products delivered, in Brazil, Rio de Janeiro, there. There is no discussion about it. And if they don't deliver, they also get a penalty."* Moreover, Company 6 does not trust anyone in the business and therefore really emphasizes contracts and patents for their relationships with partners. *"Only contracts I think, because you can get justice ... they only try to rob you. That's the problem."* The same goes for commitment. Company 6's business relationships are all based on contracts. *"Making contracts is my specialty."* When asked about research collaboration opportunities with research institutions and the like, the interviewee was firm about wanting to keep all research and development activities in-house. This is due to intellectual property issues. To obtain commercial value, Company 6 has invested in developing a product and also prevents competitors from inappropriately profiting from its ideas and/or inventions.

Activities. Developing innovative extruded food ingredients or products with new applications is the main activity in value chains. Research and development and market research activities are carried out by Company 6 itself, and external parties are not included in this process. The combination of product development and the use of side streams is considered by the interviewee as the competitive advantage, and it distinguishes them as a food ingredient company in the industry. Additionally, patents are the results of this activity. All of these are the means to primarily achieving economic performance and contribute to reducing environmental problems but not meant to improve social wellbeing. Meanwhile, other activities are outsourced to partner companies, i.e. manufacturer and sales agents. *“That is the R&D. This is the central basis. This creates our unique products and the rest you can do by other companies. So, you can produce it somewhere, there are agents, they can sell etc. But to develop this innovation, you have to do it your own. ... When everybody can do it, we cannot earn money. If there is a lot of competition, nobody earns money.”*

Resources. Creativity and knowledge are the required items in the business. These are closely related to the key activity mentioned above as they are the foundation of product development. *“Knowledge of the market, knowledge of the sector, knowledge of the products, knowledge about production, because you have developed a new product and also you have to be able to produce it.”* Patents are also considered an indispensable resource. Moreover, the side streams (pea starch) are also of important and Company 6 source them from a supplier partner. The valorization of waste from the pea industry in Poland adds value to the product and, in turn, the company. The decision in choosing the supplier was based on those that offered the most competitive price. Besides, a production space and facilities are used to produce safe and high-quality extruded products.

Performance

In terms of the financial aspects, the interviewee acknowledged the contribution of partners in improving turnover and reducing costs. Sales of its extruded ingredients assisted by sales agents contributed to the turnover and competitive price of materials from its chosen supplier. Partnership is also considered the reason that product quality has improved. Using its partner's production facilities, technology and technical expertise have ensured the safety and quality of its product. However, the various innovations are not the result of the existence of partners. This is due to the fact that research and development activities are done in-house by dedicated personnel at Company 6.

The Business Model of Company 6 is synthesized in figure 6, using the Triple Layer Business Model Canvas (Joyce and Paquin, 2016)

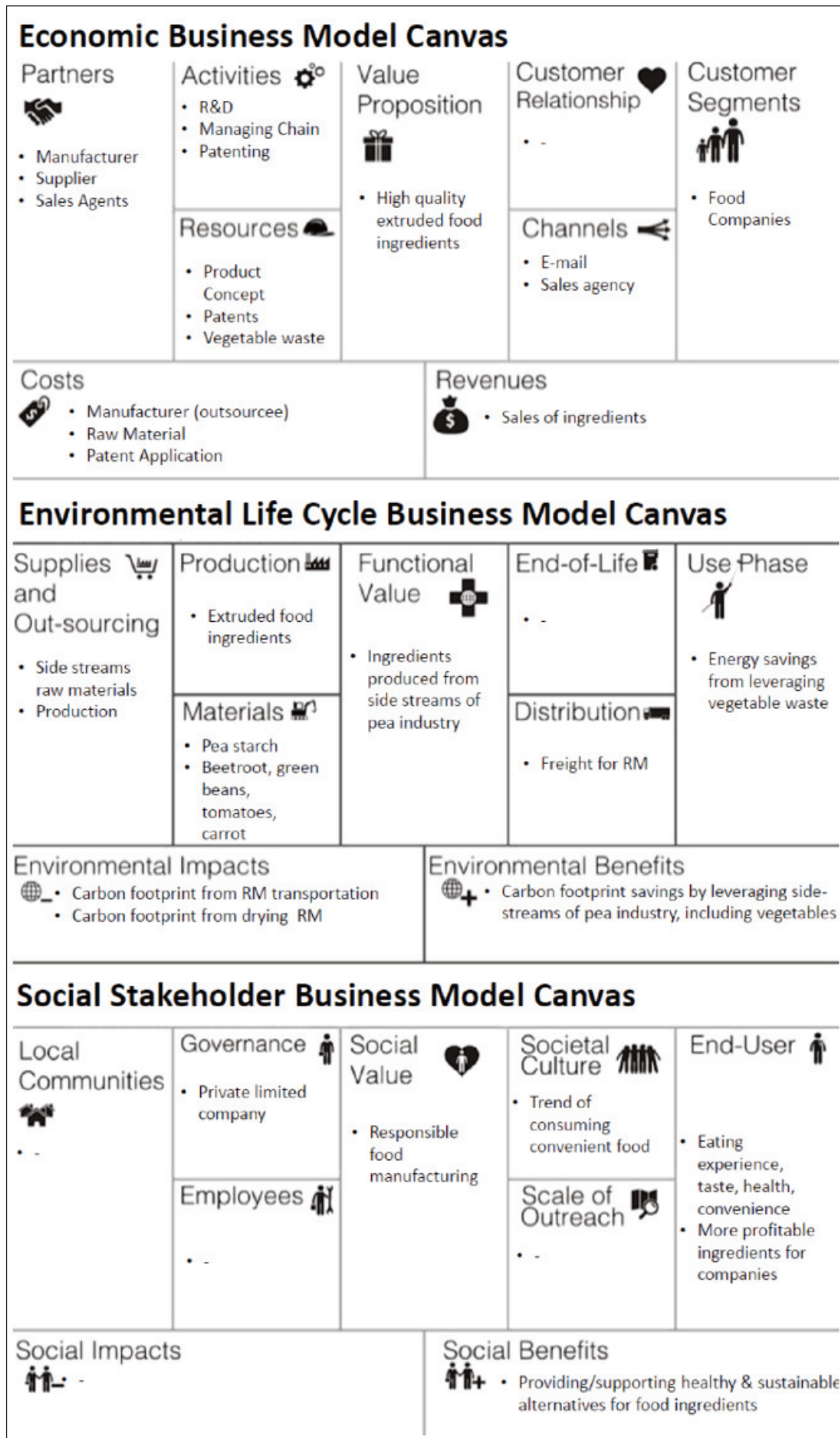


Figure 6 - TLBMC of Company 6

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