Haute Ecole
Groupe ICHEC - ISC St-Louis – ISFSC

Enseignement supérieur de type long de niveau universitaire

Creation of a dehydration centre in an urban area

Feasibility study of Le Champignon de Bruxelles in the region of Brussels-Capital

Mémoire présenté par
Caroline RIWERS

Pour l´obtention du diplôme de
Master en Gestion de l'Entreprise

Année académique 2017-2018

Promoteur :
Laurent LAHAYE

Boulevard Brand Whitlock 2- 1150 Bruxelles

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Introduction

One third of the world's food production for human consumption is wasted or lost every year, accounting for approximately 1.3 billion tonnes (FAO, 2018, para.1). Yet, 1 out 8 people in the world are regularly suffering from hunger (Courtois, 2014, p.9). Moreover, humanity extracts resources faster than the earth can renew within a year leading to an increased pressure on the environment. In Belgium, 3.6 million tonnes of food are wasted or lost every year (Courtois, 2014, p.1). With the goal to reduce food waste in Brussels and to value the already produced food, Le Champignon de Bruxelles, a small company in Anderlecht, came up with the idea to create a dehydration centre and to dry the fruits and vegetables that would otherwise be wasted. But, how would this work and is it possible to construct a viable business model that enables Le Champignon de Bruxelles to put their idea into practice?

The purpose of this master thesis is to find an answer to the following research question:

"To what extent is it feasible for Le Champignon de Bruxelles to create a dehydration centre in the area of Brussels-Capital?"

In the first part, the theoretical framework, we will analyse the current context in which Le Champignon de Bruxelles (LCB) will be implementing their project. This will include a consideration and comparison of both linear and circular economy. We will then turn our focus to the central issue of this master thesis, food waste, with a view to determine the different steps of waste management and where Le Champignon de Bruxelles could intervene. Later, zero waste trends will be analysed starting from an international perspective and narrowing to the context of Brussels, where the emphasis will lie on two current initiatives of the city of Brussels.

Subsequently, the focus will be more on the main elements of our research question. First of all, we will present Le Champignon de Bruxelles and the origination of the idea. Based on this, we will continue with the explanation of a dehydration centre and what method would be most suited for Le Champignon de Bruxelles. Afterwards, we will analyse the area Brussels-Capital as an urban area and outline the opportunities and drawbacks regarding a defined territory. Finally, we will have a look at the dietary trends in Belgium in order to identify consumer behaviour regarding food. This will help us later to create a value proposition matching the needs of consumers. Furthermore, it will assist us to narrow down the range of potential customers. The purpose of the theoretical framework is to provide the necessary knowledge for further understanding as well as to prepare the case study by identifying questions we could not answer during literature review.

Once our theoretical framework is set, we will present the case study where the emphasis will lie on Le Champignon de Bruxelles and their idea to create a dehydration centre in the area of Brussels-Capital. The case study will start with an explanation of

the different kinds of research that will be conducted in order to answer the questions that arose during the first part. First of all, we will research about different supply possibilities in Brussels for Le Champignon de Bruxelles as well as identify other actors working with unsold fruits and vegetables. Further, we will investigate prospective partnerships to support the creation of a dehydration centre and possible business to business (B2B) commercial activities. Lastly, we will research about possible business to customer (B2C) commercial activities and what potential customers think about the dried fruits and vegetables made from unsold fresh fruits and vegetables. We will examine these questions by using different research methods such as the focus group, semi-structured interviews and a survey to gather primary data that can support our thesis question.

The findings of the research will enable us to construct a business model. The Business Model Canvas will be applied and divided into nine blocks where each one represents an important part/activity of the company. At the end of our research, we will carry out a break-even analysis in order to determine the financial viability of the dehydration centre. Finally, in the conclusion, we will consider how feasible it is for Le Champignon de Bruxelles to create a dehydration centre in the area of Brussels-Capital.

Part 1: Theoretical framework

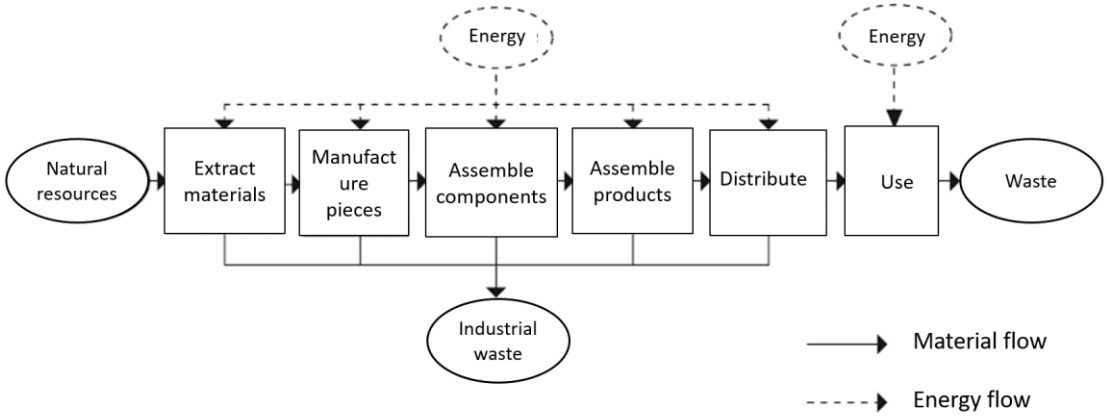
1. Context

In 2017, Earth Overshoot Day was reached on the 2nd of August, the earliest date since the ecological overshoot started in the early 1970s (Earth Overshoot Day 2017 Calculator, 2017). This means that by August, humanity had consumed the resources that earth can renew within a year, meaning that for the remaining 4 months of the year 2017, we were extracting resources from the earth's backup stock (World Wildlife Fund(WWF), 2017). Bihouix & De Guillebon (2012) and Sana & Stokkink (2014) claim that an increasing world population (expectation to reach the 9 billion threshold in 2050) will continue to put pressure on the environment and especially on primary resources, food products, soil, water and biomass. According to Bihouix & De Guillebon (2012), the rarefaction of certain primary resources is mainly due to, how Korhonen, Honkasalo, & Seppälä (2018) refer to it, the current and traditional linear material and energy flow model. Consequently, the question arises what the so-called linear economy is and how it works. This will be the topic of our next subsection, where we will have a closer look at the current and traditional economic model.

1.1. Linear economy

The linear material and energy flow model follows a "take-make-dispose" pattern (Ellen MacArthur Foundation, 2013). To simplify the understanding of the model, we will refer to Figure 1 while reviewing the different steps of the model.

Figure 1: Linear material and energy flow model



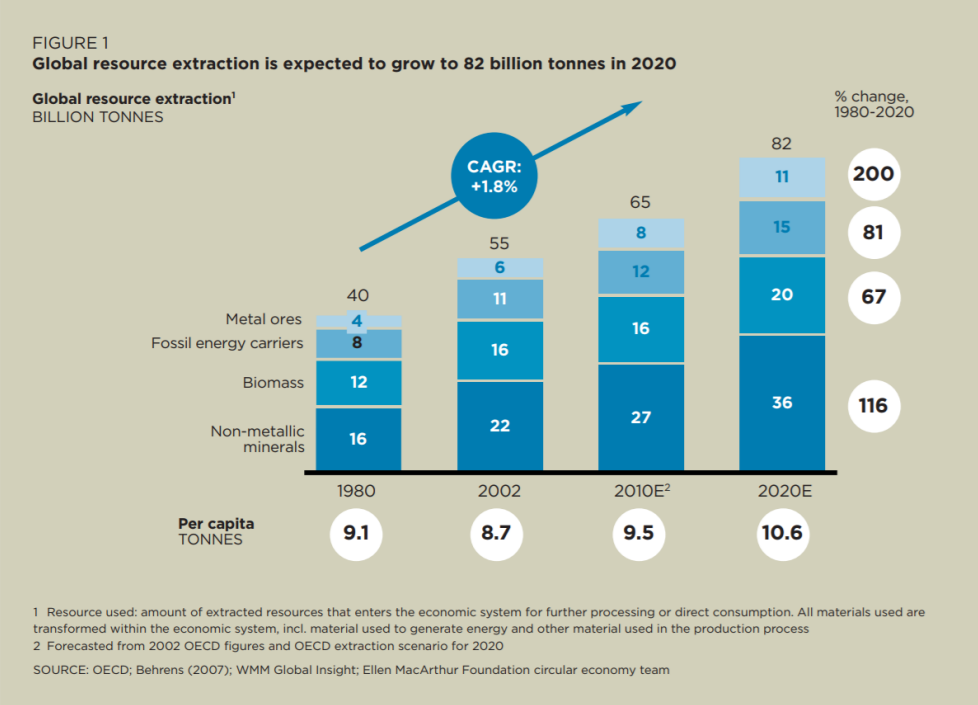
Source: Adapted from Le Moigne, R. (2014). *L'économie circulaire-Prix ACA BRUEL HEC*. Paris: Dunod. Retrieved from https://books.google.lu/books?id=Xzi_AgAAQBAJ

When we refer to Figure 1, several steps are necessary in order to create the final product. As a first step, natural resources are harvested or extracted. After that, the individual pieces are manufactured that will be subsequently assembled into modules enabling companies to create the final product. Then, the final product will be distributed and bought by an end consumer. Once the consumer has no use anymore for the product, it is discarded. Moreover, during the whole process, energy is used from

the extraction of natural resources until the use of the product by the end consumer. Hence, the current and traditional linear economy is based on extracting and/or harvesting natural resources and using energy to create a product; a product which will eventually end up as waste.

Le Moigne (2014) and Korhonen et al. (2018) claim that the limit of the linear model of resource consumption lies in its unsustainability. According to Le Moigne (2014), humanity is extracting and harvesting resources as if they were unlimited, which can be confirmed by the aforementioned earliest Earth Overshoot Day. In correlation with the forecast of a growing world population, the global extraction of natural resources is expected to grow to 82 billion tonnes in 2020, as we can see in Figure 2 (The Ellen MacArthur Foundation, 2013, p.15).

Figure 2: Global resource extraction



Source: The Ellen MacArthur Foundation. (2013). *Towards the circular economy*. The Ellen MacArthur Foundation. Retrieved from https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf

Consequently, the growing global resource extraction and the rarefaction of certain natural resources puts companies at numerous risks which can include increasing prices for primary resources, increasing price volatility or a supply disruption (The Ellen MacArthur Foundation, 2013). Yet, "circular economy provides the economic system with an alternative flow model, one that is cyclical" (Korhonen et al., 2018, p.1). One that, according to Sana & Stokkink (2014), might be a possible solution.

1.2. Circular economy: change of a paradigm

In this chapter, we will examine what way circular economy differs from linear economy, followed by a definition of circular economy itself. Subsequently, the foundation of circular economy will be reviewed. Afterwards, the concept of circular economy will be analysed thoroughly with an emphasis on the biological cycle. Finally, the limits of circular economy will be determined.

The circular economy implies a change of a paradigm, where the essence lies in substituting the concept of "take-make-dispose" by "repairing" (Sana & Stokkink, 2014). In other words, the goal of circular economy is to advocate for a more efficient and environmentally-friendly approach towards the use of natural resources and the reduction of waste (The Ellen MacArthur Foundation, 2013).

However, there is no commonly agreed definition about circular economy (Le Moigne, 2014). Among the numerous definitions that exist regarding the concept of circular economy, the following seemed the most appropriated for this master thesis: "A regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling" (Geissdoerfer, Savaget, Bocken, & Hultink, 2017, p.759).

Before the concept of circular economy will be explained, we will shortly review the foundation of circular economy.

1.2.1 Foundation of circular economy

Circular economy is not a completely new concept. It has deep-rooted origins that are unknown, as the generic concept can't be traced back to a specific date or author (The Ellen MacArthur Foundation, 2017a). According to The Ellen MacArthur Foundation (2017), circular economy has gained momentum since the late 1970s and ever since it has been constantly refined and developed by the following schools of thought:

Cradle to Cradle (C2C): The C2C concept and certification was developed by Michael Braungart and Bill McDonough. "The Cradle to Cradle framework focuses on design for effectiveness in terms of products with positive impact and reducing the negative impacts of commerce through efficiency" (The Ellen MacArthur Foundation, 2017, para. 1).

Performance Economy: The performance energy was originated by Walter Stahl and Genevieve Reday in 1976 (The Ellen MacArthur Foundation, 2017, para. 1). It describes the introduction of a closed-loop economy and "its impact on job creation, economic competitiveness, resource savings, and waste prevention" (The Ellen MacArthur Foundation, 2017, para. 1).

Biomimicry: Biomimicry, written by Janine Benyus, is a new discipline where nature serves as inspiration for innovation, for example, "studying a leaf to invent a better solar cell" (The Ellen MacArthur Foundation, 2017, para. 1).

Industrial Ecology: "Industrial ecology is the study of material and energy flows through industrial systems" (The Ellen MacArthur Foundation, 2017, para. 1). The main goal of the study, as stated by The Ellen MacArthur Foundation (2017), is to create a closed-loop process and to eliminate waste by using it as an input.

Natural Capitalism: Paul Hawken, Amory Lovins and L. Hunter Lovins refer to all natural assets as natural capital. This includes soil, air, water and all living things (The Ellen MacArthur Foundation, 2017). In other words, they "describe a global economy in which business and environmental interests overlap, recognising the interdependencies that exist between the production and use of human-made capital and flows of natural capital" (The Ellen MacArthur Foundation, 2017, para. 1).

Blue Economy: The concept was initiated by Gunter Pauli and describes how the waste of one product can become the input of new product thus generating a new cash flow (The Ellen MacArthur Foundation, 2017a).

Regenerative Design: The focus of this concept is the word "regenerative", which means, biologically speaking, "to grow again" (Cambridge Dictionary, 2018). Developed by John T. Lyle, the emphasis of the concept is on the regenerative practices for the use of energy, water and land as well as building design (Lyle, 1996).

1.2.2 The concept of circular economy

After we have defined circular economy and briefly reviewed the different foundations of circular economy, we are now going to focus on its concept and how it operates. With a view to simplify understanding, the explications are illustrated in Figure 3.

"Transitioning to a circular economy does not only amount to adjustments aimed at reducing the negative impacts of the linear economy. Rather, it represents a systemic shift that builds long-term resilience, generates business and economic opportunities, and provides environmental and societal benefits" (The Ellen MacArthur Foundation, 2017b, para.3).

The system distinguished between two cycles, which are also depicted in Figure 3, namely, on the left side the biological cycle and on the right side the technical cycle (The Ellen MacArthur Foundation, 2017b). The technical cycle will be analysed followed by the biological.

"Technical cycles recover and restore products, components, and materials through strategies like reuse, repair, remanufacture or (in the last resort) recycling" (The Ellen MacArthur Foundation, 2017b, para.4). An example would be a phone which at the end of its life is not discarded, but repaired, reused, remanufactured or recycled and

reintegrated, depending on the operation, either at the level of production, distribution or directly to the consumer.

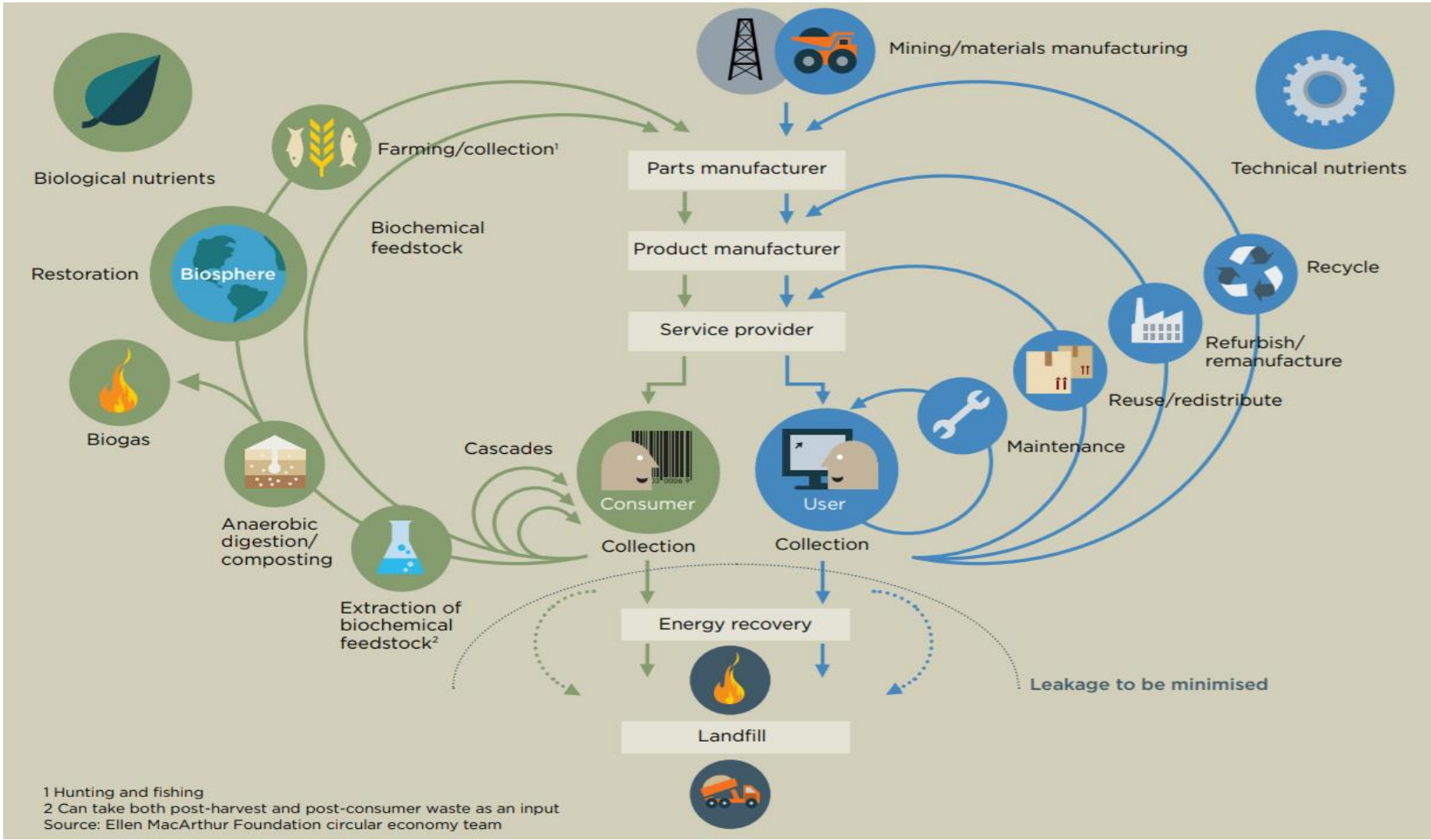
In the biological cycle, "(…) the ability to reintroduce products and materials back into the biosphere through non-toxic, restorative loops is at the heart of the idea" (The Ellen MacArthur Foundation, 2013, p.23). In other words, biological-based materials and food are reintegrated into the system through processes like reusing, biochemicals extraction, feedstock, composting or anaerobic digestion.

We are now going to look more closely at the left side of the model, the biological cycle, since the case study in this master thesis will be about biological materials, namely food (cf. Figure 3). As a first step, the model depicted in Figure 3, suggests cascading, which means reusing materials or components after end-of-life for a different purpose. Cascading can be repeated as much as the material or component allows it, knowing that each time it is reused, deterioration of the component or material will take place. (The Ellen MacArthur Foundation, 2013). Subsequently, if cascading is not possible or not possible anymore, the model suggests that the material or component is used to extract biochemical feedstock, which means that biomass is transformed into bioproducts or energy. The third step will be composting or anaerobic digestion. Composting can be explained as a natural decomposing process of organic materials under the influence of oxygen ending up in a soil-like material called compost. Furthermore, anaerobic digestion is the process of decomposing organic materials without the influence of oxygen into biogas and a solid residue. The solid residue after the decomposing process can be returned on the land or composted (The Ellen MacArthur Foundation, 2013).

All the different steps are done in order to keep the products and materials as long as possible in the economic system with the long-term goal to finally reintroduce them, in a non-toxic way, into the biosphere.

The core of a restorative circular economy is to minimise leakage of biological and technical products or materials. In case leakage can't be avoided, the model, as we can see on Figure 3, advocates for energy recovery, meaning "the conversion of non-recyclable waste materials into useable heat, electricity, or fuel through a variety of so-called waste-to-energy processes, including combustion, gasification, pyrolysis, anaerobic digestion, and landfill gas recovery" (The Ellen MacArthur Foundation, 2013, p.25). Only as a last solution, the model suggests landfill.

Figure 3: Outline of a circular economy



Source: The Ellen MacArthur Foundation. (2013). *Towards the circular economy*. The Ellen MacArthur Foundation. Retrieved from https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf

1.2.3 Limits of circular economy

Now that we have analysed the concept of circular economy, we are now going to focus on limitations regarding circular economy.

As stated by Korhonen et al. (2018), a first limit of circular economy is the early stage of scientific research considering the basis of the circular economy approach, as well as a definition of the concept which is not supported by common agreement thus hindering its practical application.

Moreover, technical, economic and political limits have been forwarded by Sana & Stokkink (2014). A technical limit, according to Sana & Stokkink (2014), is on the one hand the deterioration of certain materials when recycled (ex: recycled steel is not as good as new steel) and on the other hand the complexity of product flows, meaning that a product is rarely kept in its initial state, but often a number of components are added to obtain the desired product. This leads to a greater complexity when it comes to recycling the product. Another technical limit, advocated by Bihouix & De Guillebon (2012), is that there is no closed-loop system without any waste.

Regarding economic limits, Sana & Stokkink (2014) claim that circular economy might slow down short term economic growth. Yet, this claim relies on an economic indicator (GDP) taking solely monetary variables and no environmental or societal factors into account. Furthermore, Sana & Stokkink (2014) suggest that recycling is, economically speaking, only interesting when there is a high demand in resources. However, according to Bihouix & De Guillebon (2012), environmentally speaking, recycling will only have a positive impact on the environment if there is a controlled growth rate of global resource consumption.

Politically speaking, Sana & Stokkink (2014) suggest a reorganisation of the price, market and taxation system in order to successfully develop circular economy. According to Sana & Stokkink (2014), natural resources need to be taxed so that recycled resources become economically more interesting. Yet, this argument may be weakened regarding the effect on prices of natural resources due to rarefaction.

To conclude, this chapter outlined the limits of our current and traditional linear economic system as well as a possible alternative called circular economy; a concept that already exists since the late 1970s, but still finds itself in its infancy regarding scientific research. The core of circular economy is to avoid any sort of waste and to keep materials, components or products in the economic system as long as possible and when their end-of-life is reached, they are given back to the biosphere in a non-toxic way. By reducing waste to a maximum, the need for virgin material extraction, according to The Ellen MacArthur Foundation (2013), will be slowed down. Hence, the question arises what is waste and what amount of waste is the world facing, specifically with

regards to food waste. In the next chapter, we will briefly review waste in general and subsequently focus on food waste; the core problem of this master thesis.

2. Waste

As outlined in the previous chapter, a growing global population combined with our current economic system puts more and more pressure on the environment and especially on primary resources, food products, soil, water and biomass. The pressure on those raw materials is triggered by the fact that linear economy is unsustainable and producing a lot of waste. Circular economy may be a solution with a view to reduce waste and hence, reduce the pressure on the environment. As stated above and according to Bihouix & De Guillebon (2012) and Sana & Stokkink (2014), one of the main pressures is on food products which is directly related to the pressure on soil and water, since both are vital to grow food. As this master thesis will be about one specific type of waste, namely food waste, the decision was made to analyse this more specifically, since it is of utmost importance for the understanding of the following sections.

Within the framework of this master thesis, we chose the definition of Article 3(1) of the new Waste Framework Directive of the European Union (EU), who defines waste as "any substance or object which the holder discards or intends or is required to discard" (European Commission, 2012, p.9). Furthermore, we will explore the category of solid waste specifically, meaning "Solid or semisolid, non-soluble material (including gases and liquids in containers) such as agricultural refuse, demolition waste, industrial waste, mining residues, municipal garbage, and sewage sludge" (Business Dictionary, 2018), as fruits and vegetables belong to that category as well.

A rough estimation about worldwide urban solid waste, including construction, households, commerce and industry lies between 7 and 10 billion tonnes (Wilson et al., 2015, p.2). Yet, the United Nations' (UN) estimation lies higher with around 11.2 billion tonnes of solid waste collected worldwide (UN, 2016, para. 1).

This being said, we are now going to focus on food waste, which is the kind of waste LCB is looking to reduce.

2.1 Food Waste

According to a study conducted by the Food and Agriculture Organization of the United Nations (FAO) (2018), one third of the world's food production for human consumption is wasted or lost every year, accounting for approximately 1.3 billion tonnes (FAO, 2018, para.1). Furthermore, in Europe, 89 million tonnes and in Belgium, 3.6 million tonnes of food are wasted or lost every year, representing not only a huge environmental issue but also an economic, social and ethical one (Courtois, 2014, p.1 and p.4). According to Courtois (2014), it also represents an economic issue because every food product that is thrown away represents an economic loss for the respective individual or company in the food supply chain. Furthermore, food waste is also a social and ethical issue, because

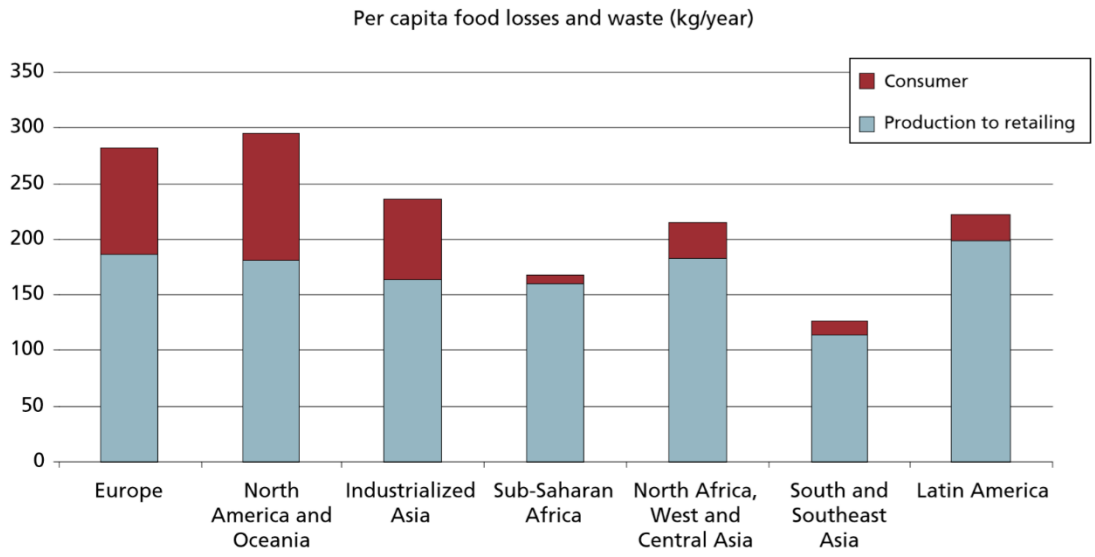
one third of the world's food production is wasted or lost while 1 out 8 people in the world are regularly suffering from hunger (Courtois, 2014, p.9). In Belgium, 100,000 people are dependent on food aid in order to survive (Courtois, 2014, p.9).

This review will start with the distinction between food loss and food waste, also called secondary and primary waste, followed by an analysis of where and at what stage most food is lost or wasted.

First of all, "food loss and food waste refer to the decrease of food in subsequent stages of the food supply chain intended for human consumption" (FAO, 2018a, para.2). One refers to food loss, also called secondary waste, when food is spilled or spoiled, accidentally or intentionally, before the final retail stage is reached (FAO, 2018a). According to the FAO (2018a), this may occur due to "problems in harvesting, storage, packing, transport, infrastructure or market / price mechanisms, as well as institutional and legal frameworks" (FAO, 2018a, para.4). However, when the food is spilled, spoiled or discarded by retailers or consumers then the word food waste or primary waste is applied (FAO, 2018a). The reasons for food waste or primary waste are, as stated by the FAO (2018a), improper storage, rigid or misunderstood date marking rules, and buying or cooking practices.

In the following part, the region and the stage in which food waste and loss occurs the most will be determined. As outlined in Table 1, food loss and waste per capita are the highest in Europe and North America and Oceania with around 280-290 kg a year. Furthermore, pre-consumption waste and loss, which means from production to retailing, is higher than food loss at consumption.

Table 1: Per capita food losses and waste, at consumption and pre-consumptions stages, in different regions

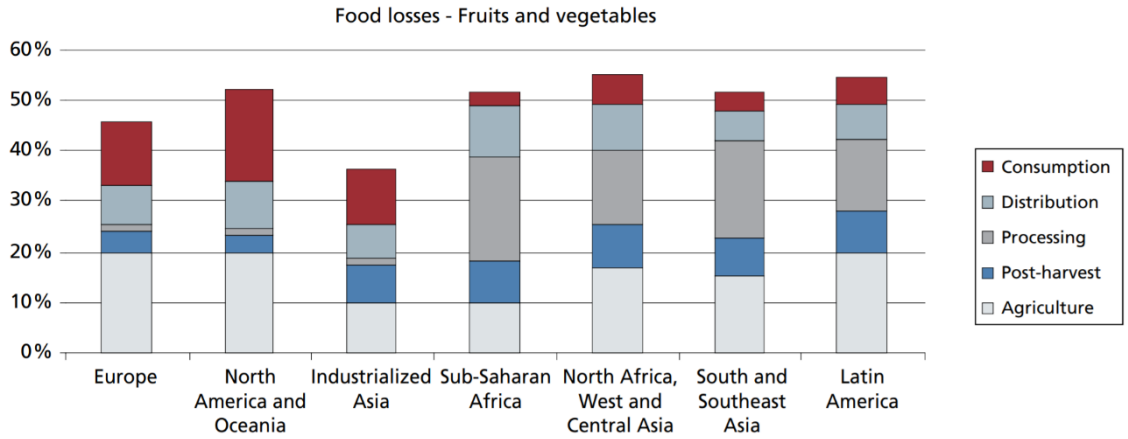


Source: FAO. (2011). *Global food losses and food waste - Extent, causes and prevention* (p. 30). Rome. Retrieved from http://www.fao.org/docrep/014/mb060e/mb060e00.pdf

Moreover, food loss and waste also depend on the degree of industrialization. As stated by the FAO (2018), in developing countries food loss and waste occurs first and foremost at early stages of the supply chain, namely at post-harvest and processing levels, whereas in industrialized countries, it mostly occurs at retailer and consumer level.

According to the FAO (2018), within food waste and loss, fruits and vegetables, including roots and tubers, have the highest rate of wastage than any other food. As Table 2 outlines, in Europe, a staggering waste and loss of fruit and vegetables occurs between the stages of agriculture and distribution, accounting for more or less 33% in total. The reason for the high post-harvest loss in industrialised countries is the tight quality standards set by the retailers (FAO, 2011). However, as mentioned before (cf. supra p.12), transportation, packaging, infrastructure or market mechanisms and even legal or institutional frameworks are also causing food loss and waste (FAO, 2018a). Yet, the food wasted at the stage of consumption can't be neglected either with a more or less 15% loss in Europe.

Table 2: Part of the initial production lost or wasted at different stages of the FSC for fruits and vegetables in different regions



Source: FAO. (2011). *Global food losses and food waste - Extent, causes and prevention* (p. 30). Rome. Retrieved from http://www.fao.org/docrep/014/mb060e/mb060e00.pdf

During this master thesis, the focus will be on the loss and waste occurring between harvesting and the final retail stage. In other words, the food waste of consumers will be left out as it is a very particular topic and not in the scope of this thesis. Furthermore, the term "food waste" in the next chapters needs to be considered with caution as, according to Filho & Kovaleva (2015), no single definition of the term exists and hence might differ from the definition of the FAO used in this paper. With a view to avoid misunderstanding for part 2 (The Case Study), only the term "food waste" will be used, regrouping the waste occurring from agriculture until retailer.

After we have gathered a good understanding about waste and more specifically food waste, we are now going to focus on how to manage food waste in connection with circular economy.

2.2 Food waste management

In this subsection we will have a look at food waste management and the order food waste should be treated. This section is important in order to find out where the dehydration centre would intervene.

The original waste hierarchy or "Lansink's Ladder" was introduced by the politician Ad Lansink in the Dutch parliament in 1979 (Recycling, 2016). It indicates an order of priority concerning how to reduce and manage waste, starting with the most favourable option on the top down to the least favourable one on the bottom (Mulder, Ferrer, & Lente, 2017). In Figure 4, we can see an illustration of the ladder of Lansink showing 6 different steps of waste management options with a view to use natural resources in an efficient way (Recycling, 2016). The ladder starts with options of reducing and reusing with the goal to avoid waste. The first option aims for reducing food waste at its source. In other words, to avoid food waste at all stages as for instance by preventing a food production surplus (Mulder et al., 2017). The second option advocates for food waste to be reused, for human consumption, with little or no change of the initial product (Recycling, 2016).

Subsequently, the ladder of Lansink focuses on recycling and energy. During the recycling process, waste is separated and processed with the goal to manufacture a new product (Recycling, 2016). Furthermore, the option energy, refers to all sorts of energy extraction from food waste (Recycling, 2016).

The last two options are incineration and landfill, which can be regrouped into the category "disposal" (Recycling, 2016). In both cases, waste doesn't serve a purpose anymore. Incineration is preferred to landfill because waste isn't disposed of in landfills, but burned instead (Recycling, 2016).

Figure 4: Lansink's Ladder

Source: Recycling. (2016, June 21). *Waste Hierarchy: Lansink's Ladder by Ad Lansink*. Retrieved 18 July 2018, from http://www.recycling.com/downloads/waste-hierarchy-lansinks-ladder/

Today's waste framework directive (Directive 2008/98/EC) of the EU is based on the principles of Lansink's ladder with some minor changes (European Commission, 2016). The waste framework directive only has 5 steps instead of 6 called: prevention, preparing for re-use, recycling, recovery and disposal (European Commission, 2016).

Recovery substitutes the option energy but has no impact on its initial meaning. Moreover, disposal is regrouping the last two options, incineration and landfill, into only one.

The dehydration centre would intervene at the second step of the food waste management hierarchy, namely preparing for re-use, because the products would be dehydrated, which means only a small change from its initial product and intended for human consumption. Furthermore, the focus would be on the dehydration of fruits and vegetables, which have the highest rate of wastage within food waste (cf. supra p.13). In the next chapter, we will have a look at zero waste trends as it is important to find out if public authorities are supporting projects reducing food waste and further, in what way they are or are not supporting these kinds of projects.

3. Zero Waste trends

Before explaining the project regarding a dehydration centre for fruits and vegetables, an analysis of the current policies and measures regarding the Zero Waste movement is required.

First, the international context of the Sustainable Development Goals will be considered, then the European approach to Zero Waste will be analysed, to then conclude with the concrete measures existing in Belgium, and more precisely in Brussels.

3.1 International context

The issue of climate change is still a recurrent topic nowadays. In 2010, a report of the International Panel for Sustainable Resource Management identified production, consumption and resource management as well as the links between them to be the priorities when addressing the issue of climate change (Fremault, 2015).

In 2011, the OECD published a study outlining the fact that an efficient food sector respecting the environment would contribute to sustainable growth and to food security, and therefore reduce the pressure on diminishing resources (Fremault, 2015).

In 2015, the General Assembly of the United Nations adopted the resolution on the 2030 Agenda for Sustainable Development. This agenda outlines the seventeen sustainable development goals and targets (UN, 2015). In this context, we will further analyse "Goal Number 12: Ensure sustainable consumption and production patterns" (UN, 2015). The following list will give some of the targets related to this goal concerning Zero Waste, and more precisely food waste.

Table 3: Targets related to Goal 12 of the Sustainable Development Goals

Goal 12: Ensure sustainable consumption and production patterns
Targets
• Implement the 10-year framework of programmes on sustainable consumption and production, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries • By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses • By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

- Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production

Source: Adapted from United Nations (UN). (2015, October 21). *Transforming our world: the 2030 Agenda for Sustainable Development.* Retrieved from http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

The aforementioned 10-year framework was adopted at the United Nations Conference on Sustainable Development (Rio+20) in 2012. This framework aims to shift current methods of consumptions and to produce a sustainable consumption and production (SCP). One programme included in the framework is to combine the FAO-UNSEP Sustainable Food Systems Programme and the Agri-Food Task Force on SCP and improve the usage of resources in an efficient manner (UN, 2012).

The FAO-UNSEP Sustainable Food Systems Programme includes four domains of activities with related outcomes (United Nations Environment Programme (UNEP), 2010). Firstly, the need for knowledge sharing about platforms on agri-food products and sustainable food systems is required. Secondly, communication about sustainability of food products needs to be improved. Thirdly, policies need to be implemented to provide the necessary conditions for sustainable production practices (FAO & UNEP, 2010, p.2). Lastly, the programme outlines the necessity of "market-based mechanisms for sustainable food consumption and production throughout the supply chain" (FAO & UNEP, 2010, p.2). It is exactly the fourth dimension of this food programme that the project of LCB is tackling with the creation of its dehydration centre.

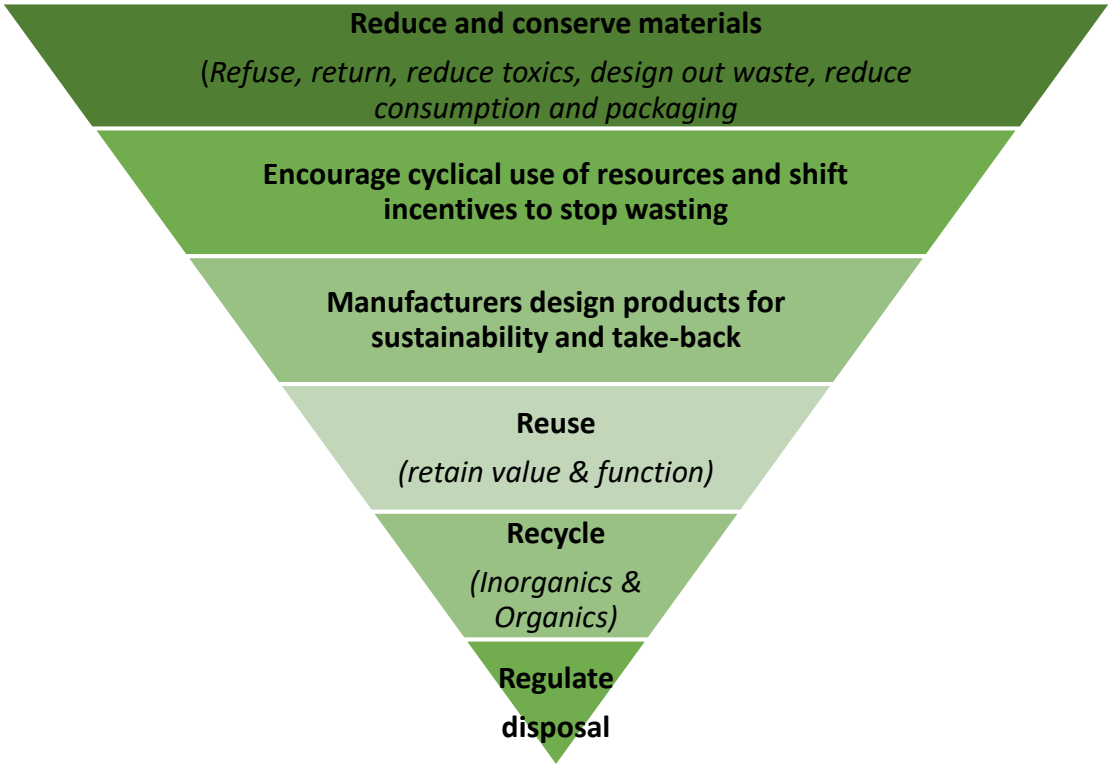
The Fundació per a la Prevenció de Residus i el Consum Responsable in collaboration with Zero Waste Europe want to implement a new concept concerning Zero Waste; the ERP. An ERP scheme is an Extended Producer Responsibility scheme which shifts the responsibility of waste collection and management to the producers from the moment that the product becomes waste (Mitjans Sanz, Diez Rica, Fernández Palacios, Medina Alsina, & Vázquez Mouriz, 2015). Producers will be responsible for the whole life-cycle of a product, and more specifically for the disposal and the recycling of the product at the end of the cycle. This scheme is mostly used regarding the disposal and the recycling of products as for instance batteries and WEEE (waste of electric and electronic equipment). Further, the issue of littering is also taken into account, where food packaging plays an important role (Mitjans Sanz et al., 2015). This scheme would affect LCB in a manner that it should consider using an environmentally friendly packaging, which according to the EPR scheme, lies solely in their responsibility.

Besides, the Zero Waste Hierarchy of highest and best use outlines fundamental guidelines for producers, companies and consumers. This hierarchy was implemented by the Zero Waste International Alliance to define the different steps on how to design

waste out of the system rather than find possibilities to regulate the disposal of waste (Simon, 2013).

The following figure will summarize the different steps of the Zero Waste hierarchy.

Figure 5: Zero Waste hierarchy



Source: Adapted from Zero Waste International Alliance. (2015). *Zero Waste Hierarchy | Zero Waste International Alliance*. Retrieved 25 May 2018, from http://zwia.org/standards/zero-waste-hierarchy/

It is now interesting to analyse which area of the waste hierarchy LCB is targeting with its dehydrated fruits and vegetables. If LCB would use a packaging that limits emissions, it would be oriented in the reduce and conserve section. Besides, LCB is encouraging a cyclical use of resources through implementing sustainable purchasing and supporting the local economy. Furthermore, the product is designed to be durable and recyclable. Lastly, the product comes from fruits and vegetable that are reused and then dehydrated in order to increase their lifetime value (Zero Waste International Alliance, 2015).

3.2 European context

Now that we have reviewed the international context, we are now going to focus on the European one. As stated by Courtois (2014), Europe has numerous initiatives in order to reduce food wastage. Already in 2008, European regulations regarding quality norms of vegetables and fruits have been loosened to counteract the wastage of food (Courtois, 2014). In 2011, the European Commission announced that food wastage has to be cut

down by half until 2020 (Courtois, 2014). Yet, according to Peschet (2017), it seems that the targets set in 2011 won't be met. Peschet (2017) blames first and foremost, the absence of a commonly accepted definition in the European Union of the term "food waste" and a lack in KPI's at a date of reference in order to evaluate the progress of the initiatives. The European Parliament forwarded the suggestions to reduce food prices as they reach the final days of their shelf life, a practice that is not legal in all the European countries (Courtois, 2014). Furthermore, from 2010 until 2013, the project GreenCook was initiated at European scale by "Espace environnement[1]" to reduce food waste. All in all, the results have been positive with, as for instance, a reduction of 20% in food waste for canteens who participated in the project "Cantines durables" from Bruxelles Environnement[2].

The 2nd of December 2015, "(…) the Commission adopted an ambitious new Circular Economy Package to stimulate Europe's transition towards a circular economy which will boost global competitiveness, foster sustainable economic growth and generate new jobs" (European Commission, 2015, para.1). In the press release from the European Commission in 2015, the Vice-President Frans Timmermans, who is responsible for sustainable development, made a statement saying that; "*our planet and our economy cannot survive if we continue with the 'take, make, use and throw away' approach. We need to retain precious resources and fully exploit all the economic value within them. The circular economy is about reducing waste and protecting the environment, but it is also about a profound transformation of the way our entire economy works. By rethinking the way we produce, work and buy, we can generate new opportunities and create new jobs. With today's package, we are delivering the comprehensive framework that will truly enable this change to happen. It sets a credible and ambitious path for better waste management in Europe with supportive actions that cover the full product cycle. This mix of smart regulation and incentives at EU level will help businesses and consumers, as well as national and local authorities, to drive this transformation" (European Commission, 2015, para. 4).*

The package can be divided into two big parts, namely circular economy and legislative proposals on waste. The main actions of the EU for circular economy include a reduction by 50% of food waste until 2030, the development of quality standards for secondary raw materials, actions on water reuse, a plan for plastics in the circular economy, revised regulation on fertilizers, an ecodesign working plan for 2015-2017, the collection in funds of over €650 million by 2020 and €5.5 billion under structural funds (European Commission, 2015). The legislative proposal on waste aims for a long-term plan in improving waste management and recycling. This includes recycling targets of 65% and 75% for municipal and packaging waste to be reached by the end of 2030, reducing

[1] An independent organization of public interest, working together with associations, companies, citizens and public authorities (Espace Environnement, n.d.).

[2] Brussels' organization for environmental management (Bruxelles Environnement, 2018).

landfill and promoting reuse, industrial synergies and the introduction of sustainable products on the market (European Commission, 2015).

All in all, the European Union wants to support the transition from linear economy towards circular economy with numerous actions. Furthermore, a legal framework was established with a view to legally bind EU countries to reduce waste. This is positive for the project, as Belgium is an EU country and, hence, legally bounded to reduce waste. Yet, the targets set by the European Commission are ambitious and not always met as we can see with the initiative taken in 2011. Furthermore, according to Planetoscope (2012), recycling rates have improved. However, this is mainly due to higher recycling rates of materials, whereas the rates of organic waste progress slower.

3.3 Belgian context

After introducing the international and European context regarding Zero Waste trends, we need to analyse the Belgian framework regarding Zero waste specifically with regards to food waste.

Belgium is a country that has always been concerned with the issue of food waste. As for example, in 2014, a Belgian charity installed a fridge that is open 24/7 where citizens can leave food for those in need (Szczepanski, 2016). On the other side, Belgium is one of the biggest food waste generators in the EU, according to a study that has been conducted in 2013 (Kretschmer et al., 2013).

According to a report of the Flemish Department Landbouw en Visserij, the total food loss in Belgium is approximately 3.6 tonnes/year. Responsible for the biggest losses are the food industry and the households (Roels & Van Gijseghem, 2011). A study found that in Belgium, 21% of the unopened packages in the mixed household waste bag are not yet past its expiration date (Roels & Van Gijseghem, 2011).

In Belgium, a global intersectoral food policy is non-existent because aspects like agricultural production, health, and resource management are mostly managed by the different regions themselves (Fremault, 2015).

The “Conseil Fédéral du Développement Durable” (CFDD) issued a list of recommendations regarding food loss and waste. This document is targeting different aspects which include fair business practices, political objectives, awareness and communication campaigns, prevention of food loss in the food security policy and social use of food surplus (CFDD, 2015).

There is a variety of actions and initiatives undertaken by actors of the food sector in order to evolve to a sustainable food system. Some of these initiatives are supported by the federal state, as for instance an action aiming at reducing water and energy consumption in the different stages of the supply chain (Fremault, 2015).

Another initiative is the one of the partnerships between Delhaize and the Brussels Beer Project (BBP), where BBP got the unsold bread from Delhaize donated in order to produce their local beer “Babylone” (EuroCommerce, 2017).

Besides, Colruyt Group cooperates with food banks in order to decrease its food waste. These food banks can collect the food that Colruyt donates to them, mostly products that have four days before their expiration date. With this initiative, the supermarket chain was able to reduce food waste by 450 tonnes a year (EuroCommerce, 2017, p.17).

Now, we are going to have a closer look at the context of Brussels, the urban area where the dehydration centre is set to be created.

3.4 Brussels context

During the last years, the region Brussels-Capital has taken several initiatives in order to fight against food waste. From 2010 until 2013, as already mentioned above (cf. European context), the project GreenCook was initiated by “Espace environnement”, which led to a reduction of 20% in food waste for canteens who participated in the project “Cantines durables” from “Bruxelles Environnement”. Another initiative was taken in 2013, when the VAT on food donation was removed. Two recent initiatives will be explained in more detail below with a view to establish a political framework.

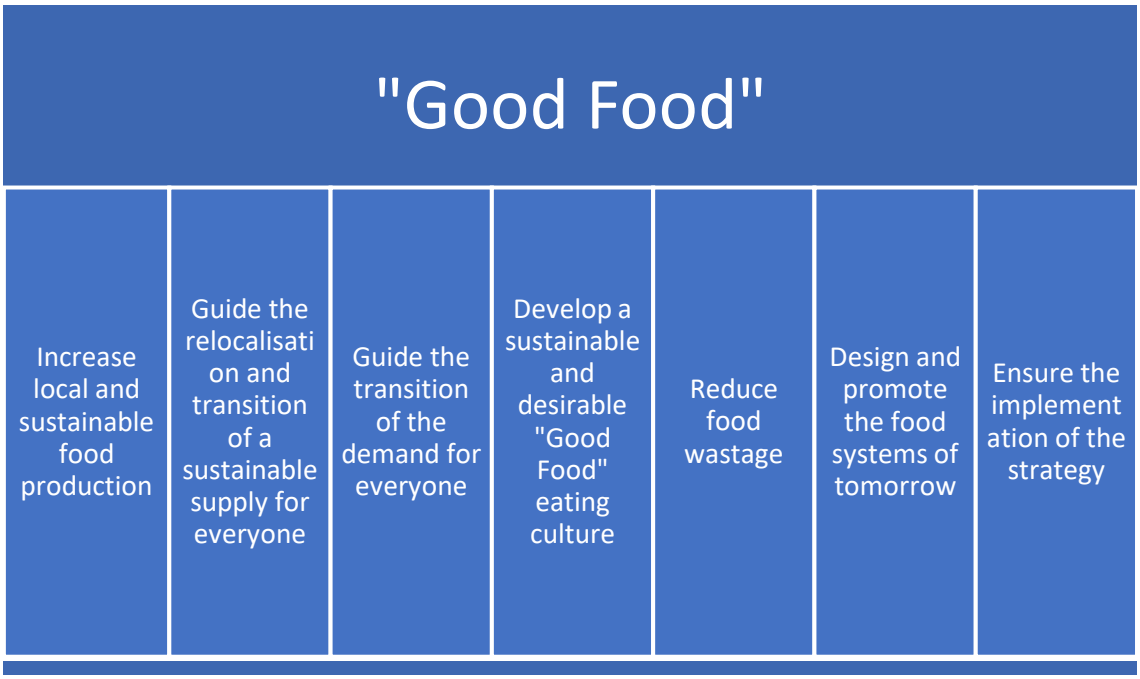
3.4.1 The “Good Food” Strategy

This subsection was written based on the information provided in the report from Fremault, C. (2015): STRATEGIE GOOD FOOD « VERS UN SYSTÈME ALIMENTAIRE DURABLE EN RÉGION DE BRUXELLES-CAPITALE ». Brussels: GoodFood.brussels.

The strategy was developed on the initiative of Céline Fremault, Brussels’ minister of environment, agriculture and quality of live, in collaboration with “Bruxelles Environnement”, and “Cellule Agriculture de SPRB”. Moreover, they collaborated with around 100 representatives of Brussels’ and Belgium’s food chain. The concept of “Good Food” was adopted to pave the way for a more sustainable food system in the future.

The main ideas of the concept are to advocate for a better production and healthier consumption. This means that they are not only aiming for a more local and qualitative higher diet as well as healthy and sustainable products, but also for a healthier lifestyle and local products to be accessible for everyone. In the illustration below (cf. Figure 6), we can see a summarized version of “Good Food” and the 7 pillars it rests upon.

Figure 6: The 7 pillars of the “Good Food” strategy



Source: Own conception based on the information provided by Fremault, C. (2015). *STRATEGIE GOOD FOOD « VERS UN SYSTÈME ALIMENTAIRE DURABLE EN RÉGION DE BRUXELLES-CAPITALE ».* Brussels: GoodFood.brussels. Retrieved from http://document.environnement.brussels/opac_css/elecfile/Strat_GoodFood_FR

The strategy “Good Food” has several main objectives. The first one, according to Céline Fremault (2015), is to support the development of urban agriculture in a way that in 2035, 30% of Brussel’s fruits and vegetables are produced locally, implying an increasing supply to the region through short cycles (Fremault, 2015, p.4). Furthermore, the young generation is also taken into account with a strategy to trigger their contemplation about nutrition (Fremault, 2015). A third objective is to tackle food wastage and reduce it by 30% until 2020 (Fremault, 2015, p.4). In the first instance, this is being done by preventing food waste, followed by fostering recovery and upcycling of unsold items.

We are now going to analyse more precisely the pillar “Reduce food waste” as it is most interesting for our case. The action is divided into two sub-actions. The first sub-action tackles food wastage at its origin which means their goal is to avoid a surplus in food leading to its wastage. The sub-action includes the sensitization of households, a “Good Food” educational program for school canteens, supporting supermarkets in finding solutions to reduce food waste as well as promoting customers to take their leftovers home after they have had a meal at a restaurant.

The second sub-action supports projects upcycling unsold food because surplus can’t be completely avoided. The strategy supports initiatives collecting unsold food by co-financing the necessary logistics. Furthermore, the strategy aims that supermarkets active in the region Brussels-Capital collaborate with at least one association. A point of

utmost importance for this paper is that the region supports projects, who aim to transform unsold food in order to reintroduce them again into the commercial cycle.

3.4.2 "Be Circular"

The regional circular economy program 2016 - 2020 (PREC) was accepted by the government of the region Brussels-Capital on the 10th of March 2016 (Be Circular, 2018a). According to the website "Be Circular" (2018), the program has three general objectives. The first one is to take on environmental issues and transform them into opportunities. Secondly, the program wants to promote local production and short cycles thus creating added value for Brussel's people. The last goal is to create jobs. As the program includes 111 actions, we will not consider all as it would go beyond the scope of this study (Be Circular, 2018a). However, we can summarize them into territorial, transversal, sectoral and governmental measures (Be Circular, 2018a).

Among all actions taken, I would like to highlight the call for projects "Be Circular" with the goal to support innovative projects from companies to develop circular economy business models (Be Circular, 2018b). Every year, €1.5 million is made available to support and promote these projects (Be Circular, 2018b).

The edition 2018, under the announcement banner "Zero Waste", is divided into 4 main topics: 3R (Repair, Reuse, Recycle), sustainable nutrition, new business models and circular construction sites (Be Circular, 2018b). The winners of the call for projects "Be circular" receive financial aid, consultancy if needed and the honours for a successful project (Be Circular, 2018b). In the edition 2017, one of the winners was "Le Champignon de Bruxelles" with the idea to create a dehydration centre in order to reduce food waste. In the following chapter, we will have a closer look at the company and its initiative.

4. Le Champignon de Bruxelles

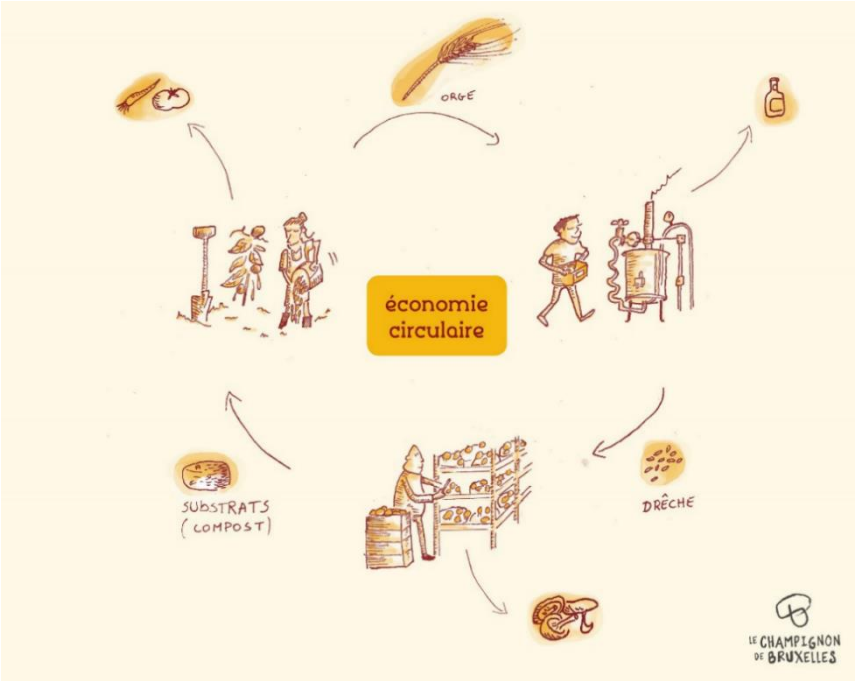
The company was founded in 2016 in the form of a cooperative company with limited liability. The main idea of the project is to locally produce healthy food by reasserting Brussels organic waste. Nowadays, food production is heavily decentralized and imported from all over the world. However, Le Champignon de Bruxelles found a way to grow Japanese mushrooms in Brussels by adhering to the principles of circular economy.

4.1 A production fitting into the scheme of circular economy

LCB produces three kinds of mushrooms known under the name Shiitake, Nameko and Maitake. They are grown on substrates made from brewer grains, which is the "solid residue left after the processing of germinated and dried cereal grains (malt) for the beer production and other malt products" and sawdust (Feedipedia, 2017). A striking fact is that only 10% of the resources necessary to produce beer are actually ending up in your glass, constituting a considerable waste of resources (COOPCITY, 2017). Several breweries in Brussels have a constant increase in production as for instance "Brasserie de la Senne", "Cantillon", "Brussels Beer Project" (Séon, 2017). However, an increase in production comes with an increasing quantity of organic waste. So far, according to Séon (2017), none of Brussel's breweries are efficiently exploiting the potential of brewer grains as a resource.

Therefore, Le Champignon de Bruxelles has created a method to revalorize the residue and make it their primary resource with a share of around 60% in each substrate (Le Champignon de Bruxelles, 2017). As breweries need to pay to get rid of brewer grains, the system of LCB creates a unique situation where both parties benefit (Ghilain, 2017). According to "Bruxelles Propreté", the price depends on the quantity they want to have taken away. In other words, LCB gets 60% of its primary resources for free and in return, the brewery doesn't need to pay the fee.

Figure 7: The production cycle of “Le Champignon de Bruxelles”



Source: Le Champignon de Bruxelles (2017, 13th novembre). *Circuit de production.* [Intranet]. Bruxelles : Le Champignon de Bruxelles.

Once the brewer grains are picked up at “Cantillon”, who are located right next to the headquarters of LCB, they are brought to the caves of Cureghem to get mixed with sawdust and turn it into a more solid mixture. After that, the mix of the two resources is pasteurized at 90C° for 2 to 3 hours in order to stop the proliferation of other mushrooms or bacteria (Le Champignon de Bruxelles, 2017, p.11). Afterwards, the mixture needs to be cooled down as fast as possible and filled into bags where the inoculation with the appropriated mycelium takes place. This step must be done under strict hygienic rules to avoid any type of contamination. Subsequently, the inoculated bags are placed for 8 weeks in the inoculation room (Le Champignon de Bruxelles, 2017, p.11). Once the mycelium covers the whole substrate and starts to form a white crust, the substrates are placed in the last room for one and a half weeks, where the final eatable mushroom starts to sprout.

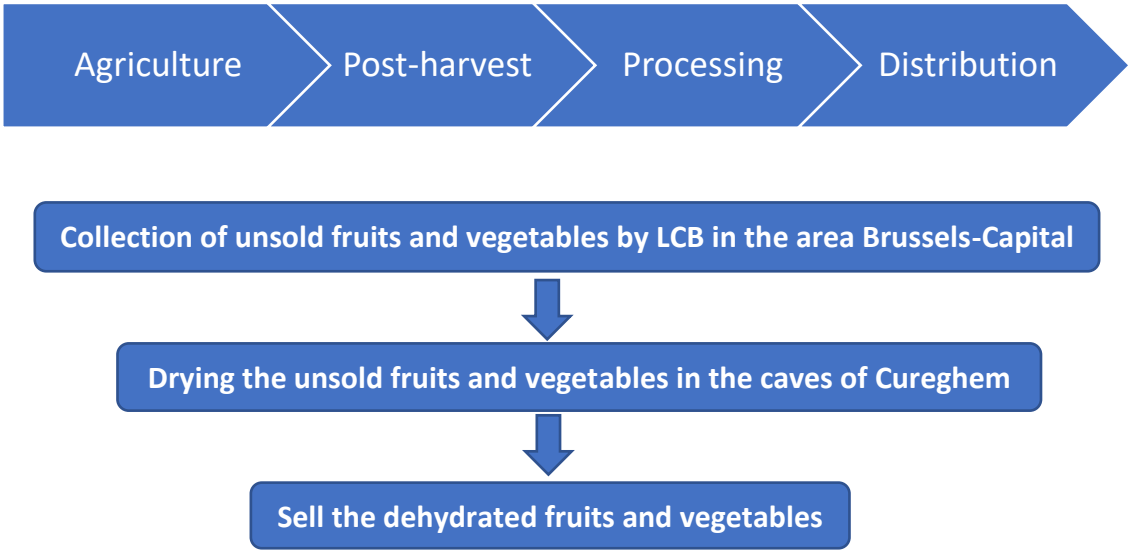
The final step is the harvest of mushrooms. Nonetheless, this is not the end of a substrate’s life cycle. In fact, they are picked up by farmers who use them as fertilizer on their fields to grow vegetables or maybe even barley, which is then in turn used again to brew beer.

4.2 A production process serving a second purpose

During the pasteurization process, a crucial part for the substrates’ origination (cf. supra), the mixture is brought up to 90C° for 3 hours and then cooled down to 20C° room temperature (IRISIB (Institut de Recherche de l’Institut Supérieur Industriel de Bruxelles), 2017, p.1). This heating and cooling down process implies the evacuation of

a considerable amount of energy at each production cycle. The cooling down phase, lasting 4 hours, enables to evacuate energy of approximately 300 000 kJ (IRISIB, 2017, p.1). The power of cooling is about 20kW, which is evacuated under the form of hot air (IRISIB, 2017, p.1). So far, the evacuated energy doesn't serve a purpose. However, LCB wants to initiate a shift and use it for dehydration, which could serve, according to Camille Séon (Project Manager at LCB), to dehydrate more than 1 ton of fruits and vegetables annually, with the machine only used once a week. As a result, LCB had the idea to create a dehydration centre in the area Brussels-capital, more precisely at Cureghem, with a view to reduce food waste in Brussels. In the following figure, the general idea is presented and divided into the main steps.

Figure 8: Presentation of the general idea



Source: Own conception

5. Dehydration centre

After the idea of a dehydration centre was born, it still had to be developed. Therefore, in this section, the different options and methods of dehydration will be studied in order to find a method most suited for our case. This will be followed by an explanation of the notion of a dehydration centre, to which we will regularly refer to during this master thesis. Moreover, this chapter has been written based on literature. An expert in dehydration, Laurence van Nedervelde (Researcher at LABIRIS) was also contacted. Nevertheless, she referred me again to literature as dehydration depends heavily on the method, the machine and what you're dehydrating.

As a first step, the focus will be on the concept of dehydration. As stated by Brennand (1994), Flores & Schlenker Davis (2016) and The University of Georgia Cooperative Extension (2018), dehydration is the oldest method of food preservation. Already during the ancient times, sun drying was used by the Persians, Greeks, Chinese, Hindus and Egyptians to preserve fruits and vegetables (Brennand, 1994). The process of drying

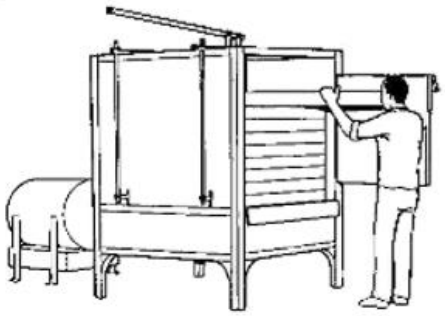
consists in removing the moisture from the food (The University of Georgia Cooperative Extension, 2018). In other words, “microorganisms which grow rapidly on raw or fresh food products can be controlled by drying because the lack of water limits the growth of microorganisms; however, drying does not kill the microorganisms” (Brennand, 1994, p.1). As a result, bacteria, mould or yeast are unable to grow on the food, usually leading to its spoilage (The University of Georgia Cooperative Extension, 2018). Yet, as Brennand (1994) claims in his paper, preservation also requires control of enzymes, since they can catalyse a change in colours or undesirable flavours. Therefore, some fruits and vegetables need a pre-treatment. However, since we don’t know yet, which fruits and vegetables will be dried, we will come back to this point later (cf. Key Activities).

In this paragraph, methods used to dehydrate fruits will be briefly presented, while focusing on the most common ones. First of all, we can distinguish between outside and inside drying (The University of Georgia Cooperative Extension, 2018).

Outside drying can be distinguished between sun drying and solar drying, which is an improved version of sun drying using a foil surface to increase temperature and shorten drying time (The University of Georgia Cooperative Extension, 2018). Both methods rely on the sun as the energy source and are therefore unsuitable for our case, since the drying will take place inside the caves of Cureghem.

The most common inside drying methods are dehydrators, ovens and microwaves (The University of Georgia Cooperative Extension, 2018). Yet, ovens are ideal only for occasional drying, because it is slower than a dehydrator and uses more energy (The University of Georgia Cooperative Extension, 2018). Furthermore, according to The University of Georgia Cooperative Extension (2018), microwaves should only be used to dry herbs because of the impossibility to create air flow in them. Therefore, in this case, dehydrators will be the method used to dehydrate the fruits and vegetables. Dehydrators are equipped with heat regulators, an inside air circulation system and a venting system, which allows the intake and exhaust of air, helping to evacuate the moisture (Brennand, 1994). According to Practical Action (n.d.), there are also other food drying techniques including spray, roller and freeze dryers, as well as tray and tunnel dryers. However, as stated by Practical Action (n.d.), tray dryers are the only ones appropriated regarding output and costs for small and medium sized companies. In Figure 9, a simplified model of a tray dryer is depicted.

Figure 9: Tray dryer



Source: Singh, C. (2015). *Drying and Dehydration of Fruits and Vegetables.* [Power Point Presentation]. Athens, GA: The University of Georgia.

Therefore, considering the data gathered, a dehydrator with trays would be the optimal drying method for this case. Furthermore, the nutritional value of dried fruits and vegetables almost stay the same if the ideal temperature of the specific product is respected (Brennand, 1994). Only a minimal loss in vitamins may occur, while minerals and fibre remain the same (Brennand, 1994).

The concept of a centre has to be defined as well. Numerous definitions of the word "centre" exists, however, for this case the following definition will be applied: "A place or group of buildings where a specified activity is concentrated" (Oxford University Press, 2018).

In combination with the notion of dehydration, the dehydration centre in this master thesis would be located in the caves of Cureghem where the activity of dehydration by the method of tray dryers would be concentrated.

6. Urban area

In this chapter, the focus will be on the concept of an urban area. As a first step, the notion of an urban area will be defined according to the definition of National Geographic's: "An urban area includes the city itself, as well as the surrounding areas" (National Geographic, 2011).

Throughout this master thesis, the region Brussels-Capital will be the referred urban area, constituting an important variable because it defines the framework of the dehydration centre and impacts the feasibility of its creation. Therefore, it is of utmost significance to determine the actual situation in the region Brussels-Capital, as well as the potential opportunities and drawbacks regarding a defined territory.

The previous established context and more specifically the Belgian and Brussels political framework regarding zero waste trends allows us to draw a first picture about the support public authorities provide to local initiatives. To complete the picture, a SWOT

about the region Brussels-Capital created by be.brussels as part of the regional program for circular economy 2016-2020 (PREC) will also be taken into account (cf. Appendix 1: SWOT analysis of the region Brussels-Capital). All in all, it can be said that public authorities support local initiatives regarding circular economy, which is positive for the project. Moreover, the international as well as the European political context are supporting the shift from linear to circular economy (cf. supra), which can be confirmed by be.brussels (2016). Besides, according to be.brussels (2016), Brussels states an example in ecosystem approaches. However, as claimed by be.brussels (2016), the regions in Belgium don't have a common agreement on the notion of circular economy and its definition.

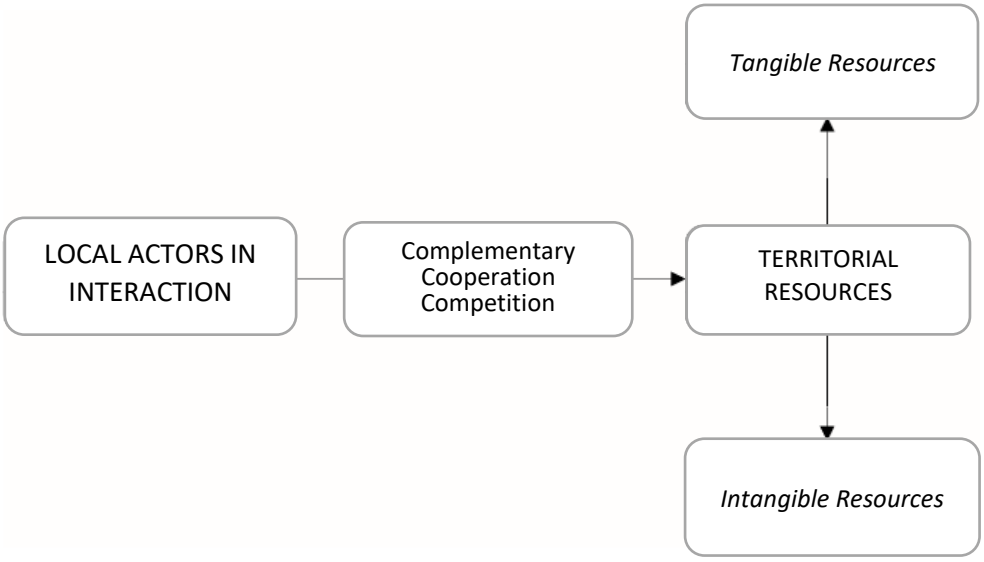
Besides circular economy, the region Brussels-Capital also presents economic opportunities and threats. As stated by be.brussels (2016), on the one hand the region has a steady increase in population and a growing economy linked to its environment and on the other side, the region observes an outflow of wealthy households, a competition between regions and an unfavourable economic situation.

The region Brussels-Capital offers as well multiple strengths (cf. Appendix 1: SWOT analysis of the region Brussels-Capital), as for instance its unique geographical position (be.brussels, 2016). Moreover, the capital city is the heart of Belgium's economy with 93.000 companies active and 16% of Belgium's population employed in the city (be.brussels, 2016, p.66). Besides, according to be.brussels (2016), Brussels disposes of a high degree of knowledge and technological competences among their research centres, universities and hospitals. Yet, the region presents some important weaknesses which have to be taken into account. The region has a high unemployment rate, combined with a youth unemployment rate of 26,8% and an under qualified supply of manpower (be.brussels, 2016, p.66). Furthermore, Brussels has one third of its population living beneath the level of poverty (be.brussels, 2016, p.66). Besides economic weaknesses, the region also has, according to be.brussels (2016), logistic problems as many main streets are often clogged due to traffic. A last weakness that will be outlined in this paragraph is the low rate of reusing and valorising materials constituting an economic, social and environmental issue.

Another point, which will be outlined in this paragraph, is the defined territory where the creation will take place. According to Asselineau, Albert-Cromarias, & Ditter (2014), a defined territory gives small and medium sized companies the opportunity to create a local ecosystem which might turn into a key resource for the development of a company. In other words, Asselineau et al. (2014) suggest that companies shouldn't see themselves as isolated entities, but rather rely on their diverse relational environment when developing their own strategies. Therefore, the authors define territory "as a group of economic actors linked by complementary relations, cooperation or competition with a view to construct and exploit resources owned by a specific area,

hard to imitate or relocate" (Translated from Asselineau et al., 2014, p.2). According to Asselineau et al. (2014), resources can be tangible or intangible.

Figure 10: The territory as an ecosystem



Source: Translated from Asselineau, A., Albert-Cromarias, A., & Ditter, J.-G. (2014). L'écosystème local, ressource clé du développement d'une entreprise. *Entreprendre & Innover*, (23), 59–70. https://doi.org/10.3917/entin.023.0059

In this case, the territory will be the region Brussels-Capital including its economic actors and resources. As stated above, 93.000 companies are active in the region (be.brussels, 2016, p.66), representing a lot of potential partners to create a local ecosystem.

7. Dietary trends in Belgium

The following chapter is about the general dietary trends in Belgium, because it is of utmost importance to find out about consumers behaviour regarding food in order to be able to create a value proposition that either matches the needs of consumers or solves a problem for the consumer (Osterwalder, Pigneur, & Clark, 2010).

In Belgium, 13,1% of the average revenue is spent on nutritional purposes, which means that in absolute numbers, more than €22 billion is attributed yearly to the food industry (Lenaers et al., 2017).

As stated by Lenaers et al. (2017), a real change in food consumption was triggered recently by growing concerns about the origin of our food, sustainability and food security. Therefore, a first trend, which has been identified by the Flemish Institute for a Healthy Live (VLAM), is the strong propensity towards a healthier and more balanced lifestyle (Gandola, 2017). This generalized trend could also be singled out in the Weber Shandwick Report from 2017. According to Lenaers et al. (2017), three out the 10 current food trends are to reduce food waste, consume locally and healthy. When it

comes to reducing food waste, 66% of the consumers in the world would pay more for sustainable products (Lenaers et al., 2017). In addition to that, consumers want more sustainable packaging solutions (Lenaers et al., 2017). Yet, as stated by Lenaers et al. (2017), the counter-trend is mass consumerism where the price is the most important variable.

Another food trend is to consume locally. Almost 83% of consumers confirm the purchase of local products more regularly (Gandola, 2017). These statistics are supported by the data gathered from the Weber Shandwick Report, where it is stated that Belgian products are bought at least once per week by 85% of Belgians and once per day by 42% of Belgians (Lenaers et al., 2017). Furthermore, short cycles are becoming popular as there is an increase in 1.5% of products directly sold from the producer to the consumer (Lenaers et al., 2017). Yet, globalization is a counter-trend, giving the consumer the opportunity to buy the desired product at any moment (Lenaers et al., 2017).

Healthy food is a third tendency combined with an increased interest in vegetables and a decrease in demand for the consumption of meat. According to the Weber Shandwick Report from 2017, 9 out of 10 Belgians think that eating healthy is important (Lenaers et al., 2017). However, as stated by Lenaers et al. (2017), half of them don't know how to eat healthy. Several initiatives have been taken to counteract the latter fact. Among them is a sensitization campaign with the purpose to explain to consumers how to eat healthy. Furthermore in 2016, the Belgian government, in collaboration with "FEVIA" and "Comeos", signed an agreement called "Convention Alimentation Equilibrée" with the goal to reduce the average daily intake of Belgians in calories by 5% until 2020 (Lenaers et al., 2017). Moreover, the healthy food trend is also very popular with social media and amongst bloggers (Lenaers et al., 2017). Besides, according to the VLAM, 20% of Flemish confirm that they consume less meat and 30% think of doing so in the future (Gandola, 2017). This trend is confirmed by Lenaers et al. (2017), who state that during the last 8 years, the consumption in meat has dropped by 13%. Yet, the VLAM (2017) and Weber Shandwick Report (2017) also confirm that meat is still a very important component of Belgian meals.

A fourth propensity identified during our research is an increasing number of Belgians suffering from a food allergy over the last 10 years (Lenaers et al., 2017). Furthermore, the expenditures on biological food have increased by 12% from 2015 to 2016 (Gandola, 2017). In a survey conducted by VLAM, 36% of Flemish people indicated that they want to buy more biological products in the future (Gandola, 2017).

Furthermore, the concept of convenient food solutions, also known as cocooning, is gaining popularity. As claimed by Lenaers et al. (2017), the trend is triggered by the facts that millennials and their parents have less time to buy food products and prepare meals, resulting in an increase in online food orders and a more important role played

by delivery services. In addition to that, Lenaers et al. (2017) and Gandola (2017) singled out a growing demand in healthy prepared meals and lunch boxes. Nevertheless, a counter-trend forwarded by Lenaers et al. (2017) are consumers seeking restaurant experiences in order to change from the ordinary. The same goes for shopping; until today, 92% of the consumers prefer to do their grocery shopping in food stores (Lenaers et al., 2017).

Changes in eating habits and evolving perceptions about certain food products are additional food trends that we need to take into account. A change in the eating habits of people came with the introduction of flexible working hours (Lenaers et al., 2017). In 2014, only 69% of Belgians were eating at the regular times (Lenaers et al., 2017). Moreover, perceptions about certain food products has changed. For example, cereals are no longer eaten only for breakfast, but are now considered to be food option all day long (Lenaers et al., 2017).

The last trends that we can identify are the growing popularity of superfoods, food products with a lot of health benefits and natural products which means goods without food additives (Gandola, 2017). Moreover, the continuous discovery of new exotic dishes and unexpected fusions of different foods are also a part of the dietary trends in Belgium (Lenaers et al., 2017).

Part 2: Case study

8. Research Set-Up

This research started with a literature review, also referred to as secondary or desk research, in order to create a theoretical framework (Hamilton, 2010). Next to creating a context to place the case study in, it enabled us to identify gaps upon which we can build further research. In other words, the literature review presented some questions which are of utmost importance in order to find out to what extent it is feasible for LCB to create a dehydration centre in the area of Brussels-Capital. Therefore, in this chapter the order in which the research was conducted will be explained.

First of all, we will research specific sourcing possibilities in the area of Brussels-Capital as during the literature review we could only find out that, in general, during the stages of agriculture and distribution a considerable amount of fruits and vegetables are wasted. Furthermore, we will identify actors working with unsold fruits and vegetables with a view to find out more about the environment we are in.

Secondly, the concept of a defined territory and urban area gave us the first indications about the necessity to create partnerships. The findings of the first research revealed that there are not only companies that might be interested in a partnership, but also in the product itself. Therefore, the second type of research will be about partnerships and possible B2B commercial activities.

Thirdly, the literature review indicated that B2C might also be a possibility as general food trends in Belgium, gave us a first disclosure about what consumers are looking for and how their behaviour has changed over the last years. In the Customer Segment (cf. infra p.69), we conducted an analysis which helped us to identify the potential customer segment regarding B2C. Yet, we need to know more about what potential customers think about dehydrated products made from unsold fruits and vegetables as well as their habits considering dehydrated fruits and vegetables.

Finally, quantitative research will be conducted in order to support or undermine the findings of the previously conducted interviews with potential customers. The quantitative research will give us more representative results.

In the end, the findings of the research will be used to construct the business model canvas (BMC) (cf. infra p.67).

An overview of the overall research can be found in Table 4. The table outlines which research method was used to answer sub-research questions and hence the main research question. The sub-research questions are following the above-indicated order.

Table 4: Research overview

Research questions		**Research methods**		
General research question	Sub-research questions	Interviews	Focus group	Survey
To what extent is it feasible for Le Champignon de Bruxelles to create a dehydration centre in the area of Brussels-Capital?	How do actors working with unsold fruits and vegetables in the area on Brussels-Capital operate? What are the different supply possibilities for Le Champignon de Bruxelles?	X		
	What partnerships and synergies are possible to support the creation of a dehydration centre? How are companies working in the field of sustainable nutrition or sustainable development within the sector of food and beverages interested in a dehydration centre in the region Brussels-Capital?		X	
	To what extent are consumers who live in the region Brussels-Capital interested in dried fruits and vegetables made from unsold fresh fruits and vegetables?	X		X

Source: Own conception

In the following chapters, we will explore each research objective in detail with the corresponding methodology, results and limitations. Furthermore, the exact reason why each research was conducted will be explained.

9. Other actors working with unsold fruits and vegetables and possibilities for sourcing raw materials

By studying the different stages of food waste, we found out that between the stages of agriculture and distribution a considerable amount of fruits and vegetables are wasted. However, we don't know yet where exactly food is wasted in Brussels and where LCB could intervene to collect fruits and vegetables which would otherwise be wasted.

Therefore, the first research objective was to find out more about food waste in the area of Brussels-Capital; the way that actors working with unsold fruits and vegetables operate as well as to determine different supply possibilities for LCB. Hence, the following research questions were constructed:

- *How do actors working with unsold fruits and vegetables in the area on Brussels-Capital operate?*
- *What are the different supply possibilities for Le Champignon de Bruxelles?*

With a view to seek a response for above-mentioned research questions, the method of semi-structured interviews was chosen since "successful innovation requires a deep understanding of customers, including environment, daily routines, concerns, and aspirations" (Osterwalder et al., 2010, p.128). As our research questions require a deep understanding about different supply possibilities and operating processes of actors working with unsold fruits and vegetables, semi-structured interviews seemed to be the right technique in this case in order to gather data. Furthermore, the same method will be applied to another interview sample in order to answer the question: To what extent, are consumers, living in the region Brussels-Capital, interested in upcycled dehydrated fruits and vegetables (cf. Chapter 11)?

In the following subsection, semi-structured interviews as a method will be explained and justified, followed by an explanation of the sample size. After that, the process of data collection and analysis will be outlined. Subsequently, the results of the interviews will be presented. Finally, limitations regarding semi-structured interviews as a research method will be reviewed.

9.1 Data generation by the means of semi structured interviews

In this section, the methodology used to gather the necessary data will be explained and justified; "the term *methodology* refers to the way in which we approach problems and seek answers" (Taylor, Bogdan, & DeVault, 2015, p.3).

Semi-structured interviews are a qualitative research method also referred to as an asymmetrical-trust interview (Massarik, 1981, listed in Wengraf, 2001): ''In the *Asymmetrical-Trust interview*, the interviewer is defined as Sage, as source of counsel and wisdom, and the interviewee as petitioner, holding the weak side of a power-balance. [Or vice-versa? TW]'' (Wengraf, 2001, p.153). This quote describes the balance

of power in this method. The interviewee can (and is supposed to) steer the direction of the interview as much as the interviewer, this is different to methods like structured interviews or open interviews. The interview, however, will follow the main subjects and areas that the interviewer sets up in the form of questions. These will lead to follow-up questions which emerge due to the dialogue between interviewer and interviewee (DiCicco-Bloom & Crabtree, 2006). The main subjects and questions will be based on the literature research and account for the structured aspect of the interviews. The open aspect of semi-structured interviews refers to the dialogue about those subjects (Miles & Huberman, 1994). The choice was made to conduct face-to-face interviews over telephone interviews. This is chosen because the non-verbal communication and personal interaction aspects of the interviews are necessary to identify underlying reasoning and follow-up questions, and this cannot be observed via the telephone (Saunders, Lewis, & Thornhill, 2004). Moreover, as stated by Adams, Khan, & Raeside (2014), the lack of visual contact might trigger the feeling of time pressure and lead to both parties rushing through the interview. Therefore, in our case, having face-to-face interviews was the most effective choice.

9.2 Interview sample

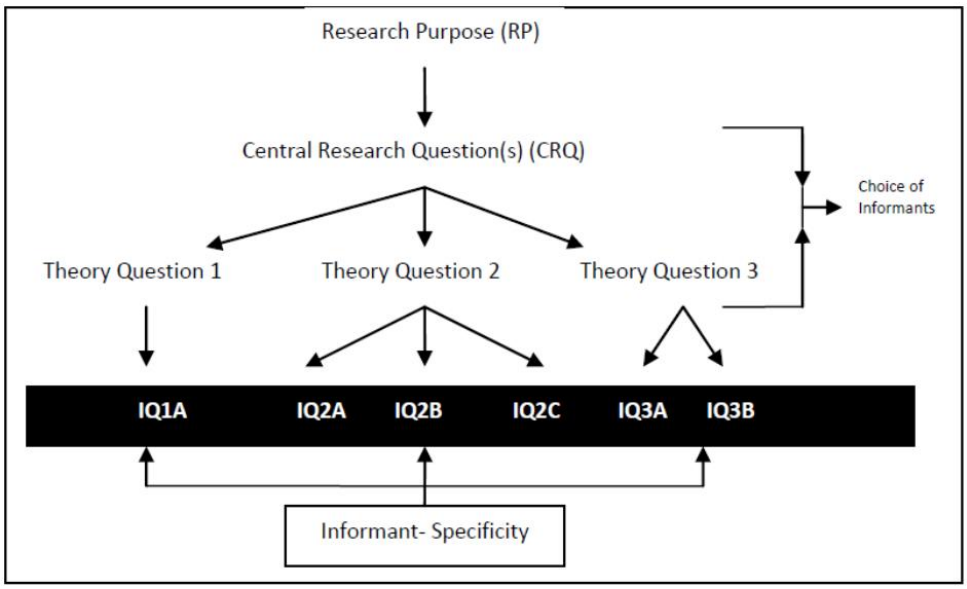
As claimed by Mason (2010), the sample size for qualitative research depends on the degree of saturation: "There is a point of diminishing return to a qualitative sample—as the study goes on more data does not necessarily lead to more information" (Mason, 2010, p.1). Therefore, no limit will be set on the number of interviewees at this point but will be determined by the researcher in the ongoing process. Furthermore, a certain degree of diversity will be applied in order to ensure that data covering different companies will be gathered (Cutcliffe, 2001). In other words, the sample comprises actors working with unsold fruits and vegetables while not only companies will be interviewed, but also food banks.

As we wanted to choose interviewees based on their potential relevance to the study, the judgemental sampling technique was used instead of random sampling, which is how samples are usually conducted (Miles & Huberman, 1994). According to Miles & Huberman (1994), an advantage of this method is that the interviewee is less likely to bias the data. In this case, the selected technique seemed to suit to our purpose as data from a specific company is required.

9.3 Data collection

To structure the interviews in order to obtain the necessary data, the model of Wengraf (2001) was used. This model helps to set up the interview in a clear, organized manner by working from the main research purpose down to clear questions (see Figure 11). It starts with the research purpose (RP) which are translated into central research questions (CRQ). These CRQ's are then transformed into theory questions (TQ) in order to create understandable interview questions (IQ) (Wengraf, 2001).

Figure 11: Interview set-up



Source: Wengraf, T. (2001). *Qualitative Research Interviewing* (1st edition). USA: SAGE publications Inc.

This interview guide was constructed based on the latter model and can be found in Appendix 2: Interview guide for actors working with unsold fruits and vegetables.

9.4 Data analysis

The data gathered by the means semi-structured interviews will be analysed in adherence with the labelling method, also known as the coding method (Krueger & Casey, 2014): "Coding consists of placing similar labels on similar things. The task is to sort comments into similar categories" (Krueger & Casey, 2014, p.203). In other words, this method supports the categorization of information gathered in order to focus on the essential data, while cutting out the irrelevant data. Therefore, this method is appropriated for the data analysis of this study. Furthermore, the analysis will be carried out based on the notes written down by the researcher. The interviews have been recorded in case clarification is needed for certain notes. According to Krueger & Casey (2014), an analysis based on notes is enough, "(…) when the purpose of the study is narrowly defined" (Krueger & Casey, 2014, p.205).

9.5 Results

All in all, five interviews were conducted with different actors working with unsold food. The goal of these interviews was to gather information about their operational process, different sourcing possibilities and potential difficulties. All the interviews took place between February and April. The companies were chosen together with LCB based on their relativity for the research. Aliment AB was chosen because of their location (the same site as LCB), while FruitCollect was selected because they collect fruit in the gardens of individuals who don't take advantage of them. The food bank Brussels-Brabant was selected because it is responsible for the region Brussels-Brabant and for

the distribution of unsold food to all other associations active in Brussels. Furthermore, DREAM was also selected which is a project to reduce food waste generated by the market "Mabru". The last company selected was Fruitopia as the company's business model relies on collecting unsold fruits from markets and transforming them into jams. Besides the interviews, parts have been completed with secondary data (website info) for better comprehension.

First of all, we will explore and answer the question:

"How do actors working with unsold fruits and vegetables in the area of Brussels-Capital operate?"

The results will be divided into sections following the occurrence of the interviews. Within every section, the most important parts were selected, using the labelling method, to give a general overview of the operational framework of each company.

AlimentAB

The interview was conducted with Mohamed Ibir, manager of the NGO AlimentAB. The NGO is an association, collecting unsold food at the market of Cureghem. The operation of collecting unsold food bears the name CollectMet. The market of Cureghem takes place every week from Friday until Sunday. Every Sunday, the tradesmen start to leave the market around 15h. With a team of 10 volunteers, CollectMet collects the unsold food between 15h30 and 16h45. The volunteers check the unsold food before they collect them to avoid receiving rotten food. According to Mohamed Ibir, this happens sometimes because the tradesmen need to pay if they want to leave their unsold food on the market place.

After the food has been collected by CollectMet, it is stocked in a fridge on the site of the slaughterhouse. After that, the food is distributed to associations, churches who offer free meals to homeless people and individuals during the week following the weekend of the market.

However, because of the limited possibilities of the NGO and the narrow time frame where the collection is possible, the company is incapable to collect the entirety of unsold food available after the market every Sunday.

FruitCollect

FruitCollect is a NGO founded in 2015 in Brussels with 4 people working actively in the organisation. However, they would like to become a cooperative company. The idea of FruitCollect is to collect fruits in gardens of individuals with a view to fight against food waste. The organisation is arranging 15 collects per year where they are collecting in total, more or less, 2 tons of fruits. The logistics are handled by FruitCollect in all parts of Belgium. So far, 80 landlords and 150 volunteers are part of the project. In November 2017, unsold fruits having a value of 39.000€ were collected.

A part of the collected fruits is transformed into fruit juice and sold to shops, as for instance “Beescoop”. So far, the commercial activity with a monthly turnover of roughly 9000€ is enough to auto finance the organisation. The other part is being distributed to other NGOs, who care for deprived and disabled people. FruitCollect wants NGOs to participate in the collection of fruits in order to integrate them into the project. Furthermore, they also want to create a social mixite between volunteers during collections.

In the future, the company wants to diversify sources of unsold fruits and vegetables. In other words, they are aiming to collect fruits and vegetables at a high scale. Today, FruitCollect is already taking a part of Delhaize’s unsold F&V, but they would like to be present in more supermarkets. Moreover, they have shown interest in a partnership with LCB.

Food bank Brussels-Brabant

The food bank Brussels-Brabant is one of the 9 official food banks in Belgium and responsible for the territory of Brussels, Walloon Brabant and Flemish Brabant (Banque Alimentaire de Bruxelles - Brabant, 2018). Since 1956, the mission of the food bank is to fight against food waste and hunger (Banque Alimentaire de Bruxelles - Brabant, 2018). They are part of the Belgian Federation of food banks who in return is part of the European Federation of food banks (Banque Alimentaire de Bruxelles - Brabant, 2018). Furthermore, the food bank operates only through donations that are collected and distributed by the Belgian Federation of food banks.

Tony Michiels, Managing Director, estimates that around 24.000 deprived people live on the territory Brussels-Brabant. With a view to help deprived people, the food bank gathers unsold products from Colruyt and Delhaize in their respective central departments in Zellik and Hal every day. As a matter of fact, the logistics of all the collections are organized by the food bank itself. Moreover, the food bank prefers Colruyt as they give the products 4 days before their expiry date whereas Delhaize only gives them on the day of expiry. Besides supermarkets, the food bank also collects fruits and vegetables at the “Criée à Maline”. Once the unsold items are collected, they are brought to the headquarters where packages (1 to 2 pallets) with different items are prepared for the food bank’s members. They have 115 members who are non-profit charity organizations, as for instance the C.P.A.S Uccle. As a last step, the organizations receive the packages from the food bank and distribute them to deprived people.

According to the figures of 2016, the food bank managed to collect a total of 3.770 tons thanks to the work of 13 employees and 39 volunteers (Banque Alimentaire de Bruxelles - Brabant, 2018). Furthermore, as stated by Tony Michiels (2018), operational costs are around 400.000€ a year.

DREAM

The project DREAM (Distribution et Récuperation d'Excédents Alimentaires à MaBru), launched in 2015, is an initiative taken by the C.P.A.S of the city of Brussels in collaboration with the NGO "Marché Matinal de Bruxelles" (Mabru) (CPAS de la ville Bruxelles, n.d.). The idea is to gather unsold fruits and vegetables from merchants at the morning market, as well as other suppliers, in order to re-allocate them to associations working in the domain of food aid (CPAS de la ville Bruxelles, n.d.). The project operationalizes the compilation of, on average, 1 ton of food products a day at MaBru and other suppliers including Colruyt, Delhaize or Exki.

The project employs one coordinator and 5 to 7 employees under the article 60. After the reception of food products, the employees proceed with the inventory and prepare packages for the associations. Every food item is put online on the stock exchange platform for donations, a platform managing food donations. Usually, DREAM delivers the products with vans. However, some organizations pick up the packages themselves. Furthermore, the project DREAM manages to re-allocate all their products in such a way that they almost never have leftovers.

Fruitopia

Fruitopia is a non-profit organization with the goal to collect and value unsold fruits in Brussels by transforming them into long life products such as chutneys or marmalades. Moreover, they want to increase public awareness of food waste and change consumers' behaviour. All in all, 15 volunteers are working for the organisations.

Their sources of supply are shops such as Färm and fruits from FruitCollect. In cases where shops don't provide enough unsold fruits, they replace the missing quantity with unsold fruits from markets such as the market "Midi". Subsequently, they organize regularly participative cooking workshops, open to public, where 30 to 50kg of unsold fruits get transformed into marmalades or chutneys.

One part of the produce is sold based on a fixed price to partner shops, in order to provide a regular income and cover operational costs. The other part is sold based on a free determinable price to make the products affordable for everyone. The respective products are available in community forum such as "La Communa" or "ADES".

In the near future, Fruitopia wants to professionalize their activity and increase the volume of fruits transformed in cooking workshops to 100/200 kg. In addition to that, they want to cooperate with more shops to sell their products. Nevertheless, the company states that a few merchants are becoming reluctant as they receive their primary resources for free. Therefore, Fruitopia needs to find an agreement with the respective merchants.

Lastly, Fruitopia reports that AFSCA regulations of unsold fruits are reasonable meaning that unsold items need to be traceable only to a certain degree.

To conclude, we can discern that these companies working with unsold fruits and vegetables rely heavily on volunteers. With the exception of DREAM who have 5 to 7 employees under the Article 60 and one coordinator. All 5 companies have different ways of sustaining themselves. For example, the Food Bank is entirely funded by donations whilst FruitCollect sells a part of the fruits they collect to cover the incurred costs. Another important point is logistics. Aliment AB and DREAM are only collecting from one specific source whereas FruitCollect, the Food Bank and Fruitopia are collecting from multiple sources. Furthermore, all actors are organizing the logistics by themselves. However, Aliment AB differs due to the fact that they are collecting and distributing at the same place and as a result of this their logistics are much easier to coordinate. The logistics are particularly complicated for the Food Bank as they are collecting at multiple places and further, they need to prepare packages for the 115 associations while paying attention to the expiration dates. The information collected from the semi-structured interviews will support and inform our endeavour to answer the second question:

What are the different supply possibilities for Le Champignon de Bruxelles?

The examination of this second research question has been integrated into the chapter Key Resources of the BMC (cf. Chapter 13.3).

9.6 Limitations

The disadvantages of semi-structured interviews can be that they take a lot of time and require interviewees to provide personal information (Sekaran & Bougie, 2016). In this research, however, the interviews were settled beforehand by mail or telephone and the interviewees knew the purpose of the interviews. Each interview proceeded in a natural way without asking for personal information but, rather, general information about the company.

10. Potential for partnerships and B2B commercial activity

The previously conducted research revealed that FruitCollect may be interested in a partnership with LCB. Hence, the question arose if other companies might also be interested in partnerships. Furthermore, as we could disclose earlier in the practical framework, a defined territory gives, according to Asselineau et al. (2014), small and medium sized companies the opportunity to create a local ecosystem which might turn into a key resource for the development of a company. Therefore, as the case has a defined territory, research will be conducted to find out if other companies are also interested in partnerships with a view to construct a local ecosystem. This could help LCB to create and develop the dehydration centre. Besides partnerships, we would also like to find out if companies might be interested in using dried fruits and vegetables as components for their products. In other words, we would like to find out if B2B commercial relationships are conceivable.
As a result, we will conduct research to answer the subsequent research questions:

- *"What partnerships and synergies are possible to support the creation of a dehydration centre?"*

- *"How are companies working in the field of sustainable nutrition or sustainable development within the sector of food and beverages interested in a dehydration centre in the region Brussels-Capital?"*

In the following subsections, the focus group as a method will be explained combined with a justification that this research method is suitable to answer our research questions, followed by an explanation of the sample size and the participants. After that, the process of data collection and analysis will be outlined. Later, we will present the results of the research. Finally, limitations regarding the focus group as a research method will be reviewed.

10.1 Data generation by the means of a focus group

A focus group has been organized on the 30th of April 2018 in the offices of hub.brussels in order to identify possible partnerships between actors working with unsold fruits and vegetables in the region of Brussels-Capital. Besides, we wanted to find out if food transformers are interested in using dehydrated fruits and vegetables as a component for their products.

"*Basically, focus groups are a data collection technique that combines principles of qualitative research and knowledge of small group dynamics. This approach capitalizes on the interaction among the group members to enhance the collection of deep, strongly held beliefs and perspectives. This approach, as well as most qualitative methods, is especially useful to explore new topics and to examine complex issues involving values and beliefs that underlie behavior" (Carey, 2015, p.274).*

This statement is supported by Krueger & Casey (2014), who state that this particular qualitative technique is used to collect opinions and improve the understanding of people's feelings about a certain idea, service, product or issue. Kitzinger (1995), stresses out that in order to generate data it is very important to capitalize on the dialogues between participants.

A focus group and according to the definition used in this paper, seemed to be the right data generation technique in this case, as the participants would openly discuss the topic of unsold fruits and vegetables and bring in their field of expertise which could help to establish synergies and partnerships not only among the different actors, but also with LCB.

10.2 Focus group sample

We must now set the right sample size. As Carey (2015) states in his book, the group has to be small in order to ensure its dynamics. According to Rabiee (2004), the ideal number of participants in a focus group is subject to variation. However, Krueger & Casey (2014) suggest that the number of people in a focus group usually ranges between 5 and 8 people. The reasoning behind this is that "the group must be small enough for everyone to have opportunity to share insights and yet large enough to provide diversity of perceptions" (Krueger & Casey, 2014, p.24). This statement completes Carey's (2015) claim.

Based on the sample size indications we examined in literature, we identified a size of 8 people, including the moderator and researcher, as the appropriate size to take part in the focus group. Hereafter in Table 5, we can find a summarized table of all participants as well as a brief presentation of each.

Table 5: Table of participants

Name of participant	Position	Name of the company	Presentation of the company
Maxime NIEGO	CEO	FruitCollect	An NGO which was founded in 2015 in Brussels, collecting non-consumed fruits and vegetables in the gardens of individuals with a view to redistribute one part of them to deprived people and the other part is designated to be sold. Furthermore, they also want to start collecting fruits and vegetables left on farmers' fields. For more information about this company please consider the

			chapter on actors working with unsold fruits and vegetables (cf. supra p.39).
Florence POSCHELLE	CEO		A zero-waste online grocery store, founded in 2016, with 15 points of sales in the region Brussels-Capital. All the products are biological and sold in reusable jars of different sizes where a deposit at the moment of the purchase is withhold (Lili Bulk, n.d.). As soon as the consumer brings the jar back to the store or gives it back to the delivery person, the customer is refunded the amount of the deposit (Lili Bulk, n.d.). The products sold in the jars are either single products as for instance pasta, dried fruits etc. or a mix of ingredients ready to use in a recipe as for example a risotto mix.
Aurélien AMAZ	CEO		A biological, local and 100% circular food store in Brussels. The store, founded in 2017, operates in short circuits, working with 16 local farmers. Furthermore, they pay great importance to limit waste and foster recycling. As for instance, they suggest to their customers to bring their leftovers to the store so nearby farmers can value and use them in their compost.
Maïwenn KLEIN	Project Manager		Shak'Eat is a catering service, founded in 2016. The company cooks lunches using unsold items. Around 80% are unsold fruits and vegetables. The other 20% are dried products as for instance flour which are bought by the company. The prepared lunches are delivered by

			“Dioxyde de gambettes”, a delivery service using bicycles.
Aude GRILLOT	Advisor	greentech.brussels hosted by hub.brussels	“The role of greentech.brussels is to provide free advice and guidance to start-ups and companies active in the environment and/or sustainable energy sectors as well as those who adopt a sustainable or circular economic model” (greentech.brussels, 2017, para. 2).
Hadrien VELGE	CEO	LE CHAMPIGNON DE BRUXELLES	The company was founded in 2016 under the form of a cooperative company with limited liability. LCB is producing three different Japanese mushrooms by reasserting Brussels organic waste. The mushrooms are biological and produced locally. Their idea is to create a dehydration centre in order to dehydrate unsold fruits and vegetables while using the lost energy of a natural industrial process needed to produce their mushrooms. For more information about this company please refer to the chapter on LDB (cf. supra p.24).
Camille SEON	Project Manager	LE CHAMPIGNON DE BRUXELLES	Idem. (cf. supra)
Caroline RIWERS	Researcher/ intern at LCB	LE CHAMPIGNON DE BRUXELLES	Idem. (cf. supra)

As Krueger & Casey (2014) suggest in their book, the participants were invited by mail beforehand in order to assure that the group is of the right size and participants possess

the required traits. Finally, a date was agreed upon by the means of the online survey instrument “Doodle”.

“Focus groups are composed of participants who are similar to each other in a way that is important to the researcher. The nature of this homogeneity is determined by the purpose of the study” (Krueger & Casey, 2014, p.24). Kitzinger (1995), Rabiee (2004) and Carey (2015) agree with the concept of homogeneity. However, as stated by Krueger & Casey (2014), the degree of homogeneity is subject to variation. For this focus group, we were looking for companies presenting 3 characteristics with a view to assure that, “the members are knowledgeable, willing, and capable of communicating; the topic and the group setting are compatible with group interaction” (Carey, 2015, p.1). First of all, they had to be active in the field of sustainable nutrition or sustainable development within the sector of food and beverages. Secondly, the companies represented by the participants had to be active in the region of Brussels-Capital or its close surroundings in order to ensure short cycles and thirdly, they had to be interested in a dehydration centre.

The selected participants have the required traits. Furthermore, two participants represented LCB as Hadrien Velge is the CEO, yet Camille Séon is the project manager and has more detailed knowledge about the technical aspects. Therefore, it was important that both were present. Aude Grillot, advisor at greentech.brussels, was the facilitator as she considerable experience and according to Rabiee (2004), a skilful facilitator should not be underestimated.

10.3 Data collection

The focus group started with the facilitator giving a broad introduction to the focus group and explaining the purpose of, it as well as its content. This was followed by an introduction round where each participant got the opportunity to present themselves and the company that they work for. After that, LCB explained their idea to create a dehydration centre with the purpose to dry unsold fruits and vegetables, and outlined the current state of the project and the different steps towards it’s realisation. As from the beginning on, it was the goal of the researchers and facilitators to establish, as stated by Kitzinger (1995), the right atmosphere in order to assure a smooth and natural conversation among the participants.

Subsequently, the facilitator explained the structure of the focus group. As suggested by Kitzinger (1995), the facilitator encouraged the participants in the beginning to talk to each other following the given structure rather than to the researcher. Furthermore, throughout the focus group the dual moderator focus group method was used which means that the two facilitators work together, yet they perform different roles (Krueger & Casey, 2014). In this case, the facilitator (advisor at greentech.brussels) ensured that the discussion progresses smoothly and the researcher made sure all the topics are covered.

The first question covered the needs and issues of the represented companies regarding their business. The second question was emphasized on the resources of the different companies, and how they could match with another company's needs in order to create synergies. The third question focused on the dehydration centre; what the participants think about it, how they would use the dehydrated fruits in their business and, if possible, an indication which fruits and/or vegetables they would be interested in.

After each question was announced, every participant had the possibility to express his/her opinion respecting the seating plan around the table, followed by an open discussion about each question. The discussion proceeded naturally, and the facilitator almost didn't have to intervene to redirect the focus group. Furthermore, the focus group lasted 1h30min which lies between the recommended time of 1-2h (Rabiee, 2004).

10.4 Data analysis

The data gathered by the means of a focus group were analysed using the same method as for the semi-structured interviews, namely the labelling method (Krueger & Casey, 2014) (cf. Chapter 9: Data analysis).

10.5 Results

In this section, the results of the focus group will be presented. The focus group was composed of 8 participants which were selected based on three main criteria. First of all, they had to be active in the field of sustainable nutrition or sustainable development in the sector of food and beverages. Secondly, the companies represented by the participants had to be active in the region of Brussels-Capital or its close surroundings in order to ensure short cycles and thirdly, they had to be interested in a dehydration centre.

A detailed list of the participants had already been established earlier (cf. supra p.44). Among the 8 participants were two moderators, the advisor and the researcher. The advisor was leading the focus group whereas the researcher made sure all topics were covered. In the following section, we are going to recall the research question and sub questions before examining the results.

10.5.1 Research question

In this part, we will examine the research questions and the different topics which were covered during the focus group:

- *"What partnerships and synergies are possible to support the creation of a dehydration centre?"*

- *"How are companies working in the field of sustainable nutrition or sustainable development within the sector of food and beverages interested in a dehydration centre in the region Brussels-Capital?"*

With a view to answer these questions, the following topics were covered during the focus group:

- Examining the needs and/or issues of every business as represented by the participants.
- Identifying the resources of the companies as represented by the companies.
- Determine possible partnerships and synergies with the participants.
- Gather information about companies' interest in a dehydration centre and how they would use the dehydrated fruits and vegetables in their business.
- Collect specific information on what kind of dehydrated fruits or/and vegetables they are interested in.

10.5.2 Results

FruitCollect is collecting non-consumed fruits and vegetables in the gardens of individuals and a part of them are transformed into juices, soups or stewed fruits. The problem of their products is the use by dates. Especially for the soups as the use by date, according to Maxime Niego (CEO), is 8 to 12 days. Therefore, FruitCollect has an interest in a dehydration centre because the company could dehydrate the ingredients of the soup and hence, increase the soups' shelf life. Furthermore, the risk that the soup goes bad before the consumer cooks the soup will also be diminished. In a second instance, food waste could again be reduced. For the soups, FruitCollect would mainly need vegetables. However, the company couldn't specify yet what kind of vegetables they would be interested in. However, Maxime Niego is not only interested in dehydrating fruits and vegetables for making soups, but also in selling them. In other words, a partnership regarding the commercialization could be a possible option. Moreover, with regards to resources, FruitCollect has the necessary logistical means to transport the collected food from one of the identified leaks to the dehydration centre. Maxime Niego judges a partnership and the resulting synergies as beneficial for both.

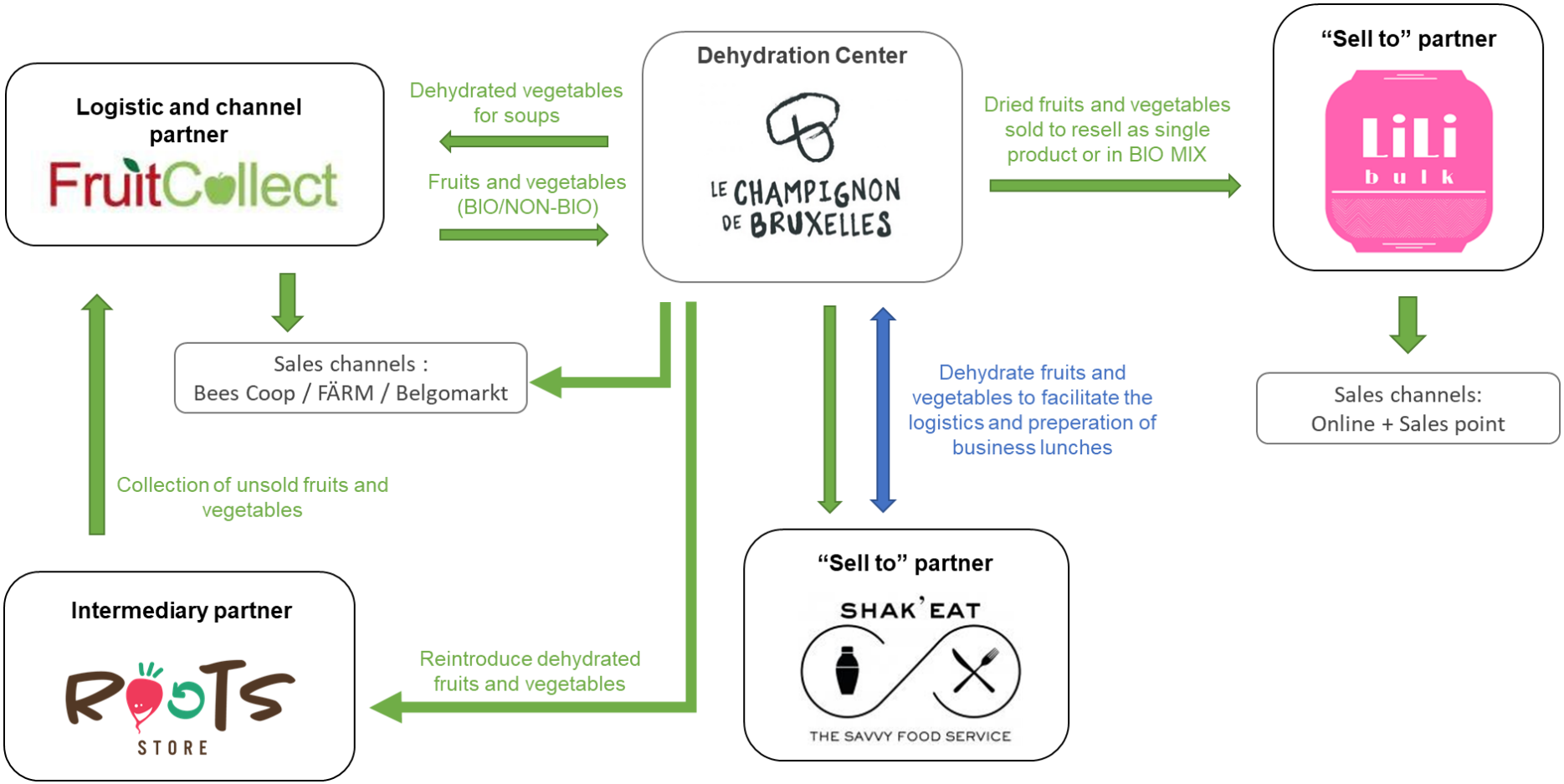
Lili Bulk, a zero-waste online grocery store, wants to increase the number of local producers they work with in order to increasingly work in short cycles. The company is very interested in a dehydration centre as It would not only allow them to source locally, but also allow them to suggest different recipes by using dehydrated fruits and vegetables. In other words, they are interested in the final product to either sell it directly in their online grocery store, or at their 15 sales points, or to use it and create a mixture of ingredients which could be immediately used in a recipe such as a dal mixture or risotto mixture. In a first instance, the company would be interested in dehydrated apples, carrots, zucchinis and mushrooms. However, the company assured that they would be interested in more types of fruits and vegetables, but that at the present time, they couldn't give more specific information.

Shak'EAT prepares business lunches using unsold stocks with around 80% of stocks being fruits and vegetables. The company is encountering difficulties with the logistics of the operation, together with preparing the business lunches. They are interested in the dehydration centre to use the final products in order to facilitate their logistics. As the dehydrated fruits and vegetables have a use by date of two years, the company could simplify their logistics, as well as reducing their own food waste. However, they couldn't specify what kind of fruits and vegetables they are interested in, but stated that it would be a larger variety.

Roots is a local, biological and 100% circular food store that has losses of around 300 to 400€ a month because of unsold fruits and vegetables. The store is interested in a dehydration centre as the unsold fruits and vegetables could be brought to the centre, dehydrated and then reintroduced into the store for selling purposes. However, Roots cannot, in any way, assure the logistics. FruitCollect suggested that they could assure the logistics and pick up the unsold fruits and vegetables, and bring them to the dehydration centre in order to resell the dehydrated final product again to the store.

With the goal to answer the question; *"What partnerships and synergies are possible to support the creation of a dehydration centre?"*, the following diagram was constructed to show a summarized version of possible partnerships and the resulting ecosystem around the dehydration centre.

Figure 12: Concept mapping of possible partnerships



Source: Own conception based on the results of the focus group

In Figure 12, we have outlined all the different partnerships which are possible among the actors who took part in the focus group.

Now we will answer the second question of this research:

"How are companies working in the field of sustainable nutrition or sustainable development within the sector of food and beverages interested in a dehydration centre in the region Brussels-Capital?"

The companies are interested in the dehydration centre in two ways. First of all, we found that all participants were interested in a partnership. The interest might be triggered by the fact that the companies were founded recently. The oldest company in the focus group was FruitCollect who was founded in 2015. Furthermore, the kinds of partnerships differ depending on the business of the company. The reason why they are interested in partnering with LCB is because of the value proposition fitting to the needs and the philosophy of the companies. In other words, they all shared a common interest in the reduction of food waste. Moreover, the companies showed interest in dehydrated products because they can increase the use-by dates of their products or their raw materials. Further, if they facilitate the logistics and work with local producers, it will result in shorter cycles and reduce economic losses by dehydrating their unsold fruits and vegetables.

10.6 Limitations

A downside of a focus group is that participants may not feel as comfortable as in an anonymous interview (Kitzinger, 1995). Furthermore, a common criticism, is that the data quality might be compromised if the focus group is dominated by one or two persons (Carey, 2015). Yet, the establishment of a relaxed atmosphere and the application of the dual moderator method was used to counteract these limitations to a certain degree. My observations throughout the focus group can be summarized as followed. Sometimes, the participants got off topic. However, thanks to the dual moderator method, they were quickly refocused on the subject. Moreover, the focus group proceeded very naturally and wasn't dominated by one or two persons. This might be because almost all the companies were represented by its CEO which means that participants were at equal footing resulting in a non-dominating focus group.

11. Potential for B2C commercial activity

In the previous research, we found that B2B commercial activities are a possibility, but are B2C commercial activities a possibility too? During the literature review, we determined dietary trends in Belgium that seemed to fit the characteristics of the product. A detailed analysis of the match between the dietary trends and the characteristics of the product as well as study of potential customers can be found in the chapter "Customer Segment" (cf. infra p.69). Considering "successful innovation requires a deep understanding of customers, including environment, daily routines, concerns, and aspirations" (Osterwalder et al., 2010, p.128), we will interview potential customers in order to generate ideas about what they think about the product, their behaviours regarding the product and in order to identify potential concerns. The findings of the semi-structured interviews will provide us with a deep understanding of our potential customers. The goal of researching about B2C possibilities is to find an answer to the following question:

"To what extent are consumers who live in the region Brussels-Capital interested in dried fruits and vegetables made from unsold fresh fruits and vegetables?"

The following sub-chapters will follow the same structure as we have seen in the two chapters before.

11.1 Data generation by the means of semi-structured interviews

The method of semi-structured interviews was already used to determine sourcing possibilities and how other actors working with unsold fruits and vegetables operate. Hence, the detailed methodology can be viewed in chapter 9 (cf. supra p.35). The same method will be used because the interviews with potential customers need to cover the main subjects and areas that the interviewer sets up in the form of questions to ensure that we gather the right data. However, the interviewer as well as the interviewee can steer the direction of the interview. Moreover, the face-to-face method, which is explained in chapter 9, was used in this research as well.

11.2 Interview sample

The interview sample size was defined in the ongoing process of interviewing potential customers as size depends on the degree of saturation (cf. supra p.37). Furthermore, a certain degree of diversity needs to be ensured which means, in this case, identifying a range of potential customers differing in gender and age.

11.3 Data Collection

The data was collected using an interview guide that can be found in Appendix 3: Interview guide for potential customers. The guide was structured according to the model of Wengraf (cf. supra p.37). Moreover, the interviews will take place in the food store Färm; which is not only a selling point of LCB, but also attracts the type of customers that we defined as our target group.

11.4 Data analysis

The same data analysis method that was used for the focus group and the first semi-structured interviews will be used also for this research, namely the labelling method. A detailed explanation of the labelling method can be found in chapter nine (cf. supra p.38).

11.5 Results

In total, 10 interviews were conducted with consumers in the food store Färm, in Saint-Catherine. All interviewees were interviewed on the same day at the same location. At 10 interviews, I took the decision to end the interviews as a sufficient degree of saturation was reached. The answers started to be repetitive and no new information was presented after the 8th interview.

Furthermore, the participants of the interviews at Färm were selected based on the time customers had at their disposal and according to demographic characteristics (age, gender), with a view to ensure to have a certain diversity in the interviews. Table 6 outlines the demographic characteristics of the participants who took part in the interview.

Table 6: Interview sample

Age / Gender	18-25	26-35	35-50	50-65
Men	/	1	2	1
Women	2	2	1	1

Source: Own conception based on the data gathered during interviews

The results will be divided into sections following the structure of the interview guide and according to the labelling method. The following sub-headings outline consumer reaction during the interviews towards different attributes of the product.

Usage of dried fruits and vegetables

Most interviewees use dried fruits every morning as a component for their muesli or granola. They attributed this to the fact that it is tasty and healthy. Some of them also use dried fruits as snacks or ingredients for cocktails and desserts. Dried vegetables are more rarely used. Dried tomatoes, bell peppers and ginger were the only vegetables mentioned during the interviews. Yet, they also claimed that they don't see a lot of dried vegetables in stores. Individuals use them in salads, main dishes or appetizers. It was also revealed that the candidates use a lot of lentils and dried beans.

A few of the interviewees explained that they don't like dried fruits because of the texture or sweetness:

"I don't like dried fruits because they feel like chewing gum in my mouth" (Interviewee 4, 2018)

A few people fear that the fruits and vegetables lose a lot of vitamins during the drying process and are therefore less healthy.

The two interviewees who were more than 60 years old don't use dried fruits or vegetables at all. They explained that they are retired and have the time to go grocery shopping and cook meals. Therefore, they only buy fresh products. Yet, one of the interviewees over 60 reflected on his work life and stated that at that time and age, when he didn't have much time and was busy, he probably would have tried dried fruits and vegetables.

Packaging

In terms of packaging, interviewees were indecisive. Half of them preferred separate packaging and the other half would buy both depending on what they were looking for. The reason for separate packaging that emerged from the group was the liberty to make personal mixes at home. The arguments for mixes, that can be used in a recipe, were that they simplify cooking and that they are interested in discovering new recipes. Yet, two interviewees mentioned that the mix needs to be without additives, otherwise they would prefer to mix the fruits or vegetables at home themselves. Another factor mentioned is that half of the interviewees would prefer the mixes or single packed fruits and vegetables to be available in bulk, since it reduces packaging waste and is better for the environment.

Characteristics

The fact that the dehydrated fruits and vegetables are made from unsold fresh fruits and vegetables (FFV) was consistently regarded as positive because it is beneficial for the environment and helps to reduce food waste. After the first 2 interviews, I changed the way I refer to the unsold fruits and vegetables as the interviewees responded negatively to the word "recycling". After I explained to the first two participants that the fruits and vegetables are "reused", they became much more positive. Therefore, I applied the term "reused" in the following interviews. Furthermore, nearly all the interviewees would also buy the product because it supports the local economy. Mostly, the people between the age range of 18-50 confirmed that the high use-by date of 2 years and that the mix simplifying cooking are also positive attributes of the product and would persuade them to purchase:

"If the label says that it is a local product and reducing food waste, I would test it" (Interviewee 6, 2018).

Preference

The majority would prefer the upcycled product over the conventional product. Yet, some would hesitate because for them, it depends on the quality of the product as well. Moreover, the fact that the product has the objective to reduce food waste was often considered to be more important than organic amongst the interviewees. Yet, some of the people stated that organic or non-organic depends on the fruit or vegetable, and the ideal would be a combination of both organic and upcycled:

"We have to reduce food waste as much as possible, therefore organic or non-organic is not as important as food waste" (Interviewee 7, 2018).

Besides, a few interviewees confirmed that the aspect of the product being local is more important for them than upcycled or organic.

Price

Almost all the interviewees stated to be willing to pay more. Yet, it has to reasonable and correspond with the quality of the product. They were given the example of a conventionnel package of 150gr of mangos for 3€ (Final price of a package of 150gr of mangos in Färm). The price they would pay for the upcycled product ranges between 3.50€ up to 4€. Some of their responses were as follows;

"I come to this shop and I pay more because I care for the environment. So, in this case, I would do the same" (Interviewee 1, 2018).

"I would pay a lot more, if it was the best product and I had the feeling that the price is justified" (Interviewee 4, 2018).

The semi-structured interviews gave us a great insight into the target consumers' thoughts and opinions towards the concept of dehydrated fruits and vegetables which gives us an indication about the direction LCB should take when developing and launching the product. As a result, a set of hypotheses can be drawn based on the indications we gathered from the interviews with potential customers.

1. The characteristics "local" and "reducing food waste" are more important for potential customers when buying fruits and vegetables than "organic".
2. The main reason why potential customers wouldn't buy the locally dried fruits and vegetables produced out of unsold fruits and vegetables is the fear that dehydrated products are of lesser quality than fresh products.
3. A qualified majority of potential customers would still buy locally produced dried fruits and vegetables made of unsold fruits and vegetables even though the fruits and vegetables are not organic.
4. The potential customers are more interested in dried fruits than in dried vegetables.

5. The potential customers prefer the product produced out of unsold fruits and vegetables over the conventional product under the hypothesis that the quality is the same.
6. A qualified majority of the potential customers are willing to pay more for the local product produced out of unsold fruits and vegetables compared to the conventional under the hypothesis that the quality is the same.
7. The potential customers prefer single packaged fruits or vegetables.

Later, we will valid or invalid the hypothesis with the findings of the survey.

11.6 Limitations

The disadvantages of semi- structured interviews can be that they take a lot of time and require interviewees to provide personal information (Sekaran & Bougie, 2016). In this research, however, there were clear agreements made beforehand regarding these issues to prevent problems, for example, the interviews with customers were anonymous and they were only asked to give their age range. During the interviews, I did not conceive that the questions were too intrusive or that the interviewees felt uncomfortable. Yet as stated by Walsh & Wigens (2003), the validity of the data is never 100% assured because interviewees might lie or not recall correctly past events. Furthermore, Walsh & Wigens (2003) claim that the presence of the researcher may bias the response given by the interviewees. Another limitation that can be applied in this specific case is that the interviews were conducted in the food store Färm, where people have only a limited time span because they came there to do their groceries. However, before starting the interview, the interviewees were always asked if they had the necessary time to conduct the interview without rushing through it.

12. Survey to gauge the target market

The previously conducted interviews provided a deep insight about potential customers' preferences, behaviours and thoughts. Yet, the interviews only allowed us to extract ideas because due to the narrow sample, we don't know if we can extrapolate the findings. Therefore, a survey will be conducted in order to generate representative results and to support or undermine the ideas produced by the interviews with potential customers. Thus, the goal of this research is the same as the previous, namely to find an answer to the following question:

"To what extent, are consumers, living in the region Brussels-Capital, interested in dehydrated fruits and vegetables made from unsold fresh fruits and vegetables?"

12.1 Data generation by the means of a survey

As a start, the survey as a quantitative method will be defined. Groves et al. (2011) gives a very precise definition in his book "Survey Methodology" stating: "A "survey" is a systematic method for gathering information from (a sample of) entities for the purposes of constructing quantitative descriptors of the attributes of the larger population of which the entities are members" (Groves et al., 2011, p.2). The advantage of a survey is that a lot of information about potential customers' attitudes and beliefs can be collected in a short amount of time (Mitchell & Jolley, 2009). Therefore, information from a sample of potential customers will be gathered with a view to extrapolate the results to a larger population of potential customers.

12.2 Survey sample

Throughout this survey, the probability sample technique will be used; "The idea of a probability sample of people is that every individual in the target population (or at least the sample frame) has a known chance to have data collected about him or her" (Fowler, 2013, p.42). In this survey, our target group are the previously identified potential customers (cf. supra p.53). Yet, as we can't have responses from all potential customers, a sample frame will be necessary (Leeuw, Hox, & Dillman, 2012). The sample frame will be limited to the area of Brussels-Capital as the dried fruits and vegetables of LCB would only be sold in that area.

Furthermore, as we apply the probability sampling technique, the standard statistical techniques can be used to evaluate how large our sample needs to be in order to assure a certain precision (Leeuw et al., 2012).

Table 7: Number of respondents needed for percentage estimates within 95 percent Confidence Interval (C.I.)

Number of respondents	Width of 95% C.I.
96	± 10%
384	± 5%
1537	± 2.5%
9604	± 1%

Base percentage 50%, 95% Confidence Interval based on normal approximation

Source: Leeuw, E. D. de, Hox, J., & Dillman, D. (2012). *International Handbook of Survey Methodology*. Routledge.

According to Table 7, the survey needs at least 96 respondents to reach a sampling error of more or less 10 percent within a 95 percent confidence interval. The sampling error decreases the more respondents we have leading to more representative results. Therefore, the goal of this survey is to gather as many responses as possible within a limited timeframe.

12.3 Data collection

The data will be collected using a written instrument called investigator-administered questionnaires, which means that the investigator is present when the survey is filled out (Mitchell & Jolley, 2009). The data will be collected at a variety of locations in the area of Brussels-Capital (cf. Appendix 4: List of locations for survey data collection). Those locations will be food stores that attract the previously identified potential customers, our target group. As stated by Mitchell & Jolley (2009), the presence of the investigator leads to a higher response rate from participants compared to surveys where the investigator is not present. In addition, the investigator can clarify certain questions to the respondent in case it is necessary for better comprehension (Mitchell & Jolley, 2009). Yet according to Mitchell & Jolley (2009), the presence of the investigator may reduce perceived anonymity leading to less open and honest responses. However, the survey does not contain any sensitive questions where anonymity may be required.

Furthermore, as the survey will be conducted at food stores attracting the target group, the questionnaire needs to be short and effective in order to attract people to participate as well as to avoid participants not finishing the survey. In other words, we are looking to minimize the unit nonresponse and the item nonresponse error (Leeuw et al., 2012). The survey set-up can be found in Appendix 5: Survey Set-Up.

12.4 Data analysis

The data gathered by the means of a survey will be analysed confirming to descriptive statistics (Groves et al., 2011). With a view to prove our hypotheses valid or invalid, descriptive statistic seems to be appropriated as it describes "(…) the size and distributions of various attributes in a population" (Groves et al., 2011, p.2). In other

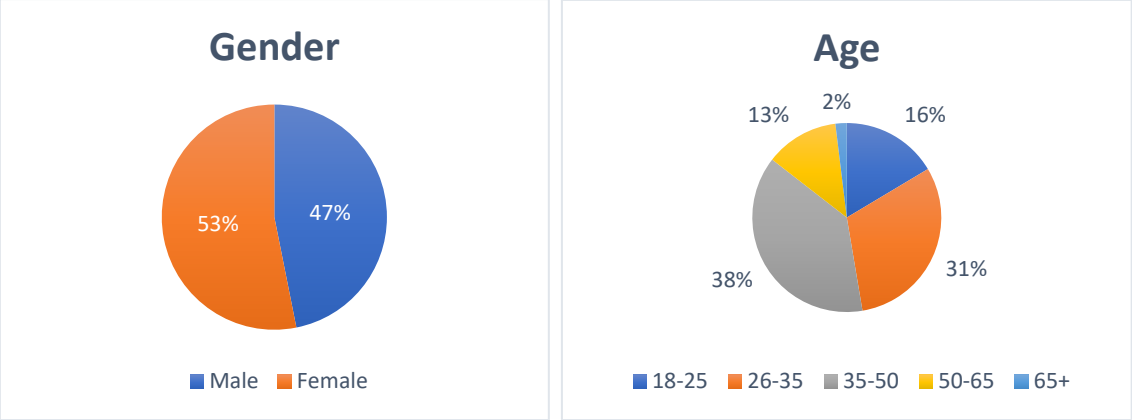
words, the results will be expressed in proportions and presented in the form of charts in order to prove valid or invalid the hypotheses.

12.5 Results

In this section, the results of the survey will be presented. As a reminder, the goal of the survey was to prove the previously drawn hypotheses valid or invalid based on the gathered results from the interviews conducted with potential customers in the food store called Färm. Furthermore, the objective was to produce results which are representative of the whole target group.

In total, the sample comprises 207 participants. In the two charts below, we can see the distribution of the participants in terms of age and gender. All participants were potential customers as they were surveyed in front of food stores where the target group shops. The outcome will be presented following the order of the survey and the corresponding hypothesis.

Figure 13: Distribution of gender and age

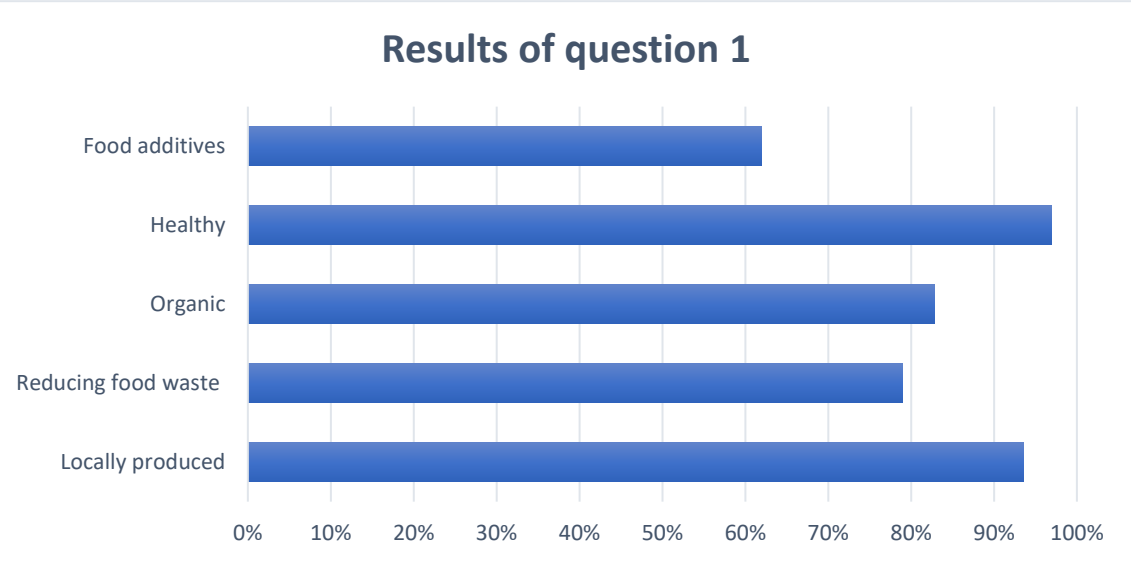


Source: Own conception based on the results of the survey

Hypothesis 1: *The characteristics "local" and "reducing food waste" are more important for potential customers when buying fruits and vegetables than "organic".*

Figure 14: Results of question 1

Question 1: How important on a scale from 1 (not at all important) to 5 (very important) are the following product characteristics to you when buying fruits and vegetables or product with fruits and vegetables?



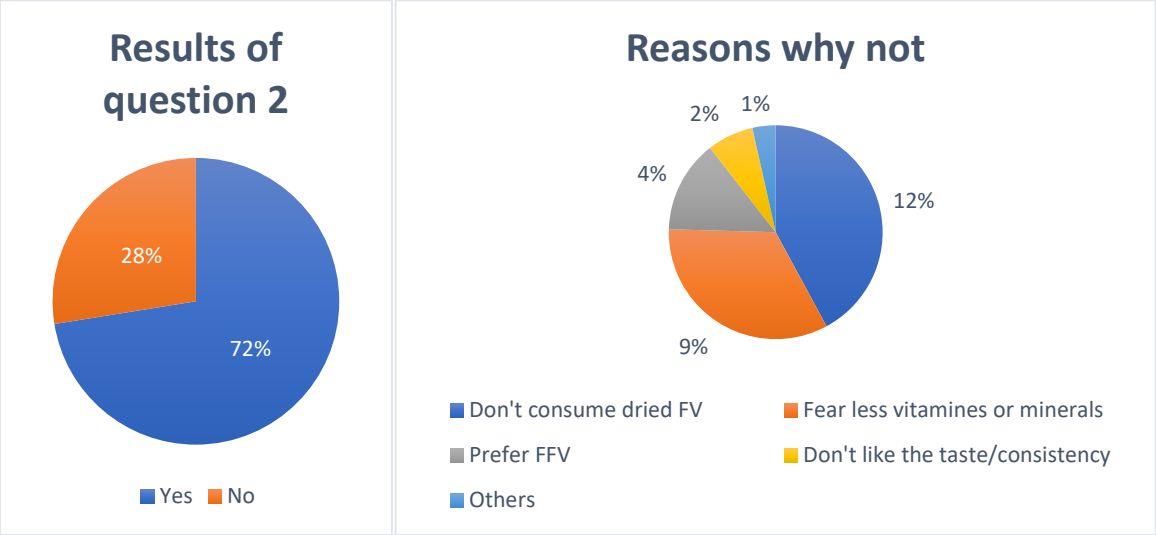
Source: Own conception based on the results of the survey

The outcome of the survey shows that the characteristic "healthy" scored the highest level of importance, followed by "local". Furthermore, according to the results, the characteristic "organic" and "reducing food waste" scored, in total, almost the same level of importance, with "organic" being regarded as a bit more important. Moreover, the trait "food additives" is the least important among the 5 traits. Yet, the latter characteristic still scored an overall high level of importance. As a conclusion, our hypothesis can't be completely validated as "reducing food waste" and "organic" have almost the same level of importance for the potential customers. The findings outline that all the characteristics are more or less important for potential customers. As the product presents at least 4 of 5 characteristics, the outcome is supportive for the project. Yet, the trait "organic" is also important and might reduce the number potential customers in the case that the dried fruits and vegetables are not organic. Furthermore, it might also give an indication on how to advertise the product.

Hypothesis 2: *The main reason why potential customers wouldn't buy the locally dried fruits and vegetables produced out of unsold fruits and vegetables is the fear that dehydrated products are of lesser quality than fresh products.*

Figure 15: Results of question 2

Question 2: Would you buy dried fruits and/or vegetables made from unsold fruits and vegetables, who weren't sold in the first place, with the goal to reduce food waste and under the hypothesis that the quality of the product is the same?



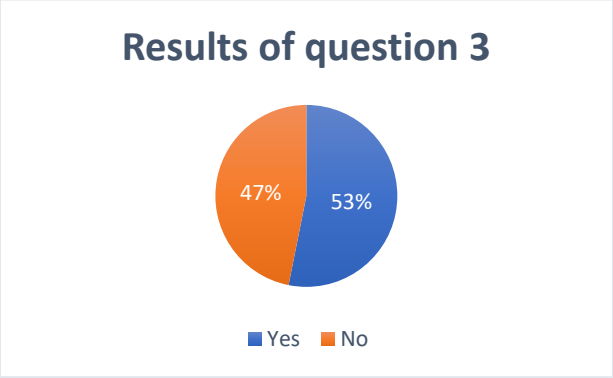
Source: Own conception based on the results of the survey

The results show that 28% of the potential customers wouldn't buy dried fruits and vegetables produced out of unsold fruits and vegetables. The main reason why they wouldn't buy the product is because they don't consume dried fruits or vegetables. The second reason mentioned was the fear of less vitamins and minerals in dried products than in fresh products. The third reason mentioned was the preference for fresh fruits and vegetables and a last recurrent reason mentioned by the participants was a dislike towards the taste and consistency of dried fruits and vegetables. Therefore, the hypothesis is invalid as the fear that dehydrated products are of lesser quality than fresh products is not the main reason why potential customers don't buy the product. Yet, it is the second reason why they wouldn't buy the product. Thus, for the project, this means that only a small number of potential customers wouldn't buy the product because most of them don't consume dried products or they fear that dried products have less vitamins or minerals and are thus less healthy. Yet, this is a misconception of the product and therefore, not promotional for the project.

Hypothesis 3: *A qualified majority of potential customers would still buy locally produced dried fruits and vegetables made of unsold fruits and vegetables even though the fruits and vegetables are not organic.*

Question 3: Would you buy dried fruits and/or vegetables made from unsold fruits and vegetables, under the hypothesis that the quality of the product is the same, even though the fruits and vegetables are not organic?

Figure 16: Results of question 3

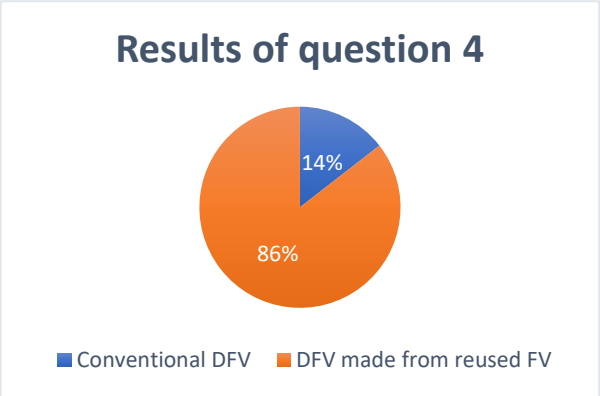


The findings outline that 53% of potential customers would buy locally produced dried fruits and vegetables made of unsold fruits and vegetables even though the fruits and vegetables are not organic. Yet, as the results don't confirm that a qualified majority would still buy them, the hypothesis cannot be validated. The result is that if LCB decides to launch non-organic dried fruits and vegetables, they might lose almost half of their potential clientele which is not favourable for the project.

Hypothesis 4: *The potential customers prefer the product produced out of unsold fruits and vegetables over the conventional product under the hypothesis that the quality is the same.*

Question 4: If you had the choice between a local product aiming to reduce food waste and a conventional product, which one would you choose under the hypothesis that the quality of the food is the same?

Figure 17: Results of question 4



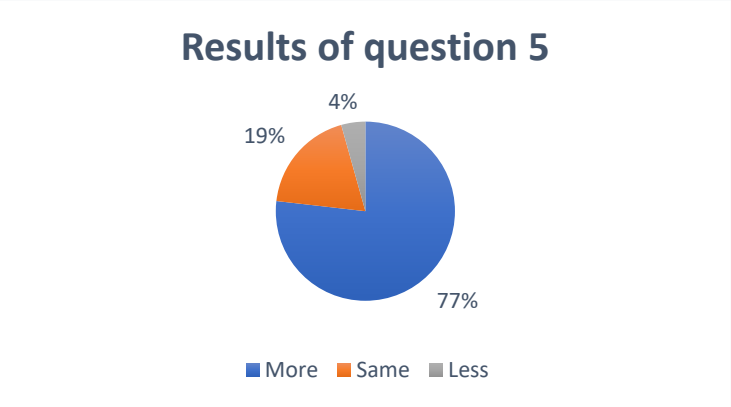
Source: Own conception based on the results of the survey

According to the results, 86% of the participants would choose the product produced out of unsold fruits and vegetables over the conventional product under the hypothesis that the quality is the same. As result, the hypothesis is validated. For the project, this means that if the quality of the product was good, a considerable part of the target group would buy the product made from unsold fruits and vegetables. Hence, it seems that the project has potential.

Hypothesis 5: *A qualified majority of the potential customers are willing to pay more for the local product produced out of unsold fruits and vegetables compared to the conventional under the hypothesis that the quality is the same.*

Question 5: Would you be willing to pay more, the same or less for the local product reducing food waste compared to the conventionnel product?

Figure 18: Results of question 5



Source: Own conception based on the results of the survey

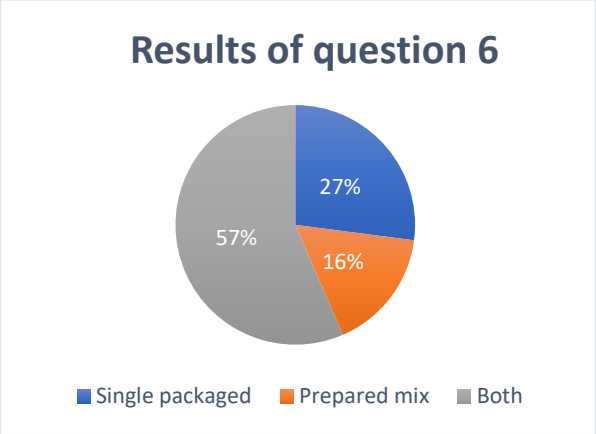
In the survey, 77% of the participants indicated to be willing to pay more for the local product produced out of unsold fruits and vegetables compared to the conventional under the hypothesis that the quality is the same. 19% confirmed that they would be willing to pay the same amount of money as the conventional product. Only 4% stated that they would like to pay less for the local product produced out of unsold fruits and vegetables than the conventional one. As a qualified majority of the potential customers

are willing to pay more for a product aiming to reduce food waste, our hypothesis is validated. This is positive for the project as a large part of the target group assigns more value to the product made from unsold fruits and vegetables than to the conventional one.

Hypothesis 6: *The potential customers prefer single packaged fruits or vegetables*

Question 6: What style of packaging would you prefer?

Figure 19: Results of question 6



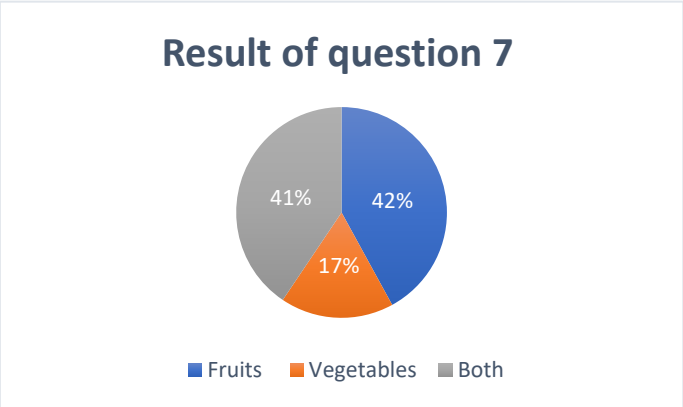
Source: Own conception based on the results of the survey

In the survey, 57% of the potential customers indicated that they like both, single packaged and prepared mixes of dried fruits or vegetables. 27% of the participants indicated that they prefer single packaged dried fruits or vegetables and only 16% said that they prefer prepared mixes of dried fruits and vegetables. Consequently, the hypothesis can't be validated as the majority prefers to have both. This gives us an indication of what potential customers are looking for and what packaging might be better to launch in the beginning of the project. In the case that LCB wouldn't like to launch both packaging, it might be better to launch single packaged fruits and/or vegetables as more potential customers are seeking that sort of packaging.

Hypothesis 7: *The potential customers are more interested in dried fruits than in dried vegetables.*

Question 7: What type of dried products would you be or are you interested in?

Figure 20: Results of question 7



Source: Own conception based on the results of the survey

The findings of the survey show that 42% of potential customers are interested in dried fruits. Yet, they are not solely interested in dried fruits as 41% confirmed to be interested in both; dried fruits and dried vegetables. However, only 17% indicated to prefer dried vegetables over dried fruits. Therefore, the hypothesis cannot be validated as almost the same percentage of people are interested in fruits as were interested in fruits and vegetables. As a result, this means that introducing only dried vegetables might not lead to a lot of success for the project. Hence, introducing fruits in a first instance might lead to a more successful start. Another possibility would be launching vegetables and fruits.

12.6 Limitations

A first limitation affecting the representativeness of the survey is the survey sample. Only 207 potential customers took part in the survey leading to a sampling error higher than 5%, but lower than 10% (cf. Survey sample) within a 95 percent confidence interval.

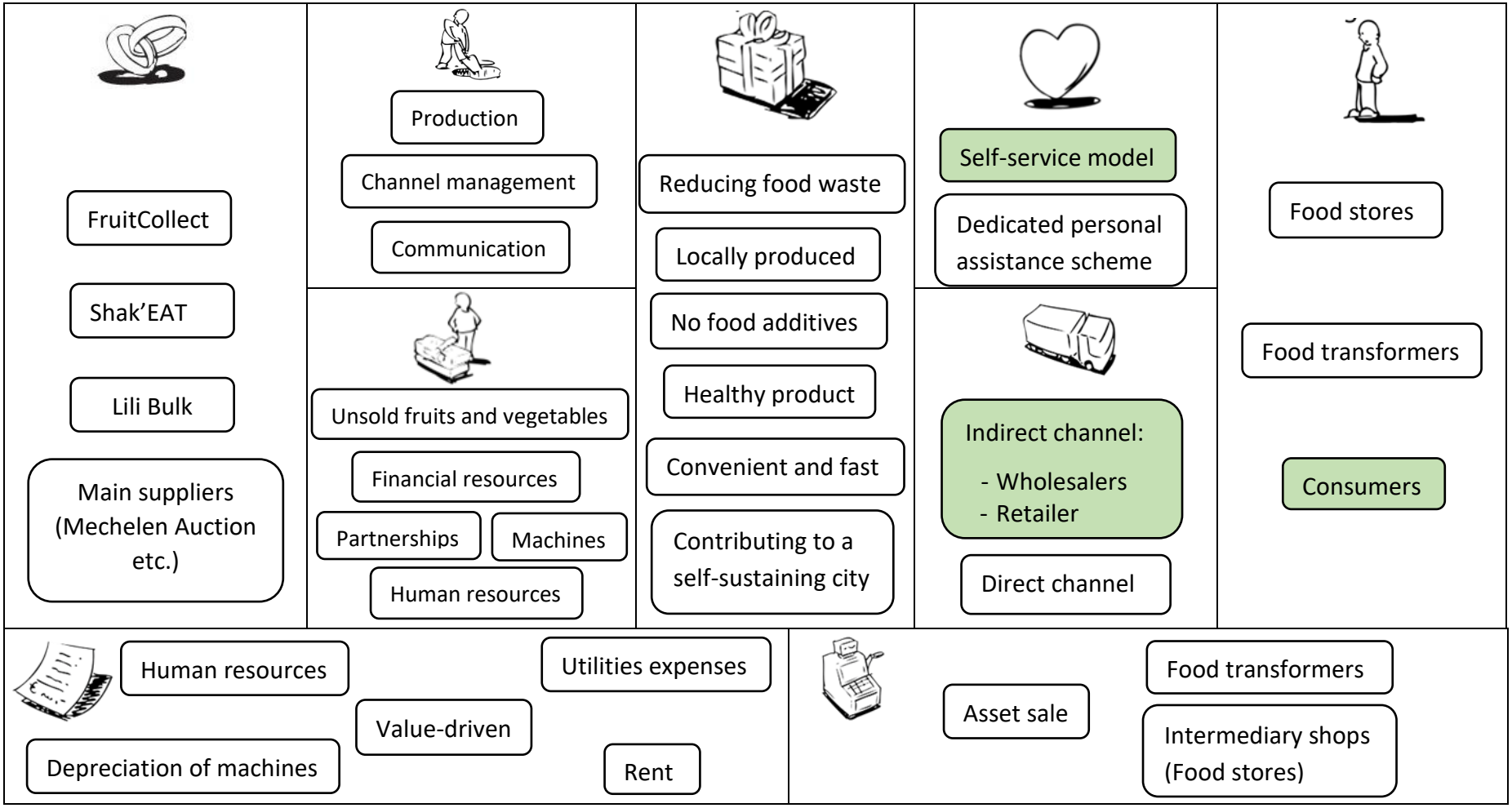
Another limitation affects the data collection method. As the data was collected using a face-to-face and written instrument called investigator-administered questionnaires, the scope of the survey had to be short. Therefore, only questions that validated and invalidated the main hypotheses were asked. Yet, the questionnaire could have been more complete and provide additional information or results if another data collection method was chosen. Nevertheless, the chosen data collection method was important for the validity and representativeness of the survey since it reduced the non-response and the measurement error.

The non-response error was reduced because the chosen data collection method leads to higher a response rate than methods where the researcher isn't present (Mitchell & Jolley, 2009). Furthermore, the measurement error was reduced because the specific terms were explained in the same way to all the participants so that no misunderstanding or misinterpretation occurred (Leeuw et al., 2012).

13. Business Model Canvas

"The business model is like a blueprint for a strategy to be implemented through organizational structures, processes and systems" (Osterwalder et al., 2010, p.15). The Business Model Canvas (BMC) is divided into 9 blocks that outline in a logical way how a company intends to operate (Osterwalder et al., 2010). In Figure 21, we can see a summarized version of the BMC and its 9 blocks. After the summarized version, every block will be analysed in detail and consider the findings that we generated during the literature research, semi-structured interviews, focus group and survey. As suggested by Osterwalder et al. (2010), the first two blocks we are going to analyse are the "Customer Segment" and "Value Proposition". After that, we will analyse the key resources and key partners as these two blocks are crucial for the feasibility study. Subsequently, we will focus on the customer relationships and channels. Finally, we will have a look at the cost structure and revenue stream with a view to construct a break-even analysis as the final step.

Figure 21: Business Model Canvas



Source: Osterwalder, A., Pigneur, Y., & Clark, T. (2010). *Business Model Generation: A handbook for visionaries, game changers, and challengers*. Hoboken, New Jersey: John Wiley & Sons, Inc.

13.1 Customer segments

The customer segment is the first building block we are going to consider. According to Osterwalder et al. (2010), when designing a business model, the customers' perspective could serve as a guiding principle since the customer constitutes the heart of every business model. A customer segment as such can be defined as an aggregation of people that a company is aiming to reach and supply (Osterwalder et al., 2010).

As a first step, desk research was conducted about dietary trends in Belgium (cf. supra p.30). In this section, we are going to base our assumptions on the date gathered in the interviews with a view to reveal if the inherent attributes of the product will match with the current food propensities. Subsequently, the findings will assist us to narrow down the range of potential customers.

The most important attribute of the product is to reduce food waste by dehydrating unsold fruits and vegetables. As we discerned earlier, diminishing food waste is one of the current food trends. Furthermore, the product's characteristics matches the current tendency to consume more local and healthy products. The unsold fruits and vegetables would not only be sourced, but also dehydrated locally. In addition to that, fruits and vegetables are generally considered to contribute to a healthy lifestyle (Centre de Recherche et d'Information des Organisations de Consommateurs (CRIOC), 2006). Besides the trend to consume healthier, we could also identify an increased interest in fruits and vegetables, congruent with products LCB would like to introduce to the marketplace.

Furthermore, the attribute of sustainability can be seen as one of the product's results because it is contributing to an increasingly self-sustainable city. Instead of devaluing food designated to human consumption, it could be collected, dehydrated and re-entered into the economic system of the city for human consumption. This matches the trend of growing concerns among Belgians regarding the sustainability of their food consumption.

Another trend that we have identified is cocooning, also known as convenient food solutions. This propensity has been triggered by millennials and their parents who have less time to buy food products and prepare meals. Dehydrated vegetables and fruits could match with latter trend, since the product can be stored for 2 years and can also be sold as a mix ready to use in a recipe, for example, a vegetable mix for a soup or a fruit mix for a muesli bowl. The leading words and characteristics of the product in this case are convenience and rapidity.

Rising expenditures and the increasing importance placed on organic products is a further propensity which has been determined earlier. The dehydrated fruits and vegetables can be organic or non-organic depending on their source (cf. Key Resources). However, according to the cascade of food waste (cf. supra p.14), no difference is made

between the two since reducing food waste and reusing food for human consumption is considered as more important. Yet, it would be interesting to ask what consumers think is more important; the attribute of reducing food waste or food being organic.

A last food tendency which could be matched with the characteristics of the product are natural products without the presence of food additives. Additives in dehydrated fruits and vegetables isn't a necessity. Anhydra, a company in Canada producing dehydrated fruits and vegetables, has demonstrated this (ANHYDRA, 2018).

Yet, we have also identified counter trends such as mass-consumerism and globalization. In other words, products where the price is the only important variable and consumers that do not regard the origin of the product highly will probably not match the product's attributes.

In Table 8, we can find a summarized version of the product's attributes matching with the corresponding trend.

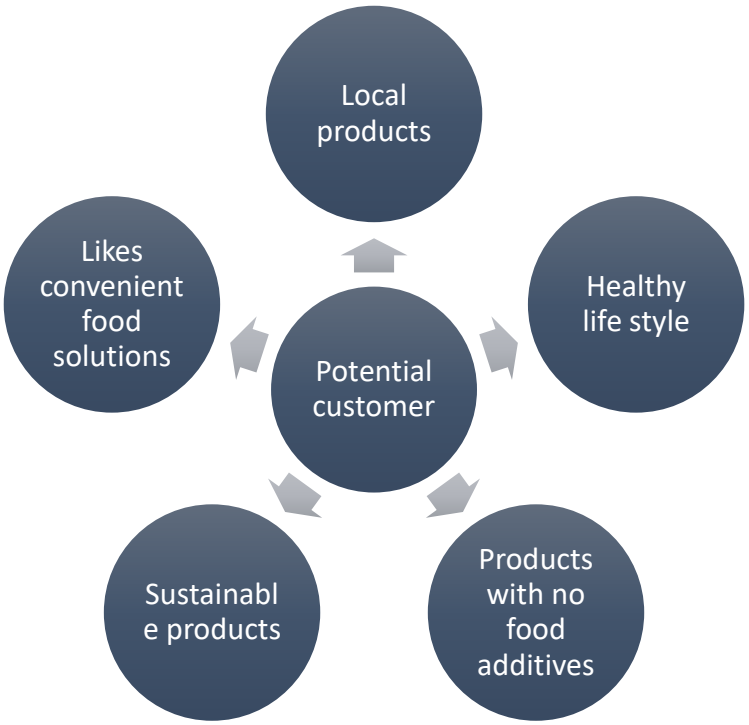
Table 8: Attributes of the product and matching trends

Attributes of the product	**Matching trend**
Reducing food waste	Actions and consumers willing to reduce food waste
Locally produced	Increase in Belgians buying locally produced food
Healthy product	Propensity towards a healthier and more balanced lifestyle/ Increased interest in vegetables.
Contribution to a more self-sustaining city	Growing concerns about sustainability
Convenience and rapidity	Cocooning
No food additives	Natural food

Source: Own conception based on the section "Value Proposition"

Based on Table 8, we can now narrow down the range of potential customers. The customers fitting to the attributes of the product would be customers who present an affinity for local and/or sustainable products. Furthermore, they might live a healthy lifestyle, care about food additives and/or like convenient food solutions. A conception of potential customers can be viewed in the figure right below.

Figure 22: Conception of potential customers



Source: Own conception based on the part "Customer Segment"

The question arises where the potential customers can be found with a view to test if and how those customers are interested in dehydrated fruits and vegetables. Therefore, empirical research was conducted by the means of semi-structured interviews in order reveal the right customer segment.

The findings of the semi-structures interviews and the survey enabled us to confirm and adjust the selected range of potential customers who are interested in the attributes of dehydrated fruits and vegetables (DFV) made from unsold FFV. As a result, the target group or the aggregation of people a company is aiming to reach and supply are customers who are interested in local, healthy and sustainable products. A like-minded customer segment was found in food stores that have those characteristics as value proposition and that sell the kinds of products that our identified customer segment would seek out. Yet, almost half of the potential customers wouldn't buy the product if it wasn't organic, presenting a threat for the project. Furthermore, during the interviews, a small commonality could be noticed and that was that interviewees between the age range from 18-35 favoured the convenient food solution of prepared mixes of dehydrated fruits or vegetables more than the other target groups. Yet, this trend couldn't be confirmed with certainty by the survey.

As this customer segment is very specific and specialized, we will consider the product as fulfilling a niche market (Osterwalder et al., 2010), with tailored value propositions,

distribution channels and customer relationships that will be analysed in the following parts.

Yet, the sales would take place through an intermediary such as food stores similar to Färm that attract the defined customer segment. During the interviews, we could identify food transformers who would establish partnerships with LCB and further, they would become customers as they would buy the final products. The food transformers, who were interested in the products, are active in the field of sustainable nutrition or sustainable development within the sector of food and beverages. Therefore, companies with those characteristics also represent possible targets for LCB. They are first and foremost interested in the product because it fits and completes their value proposition, facilitates their logistic and reduces their food waste.

13.2 Value proposition

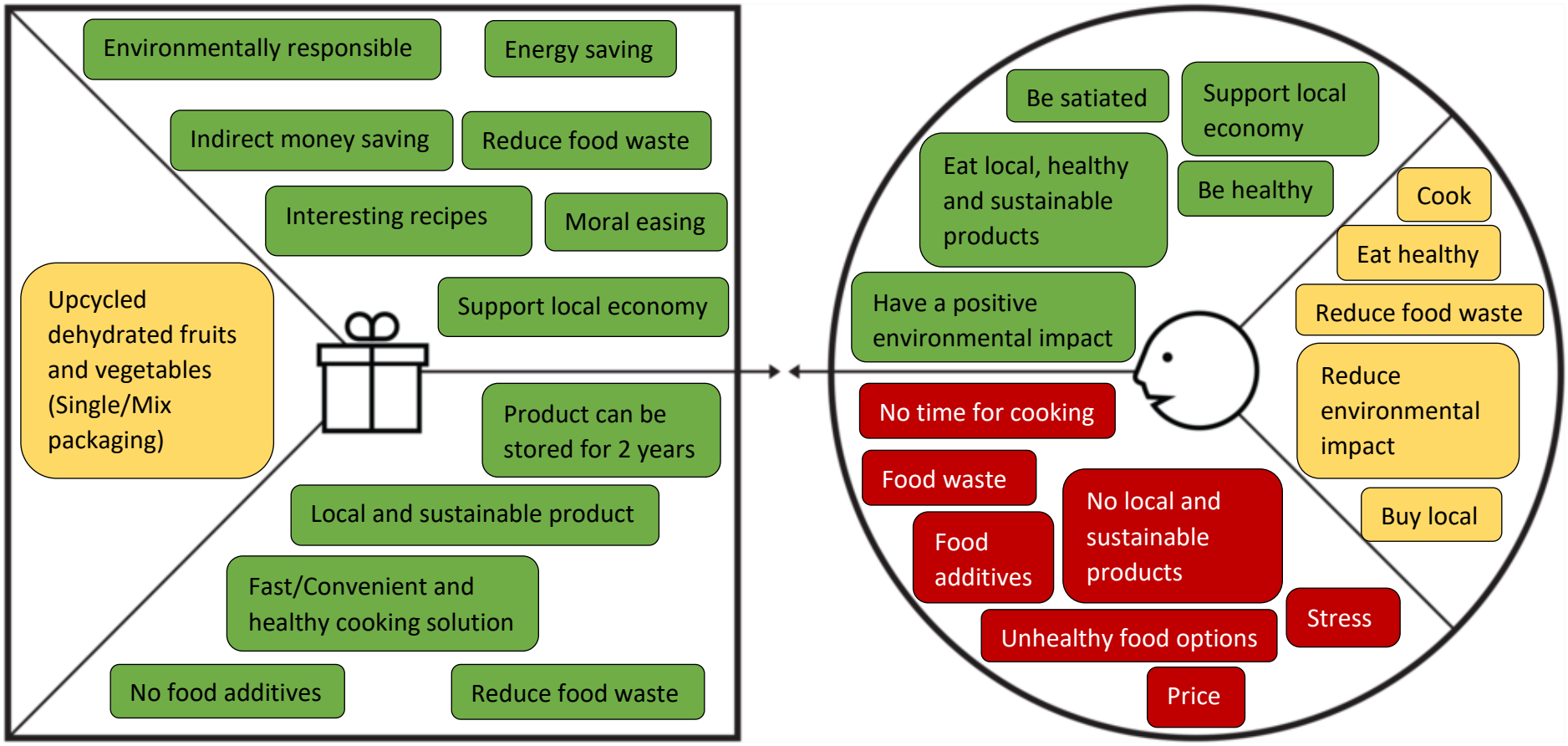
The value proposition is the second building block that we will examine. According to Osterwalder et al. (2010), it is the reason why customers choose one company over another. The value proposition consists of a product or service which satisfies the need of a customer or solves a problem for the customer (Osterwalder et al., 2010). In this paper, the product suggested to customers are dehydrated fruits and vegetables, created out of unsold FFV.

The value proposition will be established by using the value proposition canvas tool. This method is useful in order to create a match between the customer segment and the value proposition (Osterwalder et al., 2010). As a first step, a customer profile will be sketched based on the previous section (cf. Customer Segment). Secondly, a value map will be drawn based on the product that LCB would like to suggest.

In the previous section, we could determine that our customer segment are people who pay great importance to local, healthy and sustainable. A specific customer profile will be created composed out of three parts; customer jobs, customer gains, customer pains (Company 800, n.d.). Customer jobs are things that customers are trying to get done and they can be functional, social or emotional (Luenendonk, 2015a). Customer pains outline negative outcomes, obstacles or risks related to customer jobs, whereas customer gains describe the concrete benefits and outcomes they are seeking (Luenendonk, 2015a). Furthermore, the value map also comprises three sections; products and services, gain creators and pain relievers (Company 800, n.d.). The first part explains what products and services the company is suggesting to the customer and further, around what the value proposition will be built. The gain creators outline how customer gains are created by the products and services, whereas the pain relievers determine the customer pains that will be relieved by the product and services (Luenendonk, 2015a). In Figure 23, the customer profile and the value map will be conceptually depicted with a view to create a fit between the two components. On the right side in yellow, we can see the customer jobs, in red, the customer pains and in green, customer gains. Whereas on the left side in yellow, we can see the product suggested by LCB, in green (down), the pain relievers and in green (up), the gain creators.

Through the value proposition canvas, a fit between the customer profile and value proposition has been established. The value proposition, according to Osterwalder et al. (2010), is customized as the product creates value for a specific customer segment. It responds to specific needs of consumers who are looking for a positive environmental impact, local sourcing and healthy products, but who also favour convenience and usability.

Figure 23: Value Proposition Canvas



Source: Own conception based on the Value Proposition Canvas from Guppta, K. (2016). *The Difference Between Customer Profiles & Buyer Personas.* Retrieved the 26th of May 2018 from https://blog.strategyzer.com/posts/2016/3/17/the-difference-between-customer

13.3 Key resources

In the following part, we are going to examine the key resources which are, according to Osterwalder et al. (2010), essential to assure the operation of a business model. This statement is supported by Marbaise & 50Minutes.fr (2015), who claims that there's a strong relationship between a healthy company and the resources available to support its value proposition. Furthermore, we are going to have a look at different sourcing possibilities which have been identified as a result of the interviews with actors working with unsold fruits and vegetables in Brussels-Capital.

"Every business model requires Key Resources. These resources allow an enterprise to create and offer a Value Proposition, reach markets, maintain relationships with Customer Segments, and earn revenues" (Osterwalder, Pigneur, & Clark, 2010, p.34). In this case, the most important Key Resource are unsold fruits and vegetables constituting the heart of our value proposition (cf. supra p.73).

One has to be aware of the fact that food waste occurs all along the food supply chain. Throughout our investigation, we could identify several leaks which could be exploited by LCB as a sourcing possibility and hence, reduce food waste. We are going to divide the leaks into 3 different stages: Agriculture/gardens, post-harvest (from the Mechelen auction until arrival in supermarket or collection by food bank) and distribution.

At the first stage, the fruits and vegetables are already lost before they are sold to anyone, namely on the fields. The overproduction of farmers is often left on fields as it is easier and cheaper for them rather than to harvest. In addition to farmers, there are also individuals with fruit trees in their gardens. Some individuals collect them, but others don't take advantage of the fruits. The result is that these uncollected fruits are going to rot on the ground.

The second stage regroups the leaks occurring after fruits and vegetables are sold by the farmer, but before they reach a supermarket or an association. The following losses could be identified:

1. <u>Mechelen auction:</u>
   The following part has been written based on the interview with Tony Michiels, CEO at the food bank Brussels-Brabant. The sources are indicated in case the information was not provided by Tony Michiels.
   The Mechelen auction takes place in the Mechelen region, Belgium's main area to grow vegetables; "The auction-house in Sint-Katelijne-Waver handles a staggering 3,000 ton of vegetables every day (…)" (Tourism Mechelen, n.d., para.1). Besides, the Mechelen auction also sells a small quantity of fruits and flowers (Hermoo Belgium NV, 2017).
   The fresh products are shown in the auction hall and the respective price will be determined at a certain point. In case the complete stock isn't sold, it will be

repurchased by the ministry of agriculture who becomes the owner. Subsequently, the ministry of agriculture donates the unsold vegetables and fruits to food banks, who collect them at the auction site. To have access to the unsold fruits and vegetables, you need to be registered with the ministry of agriculture. However, only a small part of the unsold items is collected by food banks because of logistics problems or because the amount of FFV is more than the capacity of collection. Tony Michiels, who regularly drives to the Mechelen auction to collect unsold products, estimates that around 70-80% of fruits and vegetables are destroyed during the high season of the respective product. The destruction of the food products implies that the fruits and vegetables are, first of all, grinded and then distributed on fields. All the products sold at the auction are originally from Belgium and of an excellent quality. According to Tony Michiels (2018), the quality of the food products that are destroyed are of a better quality than the ones that one can find in "Delhaize", "Carrefour" or even "ROB The Gourmets' market", a high end supermarket.

One has to know that the Mechelen auction is not the only auction in Belgium. Hence, we can make the suggestion that other auctions in Belgium, such as the "Belgische Fruitveiling cvba" (BFV) or the "REO" Auction also have unsold FFV at the end of the day (Hermoo Belgium NV, 2017).

2. Logistic problems:

   This part has been written based on the information provided by Maxime Niego, CEO of FruitCollect, if not indicated otherwise. According to Niego (2018), the occurrence of logistical problems creates a lot of food waste. The statement is confirmed by Derqui, Fayos, & Fernandez (2016), who state that logistical issues are one of the main reasons for food waste. For instance, if a truck is delayed more than 2 hours, the supermarket will not accept the products because logistically, it is too complicated for the supermarket. Consequently, the truck has two choices; either he heads back with the products or he throws them away. Thus, Niego (2018) estimates that, yearly, around 400 tons of fruits are thrown away in Brussels because of logistical delays. His estimation seems reasonable considering the annual food loss in distribution chains in Flanders is estimated at a staggering 116.000 ton (VIL, 2018).

3. Health regulations:

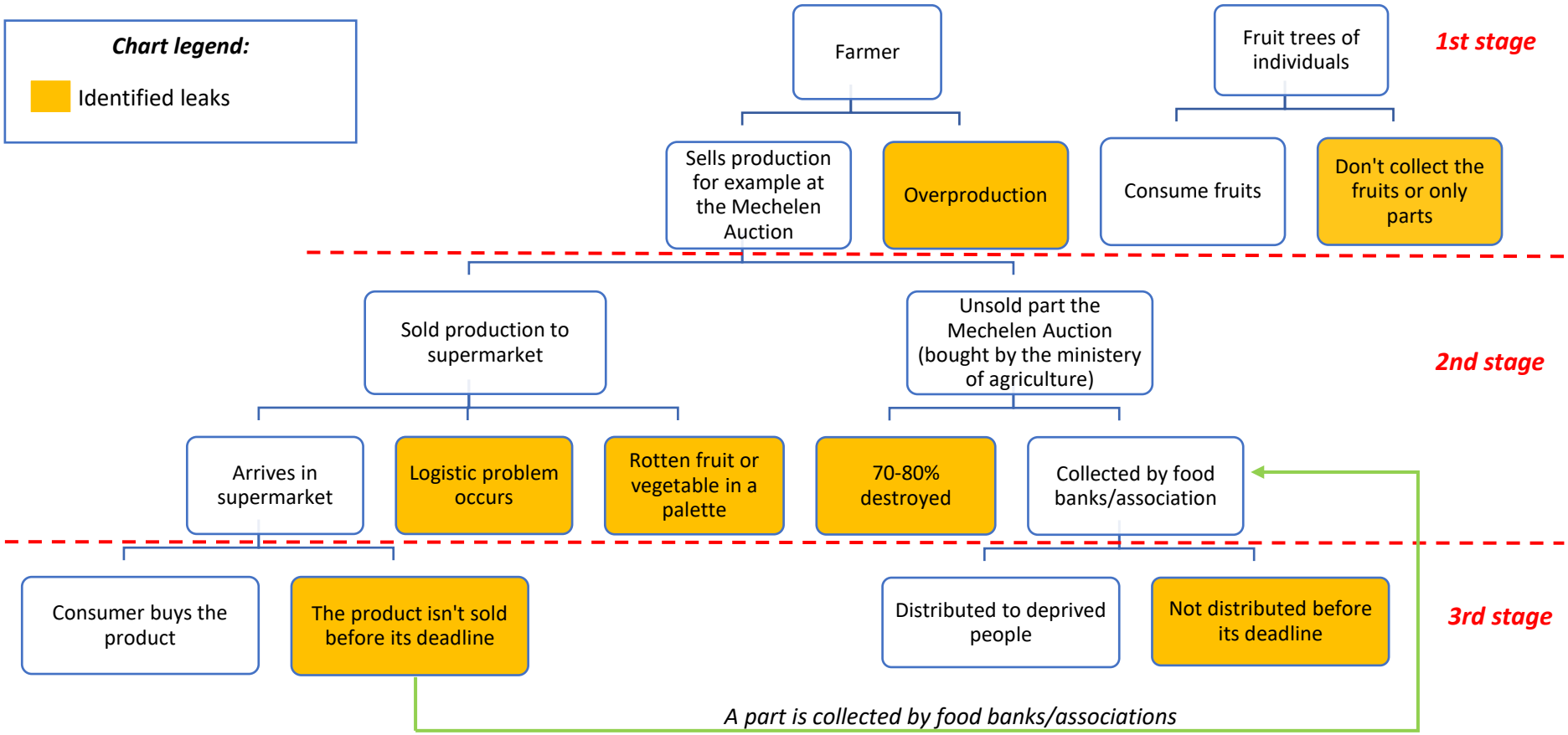
   Another reason for food waste is, according to Niego (2018), strict AFSCA regulations. He states that the biggest part of unsold fruits is collected by his company before the fruit enters the supermarket. He explained that one rotten fruit in a pallet leads to the rejection of the entire palette. The supermarket prefers to reject the palette due to the strict health regulations imposed by AFSCA.

The third stage regroups FFV leaks occurring after they have reached the supermarket or association. In the supermarket, FFV are either bought by the consumer or the product reaches its expiry date and cannot be sold anymore meaning that the FFV are removed from the shop floor and thrown away. As stated by Tony Michiels (2018), some of the supermarkets, such as “Delhaize” or “Colruyt” are collaborating with associations and donating the unsold FFV. The unsold products can be collected at the plant of Zellik or Hal. However, the size of FFV is too big for associations to collect everything. Furthermore, supermarkets, affirming Michiels (2018), apply different removal limits from the shop floor on their FFV. He revealed that Colruyt’s products are removed from the shop floor 4 days before their expiry date whereas Delhaize removes them the day itself.

In case FFV are distributed to food banks or associations, they are either distributed to deprived people or aren’t distributed in time before they turn bad.

A fourth stage exists which includes the consumer. However, in this paper, we are not going to take into account the consumer and whether he/she consumes the FFV or not, since we are focusing on the leaks during the food supply chain. Hereafter in Figure 24, we can see a summarized diagram of the food supply chain losses.

Figure 24: Concept mapping of food supply chain losses identified in the region Brussels-Capital and its close surroundings



Source: Own conception based on the interviews with actors working with unsold fruits and vegetables

Another leak that could be identified, as a result of the interview with AlimentAB, is unsold FFV from Brussels' markets, such as the market of Cureghem or the market of Midi. However, this specific leak was not integrated into the previous figure as the origin of the FFV on markets couldn't be identified with certainty. Nevertheless, this leak is part of stage 3: Distribution. The fruits and vegetables that aren't sold are usually thrown away by the tradesman. However, tradesmen cannot just leave their unsold products at the marketplace. They need to pay a fee to get rid of it. It may be interesting if someone collects the unsold fruits and vegetables from them, so they do not have to pay the fee. However, this resource flow, according to Mohamed Ibir (2018), is very unstable as the FFV available for collection varies from week to week depending on the volumes sold at the markets. Taking the example of the market of Cureghem, the biggest market in Brussels, Mohamed Ibir (2018) clarified that during the high seasons from mid-April until mid-July and from September until mid-October, the collected FFV can reach a staggering 3 tons every Sunday, whereas during the low season from mid-July until the end of August and from mid-October until mid-April, around 1 ton of FFV are collected every Sunday. The unsold fruits and vegetables are collected by AlimentAB and distributed to associations. However, AlimentAB is only collecting a part of the unsold FFV, since they don't have enough volunteers to collect everything. According to Ibir (2018), the FFV available for collection is 4 times higher than the amount they are collecting every Sunday. Nevertheless, the quality of the fruits or vegetables is uncertain as they sell low-quality products. Mohamed Ibir (2018) describes them as low-quality products because the FFV are products that a wholesaler couldn't sell to supermarkets or other professionals and which are bought by the tradesmen at a discount.

As a conclusion, we identified many leaks during the food supply chain in the region Brussels-Capital and its close surroundings representing a staggering food waste. Thus, LCB has a lot of sourcing possibilities and access to high quantities of food waste, but the amount of fruits and vegetables available for collection differ from source to source. Besides, the FFV, depending on the stage where they are collected, are of different qualities which will result in different qualities for the end product. Furthermore, since the sourcing possibilities are not located at the same site as LCB, except for the market of Cureghem, a way to organize the logistics to bring the secondary raw materials to the caves of Cureghem needs to be found.

The numerous sourcing possibilities which could be identified imply also the possibility for many supply partnerships. The sourcing possibility with the best quality and with the highest quantity is the Mechelen auction. Yet, the supply partnership needs to be accepted by the Department of Agriculture responsible for the Flemish speaking region since, according to Tony Michiels (2018), an authorisation is needed to gain access to the unsold fruits and vegetables. Another point that needs to be taken into account, as Tony Michiels (2018) explained, is the procedure as to how the unsold FFV would be

collected without entering into competition with NGOs. However as estimated, above 70-80% of the UFV are destroyed during the high season of the respective product meaning that this amount cannot or is not being collected by the NGOs and hence, both purposes could exist whilst avoiding competition. Another option would be that the unsold FFV are bought directly from the ministry of agriculture for a certain price which would mean a constant and reliable supply, rather than the invariables associated with collection.

Besides food waste, which represents the essence of the business model, intellectual resources are also important in this case. According to Osterwalder et al., (2010), partnerships are part of intellectual resources and as stated by Asselineau et al., (2014) they are a key resource for the development of small and medium sized companies, under the condition that a defined territory is given which enables the company to create a local ecosystem. In the next section (cf. Key Partnerships), the above mentioned key resource (partnerships) will be elaborated upon.

A third key resource necessary for the production process is the right equipment, namely machines. To dehydrate the fruit and vegetables, LCB will need an industrial dehydrator with trays (cf. Dehydration centre). A range of suitable machines was determined together with LCB. A list of these possible machines can be found in Appendix 6 including an explanation of why I decided to detail the following machine in this paper (cf. Appendix 6: List of possible machines and explanation of choice). The chosen machine of 25 m2 including 72 trays of 70x50 cm divided into 4 areas would have a capacity to produce 70 to 100 kg of dehydrated fruits/vegetables a day (TomPress, 2018, para 1). The energy costs necessary to dehydrate 1 kg of fresh fruits is estimated by Tompress (2018) to lie between 0.10 and 0.15€ for the respective machine, depicted in Figure 25 (TomPress, 2018, para 1). Furthermore, the dehydrator can be enlarged by an additional module doubling its capacity (TomPress, 2018). The exact description of the machine can be found in Appendix 7: Product sheet of Tompress Dehydrator.

Figure 25: TomPress Dehydrator

Source: TomPress. (2018). *Déshydrateur professionnel 25 m2 - Tom Press*. Retrieved 11 June 2018, from https://www.tompress.com/A-10001236-deshydrateur-professionnel-25-m.aspx

Besides, machines for cutting the fruits and vegetables in equal-sized slices will also be needed. Moreover, certain fruits require the removal of their pits or/and peeling. Hence, a machine removing pits and peels might also be necessary depending on the chosen fruits and vegetables.

A fourth key resource, which will be defined hereafter, is human resources. Besides, the environmental, ethical and economic impact, the activity also has a social impact. The activity to dehydrate unsold fruits and vegetables requires human resources to complete the different steps in the production process (cf. Key Activities). However, the tasks which need to be fulfilled don't require a well-trained workforce. Consequently, the activity gives an opportunity for low-skilled workforce to find a work place and therefore, not only does it reduce unemployment, but also tackles a weakness of the region Brussels-Capital (cf. Urban Area). The goal would be to take on young people from the C.P.A.S. (Centre Public d'Action Sociale) under the so called "Article 60, §7", since LCB is already working with employees under this article and according to Camille Séon, this is a possibility. The "Article 60, §7" enables C.P.A.S. to employ a person with a labour contract in order to give the respective person access to unemployment allowances as well as the opportunity to gain professional experience (Libert, 2017). The labour contract is executed either at C.P.A.S itself or externally which means within the company of a third party, as referred to by the "Article 60, §7, Externe" (Libert, 2017). The important fact, when taking on a person under the "Article 60, §7, Externe", is that the person still has a labour contract with C.P.A.S, but it is made available for third parties (Libert, 2017). Therefore, an agreement between C.P.A.S and the respective company needs to be concluded including certain conditions about the time frame and obligations of the company towards the C.P.A.S (Libert, 2017). Regarding the time frame, the respective company needs to take on the employee during the determined period necessary for the person to gain access to unemployment benefit, or during a period of minimum 1 month and maximum 6 months, when the unique goal is to provide professional experience to the employee (Libert, 2017). Furthermore, the company needs to pay the C.P.A.S the difference between the subsidized amount of the federal government and the growth salary the C.P.A.S is paying the employee (Libert, 2017). According to Camille Séon, LCB has already taken on people under the "Article 60, §7, Externe" paying the C.P.A.S around 900€ a month for the workforce.

A last key resource outlined in this chapter is financial resources which are necessary to finance investments into equipment and interior installation. Yet, the investment will be subsidized by 50% because LCB won the call for projects "Be Circular" in 2017 (cf. Be Circular). The necessary investment can be split up into two different categories. The first category is the investment necessary for the dehydrator as well as the connexion that needs to be built between the pasteurizer and the dehydrator. The second category would regroup the interior installation of work surfaces, furniture and the other

machines necessary to produce effectively. However, this is dependent on the fruits and vegetables chosen.

As indicated on the website of the supplier, the dehydrator depicted in Figure 25 requires an investment of 13,524.00€ (TomPress, 2018). Since, the dehydrator needs to be attached to the pasteurizer and according to the estimations of Camille Séon, we will take a safety marge of 4,500.00€, leading to a total investment of 18,024.00€ for the first category.

According to a phone call with the company Politec, a company manufacturing professional machines for commercial activities, a standard industrial cutting machine will cost between 1,000.00 and 5,000.00 € and an industrial peeling machine would cost between 3,000.00 and 7,000.00€. The installation of work surfaces and furniture is estimated by Camille Séon to be around 1,000.00€. A security margin of an additional 1.000,00€ will be taken. Regarding the highest cost possible, the second category would need an investment of 14.000,00€.

Consequently, the overall investment necessary to finance the equipment would be 32,024.00€, of which 50% or in other words, 16,012.00€ would be subsidized.

13.4 Key partners

"The Key Partnerships Building Block describes the network of suppliers and partners that make the business model work" (Osterwalder et al., 2010, p.38). Furthermore, "companies create alliances to optimize their business models, reduce risk, or acquire resources" (Osterwalder et al., 2010, p.38).

The focus group allowed us to acquire the necessary results to form this building block. As stated in the results (cf. supra p.49), different partnerships are possible depending on the companies as represented by their participants. The key partners would be FruitCollect, Lilli Bulk, Shak'EAT and Roots.

The motivation for creating the partnership between FruitCollect and LCB lies in the resulting synergies of optimization and economy of scale: "Optimization and economy of scale partnerships are usually performed to reduce costs, and often involve outsourcing or sharing infrastructure" (Osterwalder et al., 2010, p.39). FruitCollect has the necessary means and expertise to assure the logistics. In return, LCB doesn't need to make unnecessary investments into transportation. The same goes for FruitCollect as they want to increase the use-by-date of their soups by dehydrating the ingredients. Outsourcing on the one hand logistics and on the other hand dehydration results in optimization of both business models and in a reduction of costs. Furthermore, FruitCollect and LCB might also become partners regarding the commercialization of the dehydrated fruits and vegetables. In other words, the product will wear the brand of FruitCollect and LCB. Thus, on the one side, the partnership increases not only sales channels, but also the number of potential clients and on the other side, it results in a

sharing in profits or turnover. Since the LCB is still a very young company, FruitCollect's assets might bring the necessary support to build up the dehydration centre.

Lilli Bulk, Roots and Shak'EAT would rather be "Sell to" partners. These typically embed your product inside theirs and resell it. In essence, these partners are your customers" (Sullivan, 2017). Osterwalder et al. (2010) refer to it in their book as buyer-supplier relationship. This sort of relationship enhances reliability of supplies. Lilli Bulk would embed the dehydrated products into their Bio Mix and resell it to their customers. Furthermore, they would also like to sell it in bulk products. The resulting partnership would not only provide Lilli Bulk with locally produced dehydrated fruits and vegetables, but it would also enhance Lilli Bulk's value proposition as they position themselves as a zero-waste store. Moreover, the partnership would give LCB a stable buyer of their products.

The same sort of partnership would be formed with Shak'EAT. The company has realized that growing logistical problems makes it hard for them to run their daily business. Shak'EAT would substitute a part of the FFV by dehydrated products and use them as raw materials to cook their lunch boxes. Therefore, the partnership would reduce the risks for Shak'EAT to run out of stock or encounter stocking problems. As a result, the partnership would assure a reliable supply of dehydrated fruits and vegetables and further, provide LCB with a regular buyer.

Between Roots and LCB, a buyer-supplier relationship would also be established. Yet, the functioning of this partnership differs from the previous ones, since, first of all, Roots is a food store and not a transformer. Secondly, the food store would be the provider of the raw materials, namely the unsold fruits and vegetables of the shop. The partnership would result in an optimization of Roots' business model as they reduce their economic losses. Moreover, partnering with LCB would enhance their value proposition since they position themselves as a 100% circular, local and biological food store. In return, LCB would have a regular supplier and buyer of the dehydrated fruits and vegetables. However, the companies need to agree to the conditions of this partnership. In other words, will LCB receive the unsold fruits and vegetables for free or to a certain price. During the focus group, this couldn't be determined and hence, this needs further discussion in the future.

As a conclusion, we can stress the fact that companies are interested in a dehydration centre and its end products. In a first instance, several partnerships are possible and likely to be established. In fact, the different partnerships will allow LCB to create a local ecosystem regarding dehydration and, as Asselineau et al. (2014) advocates, become a key resource for the creation of the dehydration centre. Besides in the focus group, we could determine that companies working in the field of sustainable nutrition or sustainable development within the sector of food and beverage are maybe more likely to be interested in a dehydration centre and to partner with LCB as not only the value

proposition fits to their value proposition and even completes it in some circumstances, but also because the philosophy and values of the companies are also similar. In this sense, it might be interesting for LCB to continue looking for companies active in those fields with a view to establishing new partnerships. Furthermore, the cluster in circular economy launched in May by hub.brussels might also help to establish further partnerships (Greentech.brussels, 2018).

All in all, the focus group and its results gave the first indication concerning the feasibility to create a dehydration centre in the region of Brussels-Capital.

13.5 Customer relationships

This building block, according to the methodology of Osterwalder et al. (2010), defines the nature of the different relationships that an organisation implements and develops with its different categories of customers. The different model that a company applies towards its customer relationships depends on its business model and will have a big impact on the customer experience.

As mentioned before, LCB customers are, generally speaking, consumers who are interested in local, healthy and sustainable products. Further, there are intermediary customers which are the different food stores and/or food transformers.

Regarding customer acquisition, meaning the procedures on how to persuade new customers, LCB will implement a strategy combining content marketing and social media marketing (Belyh, 2015). According to Belyh (2015), mediums and tactics like content and social media marketing have been proven to be very effective when applied in an intelligent way. Solely using social media marketing is not effective enough, and therefore using it in combination with other tools is the way to push your business forward and elevate your product significantly (Belyh, 2015).

In order to establish a long-term customer relationship, LCB has and will put some strategies into place. As LCB is targeting a niche market, their customers will be more loyal because they can identify with the company and its value proposition (Belyh, 2015). Furthermore, it is of great importance that LCB communicates in an appropriate way what exactly they stand for (Belyh, 2015). Besides, Belyh (2015) claims that by offering a product based on qualities that potential customers feel exist in themselves, makes them more inclined to the product and the company.

For the intermediary customers, LCB puts in place a dedicated personal assistance scheme meaning that the relationship is defined by the human touch (Osterwalder et al., 2010). The different food stores and food transformers have the possibility to interact with a dedicated sales representative for their purchase decisions and the after sales services. This kind of relationship takes time and effort to develop, but the sales representative will know the different traits of its client and thus, enhance the customer experience (Osterwalder et al., 2010).

For the final customer in a dedicated shop, the customer relationship will be more based on self-service model. This means that the customer in a shop, as for instance Färm, has all the necessary tools to service themselves (Osterwalder et al., 2010).

13.6 Channels

In this section, we will have a look at the channels building block. Osterwalder et al. (2010) describes it as a medium between the value proposition and the customer segment, allowing the company to communicate and reach the customer to deliver its value proposition.

LCB has already established channels through which they deliver the mushrooms to the end customer (Le Champignon de Bruxelles, 2018). At the moment, LCB mainly operates through indirect channels which means that the company sells to the end customer through an intermediary (Le Champignon de Bruxelles, 2018). The company sells their products through two different types of partner channels; wholesalers and retailers, such as Belgomarkt, Beescoop or Färm (Le Champignon de Bruxelles, 2018). Moreover, LCB sells dried mushrooms and a Shiitake cultivation kit via their website constituting their single direct channel owned by the company (Le Champignon de Bruxelles, 2018). Yet, the products sold via their website account, according to Hadrien Velge, only constitute a small part of their turnover.

The results of the interviews at Färm Saint-Catherine, one of the current channels of LCB, show that customers of the food store are, in general, positively interested in the product and that the store attracts the defined customer segment that we identified earlier (cf. Customer Segment). Due to the scope of this master thesis, the assumption has been made that other retailers of LCB's mushrooms attract the defined customer segment as well. Therefore, it would be interesting for LCB to sell the dehydrated fruits and vegetables through the already established partner channels.

Furthermore, as a result of the focus group, we revealed that FruitCollect would like to partner with LCB not only to increase the use by dates of their soups, but also for commercialization purposes. In other words, the dehydrated fruits and vegetables would wear the name of the two companies. On the one hand, this partnership would result in an increase in channel partners and customers to serve. This assumption is based on the fact that the company is active in the field of sustainable food and sells to retailers who attract the defined customer segment as well. On the other hand, it implies the sharing of profits or turnover.

Moreover, possible partnerships with Lilli Bulk, Shak'EAT and Roots were also revealed (cf. Results Focus Group). Shake'EAT would buy the products and use them as secondary raw materials to prepare lunches. Consequently, a B2B relationship would be established requiring a direct sales channel (Luenendonk, 2015b). According to

Osterwalder et al. (2010), direct channels lead to higher margins but might be expensive to establish.

Lili Bulk would be both an intermediary and a customer. In other words, Lilli Bulk would function as a retailer selling the dried fruits and vegetables in bulk at their selling points. They would also buy the product as secondary raw materials and use them in their recipe mixes. Therefore, a direct sales channel would be established with Lili Bulk as well.

Roots, a 100% circular, biological and local food store, would function as an intermediary and become a partner channel.

All the deliveries would take place with an electric bicycle connected with a cart, the way LCB currently operates for deliveries, except for the case where the wholesaler, retailer and B2B customer would take the delivery in charge by themselves.

The different channels have advantages but also some drawbacks. Partner channels, as claimed by Osterwalder et al. (2010), allows a company to reach more customers and take advantage of their established infrastructure, network and marketing strategies. However, the margins are lower (Osterwalder et al., 2010). Luenendonk (2015b) completes the statement by saying that it might lead to a loss of control and a disconnection from the end customer. In return, as claimed by Osterwalder et al. (2010), the direct sales channel leads to higher margins. Moreover, Luenendonk (2015b) states that the customer benefits from a direct relationship leading to more control and increased customer satisfaction. Besides, the direct sales could take place under the form of personal selling implying an interpersonal communication between the buyer and the seller (Brassington & Pettitt, 2006). According to Luenendonk (2015b), personal selling is a cost-efficient way for small scale businesses to establish direct sales channels. Therefore, the dehydrated products would be sold to the companies through direct channels and to the end customer through indirect channels by the means of an intermediary shop such as Färm.

13.7 Key activities

In this part, the key activities which, according to Osterwalder et al. (2010), a company has to carry out in order to make its business model work will be determined. Key activities depend heavily on the business model type. In this case, the business model relies on a product, namely dehydrated fruits and vegetables. Therefore, the production process can be considered to be a key activity. Another key activity in this business model will be channel management, since not only the products would be sold through direct channels, but also through indirect channels (cf. Channels). Besides, several partnerships (cf. Partnerships) will be established requiring management and maintenance. A third key activity will be communication.

First of all, the focus will be on the production process which involves different steps. However, the kinds of fruits and vegetables that will be collected has not been defined

yet. The data gathered during the focus group and interviews will assist the decision regarding the first kinds of fruits and vegetables to dehydrate. For the end customer, the fruits are probably more likely to be bought if they can add them in their morning muesli (cf. Results interview). It also might be of an advantage to suggest, in a first instance, fruits that customers are used to and those that were mentioned during the interviews. Furthermore, during the focus group, some participants also mentioned fruits and vegetables that they are interested in. However, the participants couldn't tell exactly what kinds of fruits and/or vegetables, except for Lili Bulk, who could list a few. The advantage of the partnerships established between LCB and the participants of the focus group is the presumed regularity of their commands. Therefore, in accordance with the results, only a selected part of dried fruits and vegetables would be suggested to the end customers and a customizable variety to the partners complying with their needs. Yet, confirming to Deshydrateur (2018), not every fruit or vegetables can be dehydrated such as asparagus or avocados because of their structure. Hence, the selection of the fruits and vegetables needs to take into account the latter fact.

The logistics part which includes collecting and bringing the unsold FFV from the supplier(s) to the caves of Cureghem would be organised by one of the partners, namely FruitCollect. Once the unsold FFV arrives in the caves, different steps are required before the unsold FFV can be dehydrated. As stated by The University of Georgia Cooperative Extension (2018), the fruits and vegetables need to be prepared and some also need a pre-treatment. The preparing step involves the washing of the fruit, peeling if necessary or desired, removal of damaged areas and cutting them into even-sized slices or pieces (Flores & Schlenker Davis, 2016). Regular-sized slices dry faster and at the same rate (The University of Georgia Cooperative Extension, 2018). Peeling and cutting into even-sliced pieces or slices would be performed by a machine. Subsequently, depending on the fruits selected, some need a pre-treatment to prevent darkening before dehydration and afterwards (The University of Georgia Cooperative Extension, 2018). Flores & Schlenker Davis (2016) give some examples of fruits that need a pre-treatment: apples, apricots, bananas, cherries, peaches, and pears. Most pre-treatments are done using sulphuring or sulphite dips (The University of Georgia Cooperative Extension, 2018). Yet, there is a more natural way which is more fitting to the value proposition of the product, namely lemon juice containing natural ascorbic acid which will prevent the fruit from darkening (The University of Georgia Cooperative Extension, 2018).

Afterwards, the fruits and vegetables can be placed into the dehydrator where they will be dehydrated. The time for dehydrating fruits and vegetables depends heavily on the type of fruit or vegetable, the cutting form and the thickness of the slices (Flores & Schlenker Davis, 2016). According to Singh (2015), the ideal temperature for drying lies between 60 and 70 C°, in order to preserve the nutritional value of the fruits and vegetables. Furthermore, higher temperatures do not speed up the drying process as the fruits and vegetables are not dried anymore, but cooked (Singh, 2015).

Once the drying process is completed, the fruits and vegetables need to be conditioned. After the DFV are removed from the dehydrator, they need to cool down completely (The University of Georgia Cooperative Extension, 2018). Then they can be conditioned in moisture and vapor resistant containers such as glass jars or sealed packages (The University of Georgia Cooperative Extension, 2018). The maintenance and the cleaning of the different machines and work surfaces will also be part of the production process and therefore constitute a key activity as well.

A second key activity will be channel management since the product will be sold through direct channels and indirect channels. Furthermore, the partnerships need to be managed in order to take advantage of the territorial ecosystem. Channel management was chosen as a key activity because "for most manufacturers, success or failure is determined by how effectively and efficiently their products are sold through their marketing channel members (e.g., agents, wholesalers, distributors, and retailers)" (Mehta, Dubinsky, & Anderson, 2002, p. 429).

A last key activity outlined is this section is communication: "A firm's communication strategy is a critical element of its launch plan—the element most directly responsible for aiding the market's acceptance of a new product" (Lee & Colarelli O'Connor, 2003, p.6). The interviews with end customer revealed that customers are worried that dried fruits and vegetables have low nutritional value. Therefore, communication is needed to assure the customer that with the ideal temperature, only a minimal loss in vitamins may occur while minerals and fibre remain the same (Brennand, 1994). Furthermore, the way the main value is communicated to the end customer needs to be considered and determined. As interviews showed, calling the product "recycled" has a negative impact on consumer attitude towards the product. Besides, interviews indicated that customers react positively when called "reused" instead of "recycled". Thus, as Lee & Colarelli O'Connor (2003) call it, a pre-announcement and advertising strategy would be useful in this case. According to Lee & Colarelli O'Connor (2003), the pre-announcement strategy would deal with the lack of product knowledge that the potential customer has and would aim to educate him/her before the product is introduced to the market. The second part of the communication strategy would be the advertising strategy, which "(…) plays an essential role throughout the purchasing decision process" (Lee & Colarelli O'Connor, 2003, p.6). Yet, as stated by Lee & Colarelli O'Connor (2003), beyond the volume of advertising expenditures, the content of the advertising message is of utmost importance with a view to reduce customer fear about a new product. Combining the two strategies with a view to form an overall coherent communication strategy is essential in this case in order to launch the product.

13.8 Cost structure

In the following part, the cost structure of the business model will be determined. Osterwalder et al. (2010) defines the cost structure as a building block describing the

costs that are incurred in order to operate the business model. According to Osterwalder et al. (2010), one can distinguish between two types of business model cost structures; value-driven and cost-driven. Yet in both cases, costs should be minimized either way (Osterwalder et al., 2010).

In this case, the business model is conforming to the definition of), value-driven because the focus is on creating product value by reusing unsold FFV and dehydrating them in the caves of Cureghem with a view to reintroduce the dehydrated products again into the economic cycle.

First of all, the fixed costs, which remains the same despite the change in the volume of products produced, will be determined (Osterwalder et al., 2010). Subsequently, the variable cost, that changes proportionally with the volume produced, will be outlined (Osterwalder et al., 2010).

Regarding fixed costs, a table was established regrouping what is most important. The table has been constructed based on information we found due to previous research or estimations provided by LCB.

Table 9: Fixed costs

Type of fixed cost	Amount per month
Human resources	1,800.00€
Depreciation of machines	517.10€
Rent for additional space needed for the activity	200.00€
Utilities expenses	140.00€
Insurance	25.00€
Total:	**2,682.10€**

Source: Own conception based on different information (cf. infra)

Detailed calculations of the different amounts that the table is based on can be found in Appendix 8: Detailed calculation of cost structure. However, the main fixed costs constituting the total fixed costs will be explained below:

- **Human resources:** 2 full-time workers taken on under the “Article 60, §7” (cf. Key Resources).
- **Depreciation of machines:** Depreciation of the machines necessary for the production of dried fruits and vegetables under the hypothesis that all machines are depreciated within 5 years in accordance with the linear system.
- **Rent for additional space needed for the activity:** Information based on an estimation of Camille Séon.
- **Utilities expenses:** Water, energy, telephone and internet expenses according to estimations of Camille Séon.

- **Insurance:** Information based on a phone call with AG insurance.

After we have had a look at the main fixed costs, we are now going to focus on the variable costs which can be viewed in a summarized version in Table 10. In the table we haven't included the transportation cost, because it's a percentage depending on the selling price of the product (cf. infra).

Table 10: Variable costs

Type of variable cost	Cost per kilo of dried apples
Packaging	0.20€ - 0.50€
Production energy costs	0.88€
Maintenance of machines and utensils	0.50€
Total:	**1.58€ - 1.88€**

Source: Own conception based on different information (cf. infra)

- **The packaging cost:** The packaging costs comprises the package and the label. The product is sold in bulk or in little packages. According to The Pouch Company (2018), in bulk, packaging will cost between 0.20€ and 0.30€ per kilo, whereas in individual packages, it will cost between 0.40€ and 0.50€.
- **Production energy costs:** The supplier of the tray drying machine, TomPress (2018), estimates that the cost to dry 1kg of fresh fruits or vegetables lies between 0,10€ and 0,15€ (cf. Appendix 7: Product sheet of Tompress Dehydrator). Yet, to calculate the production energy cost of one kilo of dried fruits or vegetables depends heavily on the kind of fruit or vegetable as the loss of weight while the drying process varies from sort to sort.
- **Maintenance of machines and utensils:** The maintenance of machines and utensils comprises the cleaning of the machines and necessary products to fulfill the respective task. This cost is estimated by Camille Séon to be around 0.50€ per kilo of dried fruits or vegetables.
- **Transportation:** The transportation is organized by FruitCollect and constitutes another variable cost. Yet, no agreements have been made considering the sharing of profits or turnover. Therefore, in the break-even analysis, we will draw the hypothesis that FruitCollect receives 15% of every kilo of dried fruits or vegetables sold in return for taking care of the transportation and collection of FFV.
- **Primary resources:** In this cost structure analysis, we will assume that the primary resources (food waste) are for free. However, this might not be accurate depending on the source of supply. For example, the waste generated by market of Midi may be collected for free, but the waste at the Mechelen auction may not be.

13.9 Revenue stream

In this chapter, the revenue streams of the business model will be outlined. Confirming to Osterwalder et al. (2010), the revenue streams represent the cash a company generates from its different customer segments. In this case and according to the definition of Osterwalder et al. (2010), the ownership right of the dehydrated product is sold to another person, the customer, which makes it an asset sale resulting in a one-time transaction of money coming from the customer. The fixed menu pricing, where prices are predefined based on static variables, will be applied as a pricing mechanism (Osterwalder et al., 2010). Besides, the predefined prices will depend on the type of product, the volume and the customer segment.

Generally speaking, we identified two potential sources of revenue. The first revenue source will come from companies using the DFV to cook food or create recipes with them, in other words; food transformers. The second revenue stream will come from intermediary shops, as for example, Färm who will sell the dehydrated products in their shop to the end customer.

Regarding the end customer, the type of product that will be introduced to the market in a first instance will be defined based on the results of the interviews. As already mentioned above (cf. Key Activities), it might be interesting to first suggest fruits and vegetables that customers know of and are looking for in order to garner interest. Therefore, we suggest that in the beginning only 5 types of dehydrated fruits and vegetables will be launched with a view to sell them to intermediary shops. Furthermore, we suggest launching more fruits than vegetables because, according to the interviews and the survey, consumers are more used to dehydrated fruits than vegetables and further, use them on a more regular basis.

The DFV would be bought by an intermediary shop and afterwards sold to the end customer. According to Hadrien Velge, food stores take a margin between 10 and 15% on dehydrated products. Furthermore, according to Hadrien Velge, this margin is lower than for other products as shops take a lower risk to not sell the product before the end of its shelf-life. This gives us an idea at what price the different products need to be sold to the intermediary shop in order to stay reasonable in pricing compared to other dehydrated products. A price list of dehydrated vegetables and fruits constituted with information from different kinds of shops can be viewed in Appendix 9: Price list of dehydrated fruits and vegetables. The expected selling price will be calculated later in the break-even analysis.

On the subject of food transformers, the type of product will be defined with the companies, according to their needs. Three potential vegetables are carrots, zucchinis and mushrooms as Lili Bulk showed interest in them. Furthermore, they were also interested in apples. Hence, dried apples could be sold to both food transformers and end customer. However, as food transformers are interested in bigger quantities and in

specific products, the prices need to be lower than the ones sold to the intermediary food shops because the dried fruits and vegetables will be used as their primary resources. Yet, the main limitation regarding the research about food transformers is that, at the current state of things, they couldn't give any information about the amount of dried fruits or/and vegetables they would be willing to order.

14. Break-even analysis

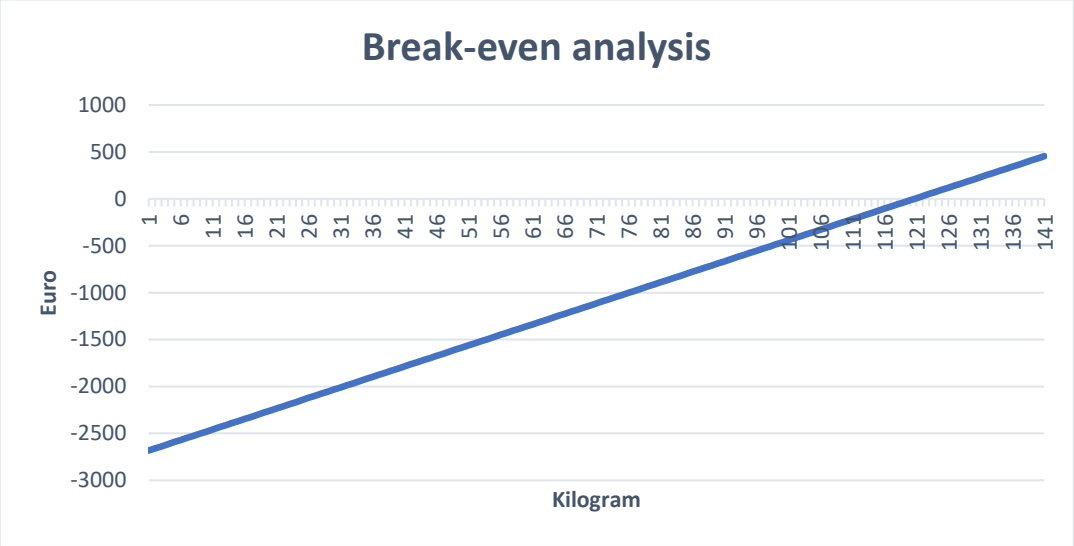
In the following part, we will focus on the break-even analysis using the contribution margin method (Cafferky, 2010). The goal of the analysis is to find out the amount of DFV the company needs to sell per month in order to cover its total fixed costs (Cafferky, 2010). The results will be expressed in unit of sales (1 unit of sale=1 kilo) of the respective product that need to be sold in order to break-even. The detailed calculation of the contribution margin method can be found in Appendix 10: Detailed calculation of break-even analysis. Moreover, two different break-even analysis will be presented. The first one is based on non-organic prices and the second one on organic prices. The reason for this distinction and the two break-even analyses is due to the findings of the survey where we found out that almost half of the potential customers won't buy the product if the it is not organic. Therefore, the characteristic "organic" plays an important role and we would like to examine what role it plays regarding the break-even analysis.

- **Non-organic apples**

  For the break-even analysis, the following hypotheses will be drawn:

  - To simplify understanding, we will take only one product to construct the break-even analysis, namely dried apples.
  - The transportation is organised by FruitCollect, who has a 15% participation in every kilo of dried fruits or vegetables sold.
  - We assume that two employees and the necessary machines for cutting and peeling are enough for the workload.
  - To simplify the analysis, the hypothesis is made that LCB sells the fruits and vegetables to the food transformers and the intermediary shops at the same price.
  - The assumption is made that the packaging cost are 0.40€ per kilo of apples sold.
  - The sales price for dried apples is calculated based on the mean of competition's prices and the extra percentage potential customers are willing to pay more (around 0.60€ more). 15% margin will be distracted from the competition's prices found on the internet or during field research as, according to Hadrien Velge, intermediary shops (in general) take a margin of 10-15% on dried products.

Figure 26: Break-even analysis with non-organic apples



Source: Own conception based on the above-mentioned data

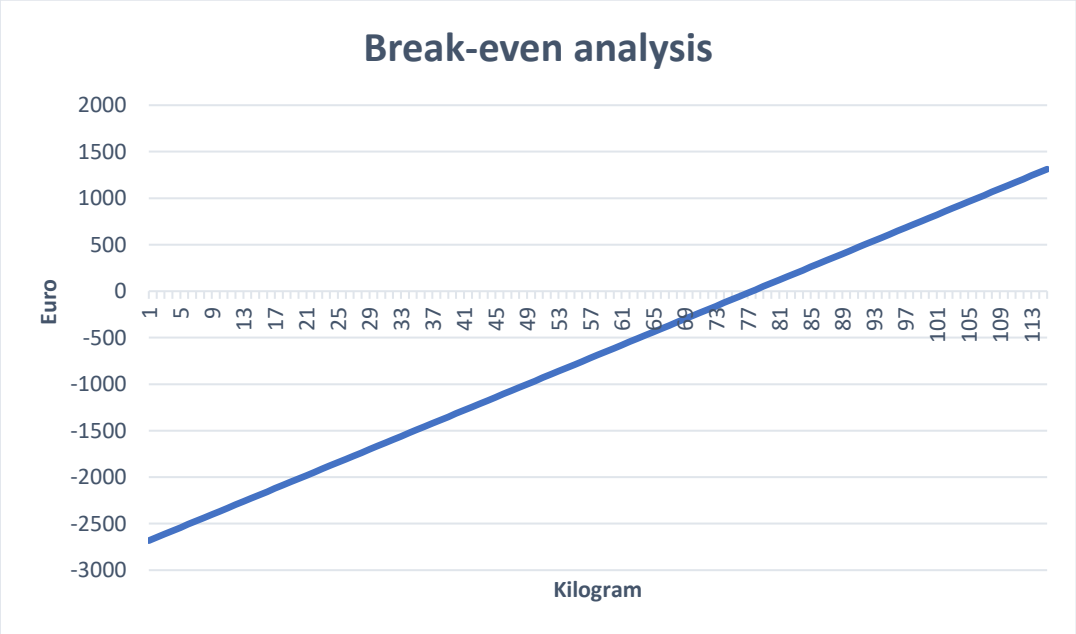
The break-even analysis for non-organic apples outlines that LCB needs to sell 120 kilos of dried apples a month to break-even (cf. Appendix 10: Detailed calculation of break-even analysis). The calculation relies on a selling price of 28.36€/kilo. The variable costs were distracted from the selling price to determine the contribution margin per unit (Cafferky, 2010). Yet, to produce 120 kg of dried apples, LCB needs to collect 706 kg of fresh apples (cf. Appendix 10: Detailed calculation of break-even analysis).

According to the data provided by the supplier of the machine, it has a capacity to produce 70 to 100 kilos of dehydrated fruits/vegetables a day (cf. Appendix 7: Product sheet of Tompress Dehydrator). However, according to the University of Georgia (2018), apples need to dry between 6 and 12 hours (The University of Georgia Cooperative Extension, 2018, p.8). For our case, we assume that they need 8 hours to dry. Therefore, we also assume that we can only fill the dehydrator once a day to its full capacity, namely 300kg (cf. Appendix 7: Product sheet of Tompress Dehydrator), which means that every day around 50 kg of dried apples could be produced. Hence, it would take LCB 3 days to produce the quantity necessary to be above the break-even level if the machine is filled up to its maximal capacity and 6 days if filled up to half of its capacity.

- **Organic apples**

The same hypotheses are drawn for the organic apples as for the non-organic apples (cf. supra p.92).

Figure 27: Break-even analysis with organic apples



Source: Own conception based on the above-mentioned data

In case LCB sells dried organic apples, the company needs to sell 77 kilos a month to break-even (cf. Appendix 10: Detailed calculation of break-even analysis). The difference regarding the break-even level is due to the price difference between non-organic apples and organic apples. The selling price was calculated in exactly the same as the previous one, but organic apples are sold to a much higher price than non-organic apples. In this scenario, the selling price of organic apples equals 43.17€/kg. Furthermore, this means that LCB needs to collect 453 kg of fresh apples (cf. Appendix 10: Detailed calculation of break-even analysis). Since the assumption are the same as in the previous analysis, it would take LCB 2 days to produce the quantity necessary to be above the break-even level if the machine is filled up to its maximal capacity and it would take 4 days if filled up to half its capacity.

15. Conclusion

From the research conducted and our findings throughout this thesis, we will now consider the main research question in order to determine the feasibility of implementing such a project:

"To what extent is it feasible for Le Champignon de Bruxelles to create a dehydration centre in the area of Brussels-Capital?"

It is clear that the current context in which LCB will be implementing their project is supportive. Regarding the business model we constructed based on the results of our research, we can conclude that LCB has a lot of supply sources at their disposal in the area of Brussels-Capital. However, the quality and the volatility of the different fresh fruits and vegetables available may cause supply problems. Therefore, it is of utmost importance for the feasibility of the project to manage those two variables and create a partnership with a big supplier such as the Mechelen auction. Furthermore, from the findings of our focus group and semi-structured interviews, we confirmed that businesses active in the field of sustainable nutrition or sustainable development within the sector of food and beverages would be willing to partner with LCB to complement and facilitate different stages of the production and supply chain. Partnerships are essential because LCB is a small company and needs logistical support. From our research, we couldn't determine what quantities the different partners would need thus presenting a gap in this feasibility study that needs more research.

Moreover, results from our survey showed that consumers are also interested in dehydrated products made from unsold fruits and vegetables, and a considerable number of potential customers would buy them. Yet, it may be harder to sell dried vegetables to consumers than to businesses. Therefore, the project may be more successful initially if it sold dried fruits and vegetables to businesses and only sold dried fruits directly to consumers. An advantage of this customer segment is that the target group is already shopping in food stores where LCB is selling their products which implies considerably less efforts and costs in marketing, reaching the target market and introducing the new product to the marketplace.

In the break-even analysis, we could determine that LCB is able to break-even while working on the machine's full and half capacity. However, the viability of the break-even analysis is limited to its hypotheses and the example of apples. One main hypothesis was that LCB's raw materials are for free which might not be the case depending on the source of supply. Furthermore, the main fixed cost is human resources where the assumption was made that two persons working under the "Article 60, §7" are sufficient considering that the fresh fruits and vegetables are peeled and cut by an industrial machine. Moreover, LCB would be able to break-even during the month if they are selling organic or non-organic products. However, according to our findings, the demand for non-organic dehydrated products is only half as high as for organic ones in the

surveyed food stores. Hence, the question arises if it impacts the feasibility of the dehydration centre if the dehydrated product is organic or non-organic, and if LCB may to need to produce both to gather enough demand.

To conclude, we can say that it is feasible for Le Champignon de Bruxelles to create a dehydration centre in the area of Brussels-Capital with the consideration that partnerships must be established to ensure the facilitation and the creation of the dehydration centre. Specifically, LCB must partner with a main supplier and partner such as FruitCollect in order to ensure logistical support. Furthermore, the demand from companies and customers need to be high enough so that LCB can at least break-even during the month. This could not be guaranteed during our research as companies could not provide specific information regarding the quantities that they would order. Hence, to ensure that it is feasible to create the dehydration centre and to bring the project to the point of realisation, it is necessary to conduct further research about the expected quantities that companies would be willing to order and whether it needs to be organic or not. Besides, it would also be interesting to expand the research and see if more companies active in the field of sustainable nutrition or sustainable development within the sector of food and beverages would be interested in buying dehydrated products from LCB.

Throughout this research, we have disclosed that food waste constitutes not only an environmental issue, but also an ethical and economical one. This master thesis is not only limited to an inquiry into LCB's initiative, but also highlights the need for initiatives like this in order to make considerable steps towards a more sustainable and responsible way of using resources that we take nowadays for granted.

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