HELPING BAKERY STRIK CONTRIBUTE TO A CIRCULAR ECONOMY

MAKING THE FOOD WASTE LOOP

BECAUSE WHAT GOES AROUND, COMES AROUND

STRIK PATISSERIE
Sinds 1937

Master Thesis by Feline Hunink

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HELPING BAKERY STRIK CONTRIBUTE TO A CIRCULAR ECONOMY
BY MAKING THE FOOD WASTE LOOP 100% CIRCULAR

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With this master thesis, I finish the final phase of finally becoming an engineer. I will be the third family member carrying this title with pride, after my brother (TU Delft) and my dad (TU Eindhoven). I want to thank STRIK for giving me the space and time to graduate on something that is important to me and interests me deeply, sustainability, while being able to apply it to an organisation like STRIK. While many people have asked me why a TU Delft student would want to work for a bakery, I hope that with this thesis and with the things I am planning to do for STRIK in the future, I can show everyone that the things you learn during the IDE program can be applicable everywhere, in big companies, in small companies and even at a local bakery like STRIK.

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ABSTRACT

STRIK is a well-known bakery in Nijmegen and surroundings, with currently 3 pastry shops, 2 chocolate/ice-cream shops and 1 central bakery for storing and production. CEO van Geenen possesses a passion and talent for entrepreneurship and an expertise in pastry-making, but little affinity for nor experience with sustainability. With the upcoming laws and regulations, governments are pushing companies to move from a linear towards a circular economy. However, a lot of companies, especially those smaller and medium-sized enterprises, struggle with implementing sustainable innovations. Guided by the Revamped Double Diamond model, this project tries to find an answer to the research question being: “How should STRIK patisserie contribute to a Circular Economy, while at the same time creating additional economic value?” while sliding through phases of discovering, defining, developing and delivering. In the first discovering & defining phase, the project finds areas of opportunity for economic, environmental and social value creating using the Triple Layered Business Model Canvas (TLBMC). Within these steps, amongst others, the company ecosystem is determined, just as a carbon footprint analysis was conducted to understand which are the most impactful categories in terms of greenhouse gas emission. Moreover, a company analysis leads to a list of implementation criteria in terms of ‘must’, ‘should’, ‘could’, and ‘won’t’ criteria. The conclusions from the TLBMC and criteria were used to define the design challenge of: “How can we make STRIK’s food waste stream 100% circular while gaining economic and social benefits?”. In the developing & delivering phase, ideas were generated and evaluated, leading to three selected concepts of 1) an educational web-page about food waste; 2) a new product line made from wasted parts; and 3) a partnership for anaerobic processing of food waste. These concepts are turned into ‘minimum viable products’ for testing the key metrics of desirability and viability. From the results can be implied that there is a high desirability and viability for concept 2, while concept 3 can assure 100% circularity, concluding a recommended perseverance of concept 2 (new product line from wasted parts) as a first step and concept 3 (partnership for anaerobic processing) as a future step. The focus is on rapidly bringing concept 2 to the market, so further detailing is done on concept 2 only, looking into the product, packaging, price and promotion. In a final ‘present & validate’ phase, the solutions for helping STRIK contribute to a circular economy are presented. The first and most important step towards circularity is making new products from wasted parts and promoting these in a qualitatively, tasteful and story-telling way. The validation phase concludes that, in addition to the earlier tested desirability and viability, that the solution hits the innovation sweet spot, as it is considered feasible, viable and desirable.

The thesis ends with a ‘discussion, conclusion & reflection’ chapter.
LIST OF TABLES, FIGURES AND ABBREVIATIONS

LIST OF ABBREVIATIONS

BMC = Business Model Canvas
CE = Circular Economy
CEO = Chief Executive Officer
CF = Carbon Footprint
CO₂ = Carbon Dioxide
CO₂ eq. = CO₂ equivalent
EMF = Energy and Material flow
GHG: Greenhouse gases (amongst which CO₂, N₂O, NH₄, etc.)
LCA = Life Cycle Assessment
kg = kilograms
KwH = kilowatt hour
MVP = minimum viable product
NM3 = normal cubic meter
TLBMC = Triple layered business model canvas
TTW = tank to wheel
WIT = wheel to tank
WWT = wheel to wheel

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1-INTRODUCTION

Context, company introduction & approach

1.1-CONTEXT & THEORY

Despite the economic benefits the industrialization has provided over the previous years, the concerns about the negative effects that this industrialization has on our natural environment are significantly increasing (Dean & McMullen, 2007). Authors and scientists are arguing the likelihood of resource scarcity or restrictions on raw materials, energy and water due to emissions from the manufacturing and production of new products (Tennant, 2013; Brennan et al., 2015). In other words, we are in desperate need of sustainable development, known as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (Brundtland, 1987; Pacheco et al., 2010). It is therefore not surprising that nowadays policies, laws and regulations are changing to force not only companies, but also consumers to implement a more sustainable way of living. A recently often discussed strategy to address such sustainability issues in terms of material and energy efficiency is shifting from a linear mode of production towards a circular mode of production (Brennan, 2015; Geissdoerfer et al., 2017). In other words, shifting from a linear economy towards a circular one. This, because with population growth and the depletion of natural resources, the growing interest towards a circular business model has led to an increased perceived necessity of building towards a circular economy (Gafsi et al., 2006; Schwoob, 2014; Chiaroni et al., 2018) mainly since the circular economy is considered a promising approach to help reduce our global sustainability pressures (Bocken et al., 2016).

But what exactly distinguishes a circular economy from a linear one? While a Linear Economy “flows like a river, turning natural resources into base materials and products for sale through a series of value-adding steps”, in a Circular Economy “the reprocessing of goods and materials generates jobs and saves energy while reducing resource consumption and waste” (Stahel, 2016). As from 1970, there have been multiple authors trying to define and understand the concept of Circular Economy (Andersen, 2007; Pearce & Turner, 1990; Stahel & Reday, 1976). There is the famous butterfly model from the Ellen MacArthur Foundation (2013), but also authors like Geng & Doberstein (2008), Yuan et al. (2008), Webster (2015) and Bocken et al. (2016) added their own notions to Circular Economy in terms of material flows, closed loops and restorative design. Geissdoerfer et al. (2017) concluded that Circular Economy can be defined as a “regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops”. These existing definitions and perspectives formed the foundation of the model from Konietzko et al. (2020), concluding that the strategies that build towards a circular economy include closing, narrowing, slowing and regenerating resource loops. Figure 1 represents a visualized version of the model by Konietzko et al. (2020) with the explanation per strategy. The model follows an order in terms of strategy hierarchy, similar to that of the commonly used R- imperatives ladder (Jawahir & Bradley, 2016; Wu et al., 2014; PLO, 2019). The higher you climb up the hierarchy ladder, the less raw material is needed and the less our environment is polluted because of these raw materials (PLO, 2019).

Many authors have tried to understand the benefits of a Circular Economy from a business perspective. Geissdoerfer et al. (2018) mentioned that “the circular economy is based on the idea of putting private business into the service of the transition to a more sustainable system”. Companies could considerably advance this transition by the creation of additional value that will both potentially benefit the society (e.g. increasing employment opportunities as according to Rizos et al., 2015) as well as create a competitive advantage from such missed, destroyed or neglected values (Geissdoerfer et al., 2016; Kramer & Porter, 2011; Nidumolu et al., 2009; Yang et al., 2016; Geissdoerfer et al., 2018). An effective tool to help companies reveal how they can create such additional value is by using the Triple Layered Business Model Canvas (TLBMC), in which the opportunities for implementing a circular business model can be explored (Joyce & Paquin, 2010). However, not only large organizations can benefit from adopting such circular business models. Small and medium-sized enterprises (SMEs) also see opportunity in following the circular economy model, allowing them to capture additional value from their products and materials, while benefiting significantly from the economic opportunities in terms of saving materials costs, creating competitive advantages and reaching new markets (Ellen MacArthur Foundation, 2015; Rizos et al., 2015; Laubscher & Marinelli, 2014). And all of this simply by “reusing what we can, recycling what cannot be reused, repairing what is broken and re-manufacturing what cannot be repaired” (Stahel, 2016).

An important industry that is required to take action in sustainability is the Food and Beverage Industry, currently one of the largest industrial sectors of the Netherlands (Centraal Bureau voor de Statistiek, 2018c). Especially the small and medium enterprises (SMEs) within this particular industry can have a great impact, as these account for a large part of the national additional value and employment opportunities (Centraal Bureau voor de Statistiek, 2019). That SMEs within this industry are taking action shows, with new start-ups like ‘in-stock’, closing the food waste loop by cooking with wasted products from other restaurants, or ‘too good to go’, slowing the food waste loop by offering leftovers for a reduced price in their mystery boxes. Unfortunately, despite the possible number of benefits companies could achieve, many are struggling with the implementation of circular strategies, for reasons such as ‘differences in mindset between the entrepreneur and the government’, ‘funding issues’, ‘the ambiguous definition of sustainability’ or ‘the overload of information but lack of practical action taking’ (Wöstern, 2016). It is therefore that such SMEs are in need of guidance in order to contribute to a Circular Economy.
1.2 COMPANY INTRO

One of the SMEs struggling with implementing circular strategies is STRIK Patisserie. A local, well-known bakery in Nijmegen and surroundings with 3 pastry shops, 2 ice-cream/chocolate shops and 1 central bakery. Co-owner van Geenen is originally educated as a pastry chef and has developed a passion for entrepreneurship ever since he bought the company from at-the-time owner Piet Strik in 1991. Mr. Strik’s father founded the company back in 1937 under the name ‘STRIK - brood & banket’ (transl. bread & pastries). Current owner Van Geenen decided to focus more on pastries than bread, while trying to expand not only with the business-to-consumer sales, but also the business-to-business sales. Within 28 years STRIK grew from a 600.000€ single-store bakery to a medium-sized, 6-store established company providing jobs for 30-60 employees and a yearly revenue of about ±2.7M Euros.

1.3 THE PROBLEM

Owner Van Geenen is a dedicated entrepreneur with a hard-working and profit-driven mentality. With this mentality he expanded his company significantly building mainly on his own resources and visions. However, the recent changes in laws and regulations around sustainability is challenging STRIK in ways they are not able to tackle with their available knowledge and assets. Currently STRIK is operating in a linear economy, in which materials are taken from nature and used to make products which we consume and eventually dispose (Ellen MacArthur Foundation, 2015). With no further personal affinity-nor experience with sustainability and an additional lack of time, it is difficult for Van Geenen to invest in this area of sustainability. However, not only laws and regulations are pressing, but also a changing consumer’s mindset is forcing STRIK to invest in this yet unfamiliar area. STRIK could significantly benefit from investing in strategies that build towards a Circular Economy, especially in terms of profitability (Ellen MacArthur Foundation, 2014). They simply need ‘a little help’. It is therefore that this project focuses on the following research question:

1.4 RESEARCH QUESTION

“How should STRIK patisserie contribute to a Circular Economy, while at the same time creating additional economic value?”

The constructed sub-questions based on the company introduction and project context are as follows.

1) What are the implementation criteria and opportunities that fit the company of STRIK?
2) What are the most interesting opportunities for the creation of (environmental) value?

These sub-questions will determine the analysis and research methods.

1.5 PROJECT GOAL

Considering the defined problem and research question, the goal is to find a way to make STRIK shift from a linear economy towards a circular one while at the same time looking for ways to create additional economic value in doing this. To do this, the following sub-goals are determined:

1) Company analysis: what are the implementation criteria and opportunities that fit the company?
2) Value creation according to the Triple Layered Business Model Canvas: what are the most interesting opportunities for the creation of (environmental) value?

With these sub-goals, the ideation phase will tackle the design challenge and find an answer to the main research question in terms of finding suitable solutions for STRIK to engage in a Circular Economy.
1.6-APPROACH & STRUCTURE

This project is guided by the Revamped Double Diamond (RDD) designed by Nessler (2016) based on the Double Diamond model from the British Design Council. This model tool provides designers, creative thinkers or project managers to set up, frame, organise, structure, run or manage design challenges, and projects through an agile approach of divergent and convergent design thinking (Nessler, 2016). However, as developer Nessler (2016) emphasized, one should always "tweak the original recipe to your own needs and taste". Therefore this model is combined using the 'lean startup' approach while testing and iterating upon ideas (Ries, 2011). The model for this project is represented in figure 2 and includes the following:

First, the methods of collecting data are discussed, after which the results are presented. To conclude, a list of implementation criteria describes what STRIK ‘must’, ‘should’, ‘could’, and ‘won’t’ do, based on a company analysis. Additionally filling in the Triple Layered Business Model Canvas leads to opportunities for value creation in terms of economic, environmental and social value. The insights and conclusions of both outputs lead to a determined 'design challenge', followed by an ideation phase. Ideas will be rapidly tested and evaluated through an iterative experimentation process using a ‘lean start-up’ approach. Then, the results and conclusions will be presented and validated in 'the final design'. To sum up, the 'don't know, could be' phase develops into a 'do know, should be' conclusion (Nessler, 2016) based on a 'lean design thinking' approach that combines the most promising aspects of two innovation strategies: design thinking and lean start-up (Müller & Thoring, 2012).

1.7-METHODS

In order to answer the research question and the corresponding sub-questions, different methods were used throughout the design process. This section summarizes the total of methods used, while each used method per phase can be found at the bottom of figure 2.

The methods for data collection were chosen based on the underlying goals of finding the company’s implementation criteria and filling in the triple layered business model canvas, as can be seen in figure 3. Therefore, qualitative interview data with the company’s CEO’s, ethnographic field data, secondary data and company data to conduct the carbon footprint analysis were collected.
Based on the results and conclusions from these methods, the design challenge is defined on which ideation can build upon. The ideation is executed using different tools and techniques for creation such as circular brainstorming and analogy thinking. Ideas are selected through the concept selection matrix and tested using a lean-startup approach. Each concept is converted into a ‘minimum viable product’ (MVP) and tested on determined key metrics of desirability and viability. Testing is done using different methods of qualitative and quantitative research, depending on the type of MVP. Concepts are adjusted and either pivoted or persevered based on the results. The final concept is further developed and presented, answering the initial research question.

How is trustworthiness assured?
Throughout the years several criteria have been explained to ensure rigor, known as trustworthiness, in qualitative research, as this type of research is very susceptible to biases (Morse, 2015). Strategies explained consist of credibility (internal validity), dependability (reliability), transferability (external validity or generalizability) and confirmability (objectivity). All of these together increase the overall trustworthiness of the research (ibid).

Strategies of triangulation, member checks and peer debriefing are used to increase credibility throughout the report where necessary (Morse, 2015). With these methods, the researcher benefits from stepwise verification during the data gathering as this way the data corrects itself during the processes of collection and analysis (Meadows & Morse, 2001; Morse et al., 2002). The latter not only by using and comparing different sources of data for answering the same question (triangulation), but also by regularly having the data checked by experts or managers (member checks). In case of unstructured interviews, a second interviewer was included in the data collection process for peer review debriefing. The qualitative interviews are not analysed using techniques of coding, which decrease the trustworthiness in terms of bias. However, the qualitative interviews and observations are analysed using a deductive approach in which the researcher builds categories in advance to the analysis to later on map connections in the data to the specific categories (rev.com, 2019). This deductive approach to qualitative research is used as the researcher already possessed a lot of knowledge about the organisation prior to the research. The categories determined prior to the analysis are based on the triple layered business model canvas and implementation criteria. Then, as for dependability and confirmability, strategies of triangulation, inquiry audits and stepwise replication through diary- and note-taking templates are used (Morse, 2015). Ethnographic observations were conducted using templates such as AEIOU (Brenner et al., 2016; Fitzpatrick, 2018) or self-made templates including a section for the running description, forgotten episodes, ideas and notes for further information use, personal impressions and feelings and methodological notes (Sangasubana, 2011). To deal with the ‘pink elephant bias’, which is the tendency for the researcher to see what is anticipated, the settings are entered with a neutral stance as much as possible (Morse & Mitcham, 2002). This means that pre-determined questions are kept as neutral as possible and the observer has tried to leave out assumptions and desired outcomes to the observed participants. The researcher tries to achieve transferability by decontextualizing and abstraction of emerging concepts and theory (Maxwell & Chmiel, 2014; Polit & Beck, 2012; Morse, 2015). This by specifically explaining each definition and strategy used with the application to the specific sector. At the end of the report a final chapter reflects on the methods and strategies that have been applied to ensure rigor throughout the research.
2 - Discover & Define

Throughout this phase, several analyses are conducted in order to answer the two sub-questions being:

**What are the implementation criteria and opportunities that fit the company of STRIK?**

**What are the most interesting opportunities for the creation of (environmental) value?**

As each analysis demands a different method, figure 4 explains again which methods are used in order to answer the sub-questions. This phase starts by explaining the methods of analysing after which the results and findings are presented. Conclusions are made in terms of implementation criteria and the most interesting opportunity for the creation of environmental value.

It is important to mention that within this report, creating environmental value refers to **decreasing the carbon footprint** in terms of CO₂ emission.
2.1 METHODS

2.1.1 DATA COLLECTION
As mentioned before, the Triple Layered Business Model Canvas (TLBMC) together with the implementation criteria (must, should, could, won’t) were used as desired output of the collected data. Based on these the methods were determined and shaped. This means that from the desired output, the following categories were pre-determined as foundation for the qualitative research.

1 Must-, should-, could- and won’t criteria
2 The company ecosystem (for the economic layer, including activities, stakeholders, channels, customers, relations, resources, partners, value and revenues)
3 The material & energy flow (for the carbon footprint analysis of the environmental layer)
4 The social activities and impacts (for the social layer, including social value, local communities, governance, employees, social impacts, social benefits, societal culture, scale of outreach and end-user)

Throughout the data collection, these categories are used as foundation for the specific observation themes, but also as analysing tool to code the qualitative transcripts.

It is important to mention that data collection was done in the central bakery in Malden, and in every STRIK store, referred to as ‘Ziekerstraat’, ‘Heyendaal’, ‘Wijchen’ and ‘Dukenburg’. However, during the data collection STRIK closed their store in Dukenburg. This means that some of the data will still include that of Dukenburg, but the solutions will focus on the three remaining stores only.

INTERVIEWS WITH CEO’S (N=2)
Two qualitative semi-structured interviews were conducted with the two co-owners of STRIK. Semi-structured interviews are appropriate here, as these allow for new issues to emerge for exploration (Saunders et al., 2007). The interviews were conducted through a general interview guide approach, which creates structure in the desired areas of information but still maintains a degree of freedom through semi-open ended questions (Saunders et al., 2007). The interviews are analysed using a deductive approach, coding based on the pre-determined categories. The analysed interview transcripts of both interviews can be found in Appendix 1-A.

FIELD OBSERVATION AND ETHNOGRAPHY
In addition to the interviews, a field observation and ethnography method was used, focusing on trying to find insights guided by the mentioned categories. Two different kinds of field observations were used, based on the pre-determined desired output.

A first set of ethnographic observations focused on work environment and employee tasks throughout the day in order to understand the habits, rituals, practices, patterns of interaction and other insider’s perspectives (Saunders et al., 2007). For these ethnographic studies it is important that the researcher finds himself on-site or in a naturalistic setting in which real people live (Sangasubana, 2011). Moreover, ethnography is dialogic, as conclusions and interpretations formed can be given comments or feedback from those who are under study (Sangasubana, 2011). Field notes or detailed descriptions should at least consist of a running description, forgotten episodes, ideas and notes for further information use, personal impressions and feelings and methodological notes (Sangasubana, 2011).

A second set of ethnographic observations was conducted with the aim of exploring the specific departments of STRIK amongst which the bakery, distribution and stores were analysed. This type of specific ethnographic research in a focused department demands for a somewhat different approach than the more exploratory ethnographic research of the first round. To deal with the ‘pink elephant bias’ (Morse & Mitcham, 2002), which is the tendency for the researcher to see what is anticipated, a specific framework was used to secure analysis structure (Brenner et al., 2016; Fitzpatrick, 2018). Guided by ‘Activities’, ‘Environments’, ‘Interactions’, ‘Objects’ and ‘Users’, the ABOU framework increases validity and confirmability by providing an observational technique used to document contextual inquiries (ibid.). These observations were mainly conducted with the aim of understanding the organisational activities and the product journey, while this way trying to understand the company ecosystem and energy and material flow for filling in layer 1 and 2 of the TLBMC.

In a third set of ethnographic observations, STRIK’s garbage was analysed. This was done by analysing the weekly store- and bakery garbage based on garbage volume and weight. The reason for this is to complement the company data on the energy and material flow, specifically for the ‘waste’ section. All of the other elements for the energy and material flow could be collected from company data and qualitative research insights.

All of the ethnographic research output can be found in Appendix 1-B, again coded with the pre-determined categories.

SECONDARY DATA
Secondary data was used to support statistical data on customers and employees as a form of triangulation to complement the data from the qualitative research insights (Saunders, 2007). However, secondary data was also used to support the carbon footprint analysis, as the data provided the specific emission factors to calculate STRIK’s emission from based on the conducted energy and material flow analysis.

COMPANY DATA
Company data was mainly collected for supporting the carbon footprint analysis in providing the necessary data to conduct on energy and material flow analysis. As there was little company data available, most of the data was collected from scratch. This means that evaluating which data to collect and use depends highly on the pre-determined categories. Most of the collected company data is to complement the company data on the energy and material flow, specifically for the ‘waste’ section. All of the other elements for the energy and material flow could be collected from company data and qualitative research insights.
2.1.2 CARBON FOOTPRINT ANALYSIS

The main goal of the second (environmental) layer of the TLBMC is to understand where the organisation’s biggest environmental impacts lie, this way providing insights for where the organization could focus their attention on when trying to implement environmentally-oriented innovations to reduce such impacts (Joyce & Paquin, 2016). As there is no prior data available about STRIK’s usage or emission, the environmental impacts need to be determined. This can be done from several perspectives (Joyce & Paquin, 2016). Even though an LCA approach focusing on the environmental impact assessment at the macro, meso and micro levels is suggested (Joyce & Paquin, 2016), this project will use a carbon footprint (CF) approach, as this method is easy to use, understandable for non-expert readers and suitable when there is little to no prior company research done about sustainability or the necessary data can be difficult to collect (Elia et al, 2017). The carbon footprint analysis is conducted calculating the greenhouse gas emission in terms of a CO\(_2\) equivalent. This means that all greenhouse gases including carbon dioxide (CO\(_2\)), methane (CH\(_4\)), nitrous oxide (N\(_2\)O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF\(_6\)) are considered, while expressed in a concluding carbon dioxide equivalent [CO\(_2\)eq] to compare within and between categories. In most cases previous research has already concluded generalized ‘emission factors’. Whenever these factors are multiplied by the corresponding unit (magnitude depending on company usage) the resulting CO\(_2\) equivalent is derived (e.g. the emission factor for grey energy is 0.649 Kg CO\(_2\)/kWh, so a usage of 10,000 kWh per year results in 6.490 kg CO\(_2\)eq per year).

2.1.3 OUTPUT

The following sub-chapters use the collected data and processes it into the desired output of implementation criteria and a completed Triple Layered Business Model Canvas.

The implementation criteria will be used at the end of the process to validate the final design whereas the triple layered business model canvas will be used to determine the most interesting areas for value creation to take into the ideation phase.

The concluding section for the implementation criteria, describing the criteria that ‘must’, ‘should’, ‘could’ and ‘won’t’ be met by STRIK, can be found on page 29 and is supported by appendix 1 and 2.

The concluding section for the triple layered business model canvas can be found on page 35 and is supported by appendix 1 and 3.
The output is structured using the ‘criteria canvas’ including criteria that ‘must’, ‘should’, ‘could’ and ‘won’t’ be met (Designabetterbusiness.com, 2019). The following section will dive deeper into each with the corresponding data.

MUST -----------------------------------

MATCH THE TARGET GROUP
Throughout both interviews (appendix A), the importance of the current target group is mentioned. According to both CEOs, these people are older and have a little more to spend on quality products. According to van Geenen, “we value these customers, as these are the customers that still spend 25 Euros on a box of chocolates”.

One of the most important reasons STRIK values this target group, aside from their spendings, is that they are very loyal, according to two of STRIK’s longest working employees (general ethnographic observations, diary 2, employee 1 & 3). “They return once a week and some even return every day”, mentioned one of the Heyendaal employees. Aside from the need that new innovations still match the current target groups, STRIK should also focus on the younger target groups (continued in section ‘should’).

MATCH THE BRAND IDENTITY
Throughout the interviews, the CEO regularly mentioned the importance of STRIK sticking to what they are good at: “Quantity in combination with craftsmanship and quality”, that is what has made STRIK grow and that is what we should focus on, as according to van Geenen. Words like quality, craftsmanship but also scalability are often mentioned by the CEOs themselves. However, the Facebook followers have another important thing to mention about what comes to mind when they think of STRIK, as appeared from a small online questionnaire (N=52), 26% of the respondents links ‘tastefulness’ to STRIK while 23% linked specifically ‘pastries’ to STRIK, even though STRIK sells more than just pastries. Aside from this, 20% of respondents mentioned a personal ‘nostalgic’ memory to STRIK such as “When I think about STRIK, I think about when I was younger, being at my grandma and grandpa’s. They always used to have STRIK pastries on the table when we came over, no matter the occasion!”. Finally another 10% mentioned being together with friends and family an important aspect when they think about STRIK. Find the questionnaire output in appendix 2-A.

Moreover, in terms of the products itself, according to Mr. van Geenen the product should be distinguishable. “The foundation of our existence is the product, so it should be distinguishable, tasty and new.” And especially new in terms of being one step ahead of the competition, as mentioned by mrs. van Geenen, STRIK should renew their traditional products, so that it is new and surprising to the customer, but not too innovative or far away from what they are good at (appendix 1A, interviews).

The perception in the mind of the customers about the brand and its associations determine the current brand image and can enable a brand to develop a rich and clear brand identity by comparing it to what the brand wants to stand for (Ghodeswar, 2008). Now understanding how the customer sees STRIK comparing it to how the CEOs see STRIK, the following value proposition can be concluded:

“For wealthy elderly and wealthy young families, STRIK offers unique, craft pastries that are tasty and of high-quality, and give people a feeling of celebrating life to free themselves from their busy day-to-day life together with friends and family”.

SHOULD -----------------------------------

ACT FROM A PROFIT DRIVEN MIND-SET
STRIK has grown to its current size only because of their profit-driven mindset, as van Geenen mentioned several times. Van Geenen: “we have always acted from a mindset of: let’s focus on profits first and if the profits are there, let’s see what it really is we need and solve things whenever something goes wrong”. Aside from the direct mentioning of the importance of profits, throughout the interviews, both CEOs regularly mentioned ‘price’ as an important aspect to innovation, new products or expanding markets. This even translates into STRIK not taking too big financial risks, as van Geenen mentioned: “Personally I find it very difficult when the horizon of investments are longer than 5-8 years and the investments are big. Then it becomes too risky for me. I prefer saying, let’s do A now and look into B in 5 years.”. This even occurs now, as STRIK is looking into becoming more sustainable. According to van Geenen: “we invest in new sustainable equipment whenever the old one breaks, but mainly because of financial incentives”.

INCLUDE EMPLOYEES
Personal impressions from the first round of ethnographic observations revealed that employees should at all times be involved in the decisions made concerning circularity implementations. Currently employees are experiencing lack of communication, stress & chaos, lack of structure and the feeling of not being heard (general ethnographic observations, diary 2). Moreover, according to mr. van Geenen, “we do see that as we are getting bigger, solving everything ourselves is not working anymore and we are more reactive than pro-active as there is little to no policy”. This, despite the acknowledgement of the importance of employees, mentioned by mrs. van Geenen. According to Yukl (2010), leaders who show more concern and integrity towards their employees are more likely to gain trust, likeability and satisfaction from employees. Moreover, according to Lee (2008), the leader’s goal should be to help employees become healthier, wiser and more willing to accept their responsibilities (Yukl, 2010) and above all to motivate
them in performing to their fullest capacity (Bambale, 2014). This should be done through overall involvement, trust, performance information and the involvement specifically in decision making (Spreitzer & Mishra, 1999). Such strategies will not only get the best out of your employees, creating employee satisfaction, but also increasing the overall organizational performance because of employee performance (Lee, 2008; Spreitzer & Mishra, 1999). This is something STRIK should most definitely work on.

USE THE PATISSERIE COLLEGE TO LEARN
As mentioned by mr. van Geenen, the Patisserie College (the bakery association with +50 members across the Netherlands) is very valuable for him personally and for STRIK. It has helped STRIK grow and innovate for several years. And it works in two ways. STRIK helps members of the Patisserie College, just as much as they help STRIK. This should at all times be valued.

NETWORK EXPANSION
“To reach more people, you should expand your network”, as according to mr. van Geenen, STRIK has grown thanks to van Geenen’s network, so this is something that should be treasured and valued.

EXPAND THE CURRENT TARGET GROUP
As mentioned before, STRIK values their current target groups. However, both CEOs mentioned that STRIK should try to focus on the younger target groups, especially since “older people are expected to die at one point, so we need to keep focussing on the younger target groups as well” (appendix A, Interview A02). Mr. van Geenen adds tot his by mentioning “our wish is obviously to lower the age reach of our target group and we have started this process a little bit by starting with ice cream and profiling ourselves differently on social media”.

Expanding the current markets to new age groups is something STRIK should focus on, especially as the older ‘loyal’ generations are slowly disappearing. Aside from this, it is important that STRIK understands who these customers are in order to reach more of them, which is one of the CEO’s desires. To do this, a target group analysis based on in-store ethnographic observations and secondary data was conducted. This was done for the two biggest target groups:
- wealthier elderly
- wealthier young families

The findings and summarizing personas created based on the findings can be found in appendix 2-B. The main insights showed that amongst the wealthier elderly, those that are aged between 65 and 73 are the most interesting in terms of income, behaviour and preferences. These people prefer a good price-quality balance and value a good store service. The social activity is more important to them than the activity itself. If a store offers good quality products, good customer service and transparency in their products and offerings, brand can win a life-long loyal customer in them. In addition, amongst the younger families, the biggest group is that with young children and one full-time working parents and one part-time working parent. These people are not very brand loyal, but do prefer specialty stores for the full store experience. They prefer a healthy life-work balance and want to make time to enjoy life together with their network of friends and family. They also value a healthy lifestyle and do not hesitate to step to another brand if the product offer is better, the store is within reach or the brand is more sustainable.

SWITCH FROM WORKING-HARD MINDSET TO MORE STRUCTURE AND ORGANISATION
Something both CEOs mentioned several times is that STRIK has always grown because of their hard-working mindset. However, they have become too big now to keep on going the way it is going. STRIK should, and will with the new developments of the younger generations taking over, work on getting more structure and organisation, even though STRIK is not a company for standardizations as mentioned by mrs. van Geenen. “I think that when we invest in structure and organisation, STRIK has a positive future in terms of company growth” - Mr. van Geenen.

GROW IN EXISTING STORES
Both CEOs mentioned the importance of growing in the current stores. Mr. van Geenen explained how growing in current stores is very desirable, as “increasing profits while keeping the same costs is the best you can get”. Moreover, as according to mrs. van Geenen, “we have more margin in our stores than we have with other customers’ groups”. STRIK should thus try to increase either the stores’ customer reach or increasing the spendings per visit for the existing customers.

DO SOMETHING WITH OUR FOOD WASTE
As sustainability is becoming more and more an important topic, both CEOs mentioned the importance of STRIK investing in sustainability as well. However, according to mr. van Geenen, “sustainability should always be directly linked to increasing profits”. Something mr. van Geenen sees future in is looking into food waste. “I would very much like to work on our food waste within STRIK”.

A BETTER WORK ENVIRONMENT
Something that was mentioned by mrs. van Geenen during the interview, was the desire for a better work environment, so that everyone likes working for STRIK. Personal impressions from the ethnographic observations in the stores imply that STRIK could clearly benefit from working on a better work-environment. Even though some employees did mention they like working because of the colleagues, many mentioned that there is too much stress and chaos and there is a big distance between employees from different stores [Appendix 1-B, general ethnographic observations, diary 2].

ADJUST STRATEGIES TO SPECIFIC STORE
While mr. van Geenen did strategically choose the store locations and store types to be so different from each other,
simply because “you should not put all your eggs in one basket”, mrs. van Geenen mentioned the clear differences between the stores as well, supported by the ethnographic observations. It is therefore important that STRIK focuses on these differences in order to make innovations work.

COULD

EXPLORE TRENDS
mr. van Geenen mentioned STRIK closely manages trends to play into, especially towards their customers. “We try to show to our customer: look, STRIK is playing into the trends and introduces something new”. To give an overview of such trends, a DEPEST trend analysis within the bakery industry was conducted. This can be found in appendix 2-C.

INCREASE WEBSHOP SALES
According to mrs. van Geenen, the webshop is something STRIK would like to focus on more. “It is simple money, as it does not require much effort”. Moreover, “at some point you’ve reached the maximum capacity of your stores, whereas the webshop can still grow beyond this”. Currently STRIK’s webshop is not very active, even though they manage to get a weekly webshop reach of +500 visitors with about 5 online orders per day. STRIK could increase profits from their webshop by updating and managing it closely.

WON’T

GROW & EXPAND OUTSIDE OF EXISTING OR COMPAREABLE MARKETS
Both CEOs mentioned that it is important for STRIK to stay in the current or a comparable market. According to mrs. van Geenen, “we should innovate those products that are traditional and give them a new look” and “we should keep doing what we are good at”. STRIK’s CEOs are not fond of taking too much risk and prefer staying in the existing markets with existing or adjusted products. This same is mentioned about innovating in terms of sustainability. STRIK acknowledges the importance of sustainability and will definitely join the movement, but, as ceo van Geenen mentioned: “we will never be the frontrunner”. STRIK should focus on what they are good at, and not try to grow outside of their comfortable area. Not only is this not desired by the CEOs, but as STRIK customers unconditionally link STRIK to pastries (Facebook questionnaire output, appendix 2-A) it is also risky as there is a chance that people might never link STRIK to this new market.

BECOME TOO BIG
Both CEOs mentioned that STRIK is currently not a company that is suitable for opening another 5 stores. STRIK should focus on increasing the profits with their current assets and not expand too soon and too much in terms of stores. They will not invest in innovations that might grow beyond what they can handle.

TO CONCLUDE

MUST

1 Match the current target group: even though it is wise to expand the target groups to younger generations as well, the older and wealthier generation is much valued because they are loyal and have much to spend.

2 Stick to the brand identity and value proposition (page 25).

3 Keep a profit-driven mindset: the financial incentive is very important to STRIK, has made them grow and it will keep on doing that. Every innovation must have a financial benefit.

COULD

1 Explore trends: branch trends could be used to make innovations, and specifically circularity implementations become more desirable and viable

2 Increase webshop sales: STRIK could invest more in their webshop to increase sales coming from their webshop and expand their current market.

WON’T

1 Grow and expand outside of existing or comparable markets: STRIK should focus on what they are good at and not take risks in trying to be too innovative. They should adjust the traditional products while surprising customers with something new, without being the ‘frontrunner’ of the innovation.

2 Grow beyond what STRIK can handle: the balance between craftsmanship and scalability is just right. Expanding to a place where demand is bigger than offering so that it either jeopardises the quality or craftsmanship is not desired by STRIK. STRIK should increase the profits using their current assets.

SHOULD

1 Include employees: For the sake of the company and the work environment, employees should at all times be involved in the decisions made concerning new implementations or innovations.

2 Work on a better work environment

3 Value and use the relationship with the Patisserie College: The association of bakeries is and always will be important to STRIK. To grow, innovate and learn from.

4 Grow in existing stores: It is very desired by STRIK that the profits and revenues are increased in existing stores with the current cost model.

5 Switch from a hard-working mindset to more structure and organisation.

6 Adjust strategies to the specific store

7 Expand the current target group to the younger target groups: STRIK should understand who these people are and what they desire.

8 Always keep expanding STRIK’s network

9 Focus on sustainability by tackling the food waste

*Based on insights from qualitative research (CEO interviews, ethnographic observations in-store and supporting secondary data, supported by appendix 1 and 2)
2.3.1 THE ECONOMIC LAYER

The output of the second analysis part is the Triple Layered Business Model Canvas, as mentioned before. The first step of this method is to fill in the economic business model canvas, in which the (1) partners, (2) activities, (3) value proposition, (4) relations, (5) revenues, (6) costs, (7) customers, (8) channels and (9) resources are included categories. As a concluding output of these categories, in order to understand how and where economic value should be added, the company’s ecosystem is visualized in figure 5. The following section explains per main activity the impacts versus potential benefits in terms of additional economic value.

**ECONOMIC IMPACT VERSUS POTENTIAL BENEFITS**

Each activity, either directly or indirectly, adds to the value proposition (page 23) of STRIK. All activities are currently managed by the CEOs without any management layers in the infrastructure. The following section compares for each activity the impact versus potential economic benefits, while taking into account the partners, resources and channels.

**Sales & Marketing**

One of the most relevant aspects of the sales activity is the fact that STRIK heavily relies on their in-store sales as the most important revenue stream. This stream of revenues should at all times be the desired key metric of STRIK’s business models, considering the profit-driven mindset of the CEOs and the high profit margins compared to other revenue streams. Furthermore, STRIK keeps a close relationship with customers through loyalty programs and social media. They also make good use of different channels to reach these customers. STRIK could benefit from managing the effects of their marketing, as they spend a lot of money on it but never measure the effects. Moreover, STRIK should invest in employee sales training to increase their in-store revenues as most of these revenues depend greatly on employee performance.

**Inbound logistics**

STRIK manages a good relationship with their suppliers, however they do not closely manage their stocks and yearly ordering numbers, leading to left-over items that need to be thrown away or reused. STRIK could benefit from stock management and being pro-active instead of re-active in terms of stocks.

**Production**

STRIK distinguishes different production departments and closely manages their quality & cost control. They have efficient short-term planning, being able to accept almost every order one day before delivery date. They acknowledge the importance of product design and development, but could benefit more from investing time into these. STRIK could benefit from focusing on long-term planning, as their current planning is very short-term. This could save a lot of money and stress while being more efficient.

**Outbound logistics**

STRIK could benefit from structuring and organizing, as this activity seems to influence all other follow-up activities. Transportation logistics could be more efficient and less depending on one person. Digitalizing should increase efficiency and decrease failures.

**Human resources**

The line of communication between CEOs and employees is short, but this sets a higher threshold for employees to ask questions to the manager. STRIK should spend more time on employee satisfaction and focus on stricter policies and a better work environment. Moreover, STRIK does not make much use of their human and intellectual resources, even though they could significantly benefit from using the expertise of employees.

Figure 5: Current company ecosystem, layer 1 output. Based on insights from qualitative research (CEO interviews, ethnographic observations and supporting secondary data supported by appendix 1 and 3A).
The second layer includes the environmental business model canvas, in which the (1) functional value, (2) production, (3) materials, (4) supplies and outsourcing, (5) environmental impacts, (6) end-of-life treatment, (7) use-phase, (8) distribution and (9) environmental benefits are included topics. As a concluding output of these layer topics, a first step was to analyse the energy & material flow of STRIK (figure 6). Even though the figure presents many different areas of production, usage and distribution, a selection is highlighted based on the environmental impact, calculated in a carbon footprint analysis. It is important to mention that there is no final concluding number of CO₂ emission, simply because a lot of categories intertwine. The carbon footprint analysis, as mentioned before, was calculated by combining the company data from the energy and material flow with the secondary data on emission factors. These calculations and considerations are concluded into two representing graphs. Graph 1 shows the emission factors per category, independent of usage. Graph 2 shows the actual CO₂ emission based on STRIK’s usage. For each and every category there is something to say about what is included and what is not included in the calculations, guided by the topics of the TLBMC. All of these considerations are explained in appendix 3-B, just as the detailed calculations per category leading to graph 1 and graph 2 are. The ‘impact’ versus ‘benefits’ section concludes the findings for the second (environmental) layer of the TLBMC.

From the environmental layer of the TLBMC can be concluded that the most impactful categories for STRIK are that of key ingredients, packaging, storing (refrigeration), gas, transportation, landfilled waste and food waste. Where some of these categories clearly jump out in terms of CO₂ emission based on STRIK’s usage (graph 2), such as ingredient usage and gas usage, other categories jump out in terms of emission factors, such as ingredients and packaging. However, an important aspect in determining the most interesting area for creating environmental value is the controllability by STRIK. While packaging and ingredients are considered to have a big impact, they are also less suitable for innovating as STRIK has close contracts with their suppliers because of collaborative purchase benefits from the Patisserie College (layer 1). Moreover, STRIK is not very familiar with, as it stays very close to their current operations and expertise. To conclude, food waste causes a lot of unnecessary greenhouse gas emission while being a very controllable and familiar category for STRIK to invest in. It is therefore implied that this category is most suitable for creating environmental value in terms of decreasing the carbon footprint.
2.3.3 THE SOCIAL LAYER

The third layer includes the social business model canvas, in which the (1) social value, (2) employees, (3) local communities, (4) governance, (5) scale of outreach, (6) societal culture, (7) end-user, (8) social impacts and (9) social benefits are included categories.

As mentioned before, all of these categories were considered while collecting the data. The data was complemented by some company data for the specific layer categories. The miniature version of the canvas is presented in figure 7, with a summarizing conclusion for each category. The detailed explanation per category can be found in appendix 3-C. The following section will conclude in which ways STRIK could benefit from adding social value and in which ways STRIK is always doing this.

SOCIAL IMPACT VERSUS POTENTIAL BENEFITS

The third layer of the TLBMC reveals that STRIK is already actively involved in local communities, not only by supporting events and charity foundations, but also by reaching and including the citizens from the local neighbourhoods of their stores. However, a big area of improvement or opportunity for STRIK to create a bigger social impact with innovations is by including their employees more actively. Currently employees are left in the dark in terms of decision-making and new innovations, even though there is a willingness of STRIK to be transparent. Employees are expected to show initiative and actively ask about such innovations, as the communication from STRIK towards their employees lacks consistency. A final area of opportunity derives from a commonly discussed social impact that most bakeries cope with, which is the risk of diseases due to the stimulation of unhealthy behaviour. STRIK could decrease this risk while adding social value if they invest in healthier product.

LAYER 1: ECONOMIC BMC

STRIK could benefit from more structure, better long-term planning, more efficiency and a better work environment in terms of added value. Moreover, the “sales & marketing” activity is key to STRIK. Especially the in-store sales are important, providing the most important stream of revenues. Business models are most interesting when build around in-store sales. Investing more in employee trainings and analytics of sales could also deliver potential benefits in terms of revenues. Moreover, STRIK should make more use of their intellectual and human resources. Finally, key stakeholders should be included in decisions and innovations in order to increase the viability of such innovations.

LAYER 2: ENVIRONMENTAL BMC

The most impactful categories in terms of CO₂ emission include that of key ingredients, packaging, storing (refrigeration), natural gas usage, transportation, landfilled waste and food waste. However, food waste is considered the most interesting area of opportunity for creating environmental value and thus decreasing the carbon footprint. It has a large unnecessary impact, it overlaps with most of the other categories, it is controllable by STRIK and it is a familiar category to a currently non-sustainability-expert like STRIK. Moreover, the CEO of STRIK considers this a big problem within the organization.

LAYER 3: SOCIAL BMC

STRIK is already actively involved in local communities in multiple ways and they should keep on investing in these as a way of creating additional social value. Two other areas of opportunity for STRIK in terms of social impact can be derived from actively involving employees and dealing with STRIK’s unconscious stimulation of unhealthy behaviour. If STRIK can implement (one of) these areas into new innovations or business models, the validity is likely to increase as innovations would then benefit not only from profit and planet, but also from the “people” part of the triple bottom line (Elkington, 1994).
As a final converging step before heading into the ‘Develop & Deliver’ phase, it is important to determine the specific design challenge. This will give the project guidance in finding an answer to the research question being:

“How should STRIK patisserie contribute to a Circular Economy, while at the same time creating additional economic value?”

Based on the output from the ‘Discover & Define’ phase, the following design challenge derived:

**HOW CAN WE MAKE STRIK’S FOOD WASTE STREAM 100% CIRCULAR WHILE GAINING FINANCIAL AND SOCIAL BENEFITS?**

**WHAT IS MEANT WITH 100% CIRCULARITY?**

In the context of this project, 100% circularity for food waste means that a circular solution for all of the disposed food by STRIK is found. In addition, part of the externally disposed food of STRIK by consumers could be taken into account as well, despite the uncontrollability by STRIK itself.
The main goal of this phase is to develop concepts out of ideas and test these concepts based on the key metrics of viability and desirability. Several tools and techniques are used to come up with ideas and selecting them, after which a ‘lean approach’ will help testing the chosen concepts in a quick and effective way. Figure 8 explains again which methods are used in order to come up with a suitable solution to the problem. The phase starts again by explaining the methods of generating ideas, selecting them and testing the chosen concepts, after which the results and findings are presented and conclusions are made in terms of the most suitable concept to persevere with. Finally, the final chapter of the phase further details the chosen concept into a final design.
4.1 METHODS

4.1.1 IDEA GENERATION

The idea generation was done using different tools and techniques. First, circular brainstorming was used in order to generate initial and quantitative ideas [Ellen MacArthur foundation, 2016; Circular Design Guide, 2019]. Within this session the industry and target group trends from the ‘Discover and Define’ phase were used as a starting point, as these could on one hand lead to interesting opportunities for STRIK, while on the other hand expand creativity to beyond the current context. Moreover, the company ecosystem from the first layer of the BMC (Discover & Define phase) was used as a starting point as well, reveals all of the important stages and activities occurring within STRIK and thus also the possible areas for implementing circularity. Overall the brainstorming was guided by asking ‘how might we’ questions within the slowing, narrowing, closing and regenerating circularity strategies (Konietzko et al., 2020).

Second, as a more qualitative approach, the analogy thinking tool was used within the session (Board of innovations, 2019). This tool compares existing solutions to the design challenge both within and outside the industry in order to choose applicable and suitable solutions for the company of STRIK (Board of Innovations, 2019). The list of existing innovations from the Circular Economy Club (2019) was used as a starting point.

The output from the creative brainstorm session can be found in appendix 4-A.

4.1.2 CONCEPT SELECTION

From the ideas generated within the brainstorm session and the additional analyses, concrete concepts were analysed and selected using the concept selection tool from the Ellen MacArthur foundation (2016). This tool guides in assessing the quality of the derived concepts from a more ‘strategic business perspective’ and the ‘ability to progress them as an organisation’, as mentioned by the Circular Design Guide (2019). The potential ideas derived from the creative brainstorm session are placed within a concept selection worksheet from the Circular Design Guide (2019), based on work from the MacArthur Foundation (2016). Here, ideas are classified based on impact and achievability. Placing the ideas in the worksheet was done in consultation with one of STRIK’s store managers while using the strategy hierarchy ladder and insights from the ‘Discover & Define’ phase. The placement explanation can be found in appendix 4-B.

Within the matrix ideas are placed in one of four areas. The area to consider is the area of ‘low hanging fruit’. The ideas within this area are easy-to-achieve ideas with a high impact. It is likely that such ideas are more attractive to STRIK, considering they have no experience with- or expertise about circularity yet. Moreover, ideas are selected based on internal or external food waste reduction. As the challenge is to make STRIK’s stream of food waste 100% circular, it is important to consider those ideas that are capable of achieving this goal.

4.1.3 CONCEPT TESTING

In order to quickly test assumptions about the concepts before spending time, resources and cash, the Lean Startup approach, formalized by Ries (2011), is used [Project Entrepreneur, 2019]. This methodology is an experiment-driven approach to rapid, in-market learning (Euchner & Ganguly, 2014). An important aspect of the Lean Startup methodology is the use of ‘MVPs’, known as ‘minimum viable products’ (Ries, 2011). Such MVPs are early-stage versions of final products, only including the necessary features enough for evaluating them and learning from them (Project Entrepreneur, 2019). These MVPs will be tested through determined hypotheses, derived from trying to find the ‘innovation sweet spot’ in terms of desirability (what people want), feasibility (what is functionally possible) and viability (what is likely to become a sustainable business model (Brown, 2009; Dennehy et al., 2019). However, as this testing phase tries to find answers to whether and how STRIK should persevere with the idea and not whether they could do so (Ries, 2011), the focus will not be on feasibility, but mainly on viability and desirability as key metrics for hypothesis testing. The hypotheses are determined in a way that testing can assume a concrete answer of ‘yes’ or ‘no’. This means using specific tangible acceptance boundary like 10% or 100 respondents.

The chosen methods of measuring and testing are based on the specific concepts. Where one concept demands for qualitative in-store testing, another demands for quantitative online testing. Moreover, each MVP might require several rounds of testing. In line with the ‘lean startup’ approach, for each round of testing is determined how it was build, how it was measured and what was learned. Appendix 5 describes each round of testing per concept in detail, whereas the following sub-chapter presents the findings and results from the testing only.

4.1.4 SHAPING THE FINAL DESIGN

The final chapter of this phase dives deeper into the specifics of the chosen concept by focusing on what the product is, what the packaging should look like, what the price should be and how promotion should be tackled.
4.2 Output 1: Idea Generation & Concept Selection

4.2.1 Chosen Concepts

After a creative session, a range of ideas was generated. These ideas were placed within one of the four areas of the concept selection matrix from the Circular Design Guide (2019) based on STRIK’s store manager input, insights from previous research and the circular strategy hierarchy ladder. What can be concluded from the classification matrix (see figure 9) is that most ideas are considered to have a low impact. This, because some concepts are only applicable to a selection of products, while other solutions require adding resources. Moreover, some concepts’ impact depend on the customer reach. While customer disposal behaviour is not fully controllable, it can be influenced considering education is an important driver in reducing consumer food waste (Stancu et al., 2016). With the design challenge in mind (to make the food waste stream 100% circular) it is important that focus is not only on the internal waste stream, focusing on STRIK’s own disposal behaviour, but also on the external waste stream, focusing on what the consumers disposes from STRIK’s products. Figure 9 represents the concept selection matrix and the chosen concepts derived. The following section explains each concept in detail.

CONCEPT 1: EDUCATIONAL WEB-PAGE
For the circularity of external food waste, several ideas concerning education and stimulation of behaviour are combined into the concept of an educational web-page (figure 9). Not only is the impact increased by a combination of different ideas, STRIK also plays into the desire to increase online shopping revenues (appendix 1A, interview A02) as this concept provides an opportunity to gain economic value by increasing traffic to the web-shop. Even though consumers might not visit the page for purchasing reasons, they will be exposed to STRIK’s products or offers at a certain point. Moreover, the impact increases as STRIK reaches more customers, which is one of their strengths considering their big loyal group of in-store customers and social media followers.

Circularity of external food waste through an educational web-page builds upon the strategies of narrowing and slowing food waste loops. Consumers are triggered to ‘re-purpose existing products and components’ (Konietzko et al., 2019) through information about how to use leftovers in new recipes. Moreover, consumers are triggered to ‘maintain their products’ by ‘creating a service that enables users to care for their products’ through information about storing or expiry dates (Konietzko et al., 2019). The circularity goal of providing such information is to eventually decrease the 20% disposal rate of consumers (Verburgh, 2018) for those products provided by STRIK.

CONCEPT 2: NEW PRODUCT LINE MADE OF WASTED PARTS
For the circularity of internal food waste, the concept for a new product line of wasted parts/products was chosen. Even though other concepts have a bigger impact in terms of the strategy hierarchy ladder (Konietzko et al., 2020), this concept has the opportunity to gain impact from up-scaling and quantifying. If the new product line is dynamic in terms of seasonal food waste, and designed together with STRIK’s bakers, a large part of STRIK’s food product range can be included while using the expertise of employees (PWC.nl, 2019). Moreover, it provides opportunities to be unique and distinctive through storytelling (Marktdata, 2017). One of the most important aspects of this concept is that STRIK is already partly familiar with it, as they are currently making their so-called ‘Kruidcakes’ from their bread and pastry leftovers. This means the threshold of investing in such innovations is low and rather risk-free. The concept differs from the existing way-of-working by looking for ways to create even more value as the considered downside of the product (it gets made from reused leftovers) is turned into the product’s unique selling point. It provides opportunities for STRIK to gain economic value from their waste.

Circularity of internal food waste through a product line from wasted parts builds upon the strategy of closing food waste loops (Konietzko et al., 2019). STRIK ‘reuses components from discarded products’ (Konietzko et al., 2019) and resells these new products. The circularity goal of the concept is to decrease the total weight of food within the general waste stream.

CONCEPT 3: ANAEROBIC PROCESSING
A small remaining stream of internal food waste is inevitable as some products cannot be reused. Therefore, the third concept includes the anaerobic processing of food waste through a partnership. Currently most of STRIK’s food waste is burned at the landfills. This end-of-life treatment is not preferred, as no value is created from the waste (Ellen MacArthur Foundation, 2015). Moreover, donating to local farms does add a social value, but no environmental or financial value. If such food waste is anaerobically processed into green resources (compost, biogas or green electricity), the life-cycle remains circular and does add value. In terms of the R-imperatives ladder (PLO, 2019), recycling into compost is not the most desired way of making waste streams circular, but it does enable STRIK to make their food waste stream 100% circular. This concept is a good final destination for food waste when the stream is already narrowed or slowed down in other ways. The reason this concept is considered a final destination is because it lacks the opportunity to create financial value from it, even though it does create environmental value. Partnering up for anaerobic digestion/composting makes it an easy-to-achieve concept for which STRIK does not require expertise. Circularity of internal food waste through partnering up for anaerobic digestion/composting builds upon the strategy of regenerating food waste loops (Konietzko et al., 2019). The circularity goal is to minimize the total weight of food transported to the landfills.
Figure 9: Concept selection matrix - explanation of matrix placement can be found in appendix 4-B.
4.3.1 MVP DEVELOPMENT

After choosing the three concepts, the concepts were turned into three ‘Minimum Viable Products’. As mentioned before, these MVPs are early-stage versions of the final concepts, only including the necessary features enough for evaluating them and learning from them (Project Entrepreneur, 2019). The first MVP represents the concept of the educational web-page with information about (STRIK) food waste. The MVP is tested in the form of an initial landing page, including only the necessary features (introduction, information about recipes, storing and expiry dates, call-to-action email subscription and a link to STRIK’s webshop by presenting an online product offer). The second MVP represents the new product line made from waste parts and products. The MVP is tested in the form of a physical prototype, made from an existing product but adjusted in terms of packaging and advertising. The final MVP represents the partnership for anaerobic digestion. In this case there is not so much of a physical or digital product representing the concept, but the concepts is tested on whether it could make the food waste stream 100% circular. Figure 10 represents each MVP in STRIK’s food waste stream. The following section will briefly describe the ‘building phase’, ‘measuring phase’ and ‘learning’ from each MVP. The detailed descriptions of the MVP processes can be found in appendix 5.

4.3.2 MVP 1: EDUCATIONAL WEB-PAGE

HYPOTHESES

- HA1: “More than 10% of STRIK’s customers would be interested in information from STRIK about how to reduce food waste”
- HA2: “More than 10% of STRIK’s customers visiting the food waste web-page is interested in STRIK’s online offers as well.”

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Even though customers do show a slight interest in information about food waste, especially in recipes (16% CTR), it is implied that they are not yet willing to put much effort into it, as the call-to-action conversion rate for information about food waste is low, both in terms of email subscription as well as Facebook commenting (<10%). Moreover, customers do not yet show much interest in purchasing products online, not when a special online offer is provided and neither when customers are directed to the web shop through social media (<10%). This means that HA1 and HA2 must be rejected and the initial concept should be pivoted due to low desirability, viability and circularity.

Moreover, some additional insights were gained from the testing results. Facebook content with the biggest reach and engagement include videos, win-posts and content about the production. Visual content on Facebook tends to get a bigger reach, even though the engagement rate remains constant (on average 5-3%). Additionally, the results imply that recipes are the type of information about food waste customers show the most interest for.
**BUILD & MEASURE**

Three rounds of testing were conducted, including physical prototype testing in-store (N=449), online-questionnaire testing (N=161) and a qualitative live reaction testing (N=10). The prototype presented an example of products that could be included in the new product line. Each were provided with an adjusted packaging, advertising the (sustainable) story behind the product. The testing measured the actual sales increase compared to the sales from a year before. Moreover it tested whether employees are capable of correctly separating the food waste from the general waste stream. Interviews with potential partners revealed that processing partners are able to recycle 100% of the collected food waste (N=2) and STRIK’s employees are willing to- and capable of separating waste so that the food waste stream becomes more than 95% clean if they are educated and informed about what they can and cannot dispose. The costs savings for separating food waste from general waste weigh out the costs for implementing special garbage bins for food waste. All of the later assumes that HC1 and HC2 can be accepted and the concept that regenerates the food waste loop should be persevered.

**LEARN**

All of the MVP testing suggest that there is a high desirability and viability for the concept, as >10% of the customers showed their interest, either through the online questionnaire, live reactions or by grabbing a discount card. Moreover, sales increased with >15%, and customers mentioned both in the questionnaire as well as face-to-face (live reaction) that they are willing to pay the same or even a higher price for the (adjusted) product. This means that HB1 anc HB2 can be accepted and the concept that helps closing the food waste loop should be persevered.

However, for the concept actually decrease the environmental impact due to food waste, it is important that the product line reaches as many customers as possible so that more of the food waste can be used to make the new products. This means the product should grab customers’ attention. For the more critical customers it is important that the story behind is it clear and transparent. This should be communicated with employees as well, as they are the face behind the product for most customers.

Three rounds of testing were done. One for testing HC1 by interviewing two potential partners to understand what happens to the food waste and whether actually 100% gets recycled. Moreover, an additional test was done using a physical prototype of the so-called organic ‘SWILL’ bin to test HC2 and check whether employees are capable of separating the food waste correctly in the right bin, since the food waste will only be recyclable if the stream is clean. As it appeared that employees needed some guidance in their disposal behaviour, a third test evaluated whether providing information about what could or could not be disposed with the food waste would help employees in creating a clean stream.

Even though the third concept should be considered a ‘final destination’ for the inevitable remaining stream of food waste, it does provide a way to make STRIK’s food waste stream 100% circular. Interviews with potential partners revealed that processing partners are able to recycle 100% of the collected food waste (N=2) and STRIK’s employees are willing to- and capable of separating waste so that the food waste stream becomes more than 95% clean if they are educated and informed about what they can and cannot dispose. The costs savings for separating food waste from general waste weigh out the costs for implementing special garbage bins for food waste. All of the later assumes that HC1 and HC2 can be accepted and the concept that regenerates the food waste loop should be persevered, but only after other measurements are taken to first slow, narrow or close the food waste stream.
Throughout the previous chapter, three Minimum Viable Products (MVPs) were created and tested based on the key metrics of desirability and viability. The first MVP, an educational web-page informing customers about food waste prevention, was tested through a designed landing page. The landing page was promoted via Social Media, as STRIK has an immense customer reach on Facebook (~8,000 followers). The results showed that even though there was a slight interest in information about food waste, respondents did not react to the ‘call-to-action’ (<1%). The latter was confirmed by additional comparisons of other Facebook posts. From the tests could be assumed that both the desirability as well as the viability is low for this concept. Therefore, the concept was pivoted.

The second MVP, a new product line made from wasted parts and products, was tested in several different ways. Sales numbers, in-store quantitative data collection (N=449), questionnaire output (N=161) and in-store interviews (N=10) revealed a high desirability (>10%) and viability for the concept (>15% sales increase with story-telling promotion).

The third MVP, anaerobic processing through a partnership, was tested using potential partner interviews (N=2) and in-store employee observations. From the tests could be implied that partners assure 100% recycling of food waste, while employees are capable of and willing to separate the food waste from other waste in the STRIK stores. This means that, despite the given that this concept will not add any economic value, it does provide a solution to make STRIK’s food waste stream fully, and thus 100% circular.

All of the latter leads to a perseverance of concept 2 in order to close STRIK’s food waste loop and minimize the total weight of food waste going to waste processors. Additional concept 3 is recommended for future adoption as a way to make the food waste stream 100% circular and minimize the total weight of food going to the landfills.

The following chapter will dive deeper into concept 2 as a final design, looking into the financial aspects as well as design, packaging and marketing aspects.
4.4.1 THE PRODUCT

For the selection of products it is important that there are products coming from a solid stream of food waste (bread, pastries) throughout the year in addition to products that are made from wasted parts depending on the season. This way the product line anticipates on the specific type of food waste in the food waste stream. To diminish the possibility that the demand becomes bigger than the offering and the story becomes more commercial than sustainable, the stocks are only filled based on what is available. The ultimate goal is that the food waste is in balance with the new product line sales, so that STRIK does not dispose more than they can reuse, as well as that they do not sell more than they dispose. Additionally these products could also be used for those give-away products that STRIK currently uses to build on local communities and customer relationships.

Moreover, it is important that for each product is communicated to the employees what is in the product. If this is not done correctly, employees might give an explanation that makes customers think about the products in a negative way. They should be trained on word choice and STRIK should explain to them how the product is produced. The most important aspect is that the products are not made from ‘old’ parts or products. This is not the case at all. The good parts are separated from the bad parts, whereas the remaining good parts are reused for the new recipes. The parts that are unusable (such as whipped cream parts or custard parts) should be separated by the employees for anaerobic processing. Again, this requires training employees in doing this correctly and informing them about their role.

4.4.2 THE PACKAGING

An important aspect is that the product draws customers’ attention through its packaging and promotion. Currently it occurs that some products are not even noticed by weekly-visiting customers (chapter 4.3.3). In order for the new product line to decrease environmental impact, it is important that it draws customers’ attention so that sales increase to a point where there is a minimum stream of food waste left. STRIK’s current color palette consists of the following colors.

The new product line should be sustainable in its appearance, but also draw attention in between the existing packaging colours. In terms of style and appearance it should match STRIK’s current brand identity of quality, tastefulness and accessibility. To obtain the experience of a tasty yet honest product, it is important that part of the packaging remains transparent so that customers can see what is actually in the packaging. Especially considering this is a new product from STRIK, so STRIK should diminish all possible doubts customers could have about the quality of the product. Moreover, in terms of packaging materials, previous research revealed that the impact of the packaging itself is significantly low compared to the food wasted due to not storing it correctly (Østergaard & Hansen, 2018; Williams & Wikström 2011; Silvenius et al., 2014). Therefore the packaging material will be chosen based on what will keep the product longest fresh to minimize possible external food waste.

A final mentioning goes to whether the packaging should be pre-printed or not. On the one hand packaging that is printed per product is more sustainable (Lecture Verspillingfabriek, 2019), saving a bunch of add-on stickers and labels. However, on the other hand it is most likely more expensive and new packaging is required for each new product in the line. Therefore, those products that remain constant throughout the year (such as those made from bread-waste) should get pre-printed packaging, while the more dynamic products that could benefit from using the same packaging should get standardized packaging.
4.4.3 THE PRICE
For the price of the product it is important to determine what will be included in the price and what not. Where one could consider that there should not be calculated a price for the left-overs, as you would otherwise throw them away, another way to look at it is that it is an expensive ingredient considering it was already processed, transported and stored once. According to CEO van Geenen, 25% of the retail price are processing costs and 25% are ingredient costs. For a regular pastry (weighing about 115gr), the in-store price is €2.20 (€2.40 incl. BTW), so this means that ingredients and labour cost already €1.10 per pastry. In the spirit of ‘creating value from waste’, these labour- and ingredient costs that were already put into the product should be taken into account. Therefore, in calculating the kruidcake price, a price/kg of €9.57 for pastry left-overs should be used. As can be seen in graph 3, Kruidcakes use about 5.2kg of pastry left-overs for ±50 units, while adding a selection of other ingredients, so the price of the kruidcake should be €8.38. This way the left-overs are treated as a valuable product instead of a waste product, in which labour and ingredients are already put in. This price calculation should be used for each of the product in the new product line, in which 50% of the left-over product’s store-price is used as ingredient price for the new product.

To gain additional social value from the success of the product line, STRIK could put some extra profit on the product to give to a charity of their choice at the end of the year, in line with fighting against- or doing something with food waste. They should make the stores compete with each other in terms of performance, and let the winning team decide on the charity at the end of the year. This way they include employees and give them a motivation for making the new product line succeed.

4.4.4 THE PROMOTION
The promotion of the new product line should include methods for reaching the existing target group, but also potential new target groups both through physical (in-store) as well as through digital promotion. It is important that the strategy for promotion differs per STRIK store, as each store has a different target group with different desires. This should be evaluated together with the store employees. For reaching new potential target groups, especially the STRIK location in the city centre (Ziekerstraat) should promote the new products on the street, considering a lot of such younger target groups live here [Nijmegen, 2018]. Here, STRIK could also get the attention of the people doing their sustainable grocery shopping at the EkoPlaza across the street, as mentioned both by STRIK employees and by customers throughout interviews. For the other stores STRIK should use their network and partnerships with local papers to promote the new product line to the existing target group. The promotion of the new product line, STRIK should use visual Facebook promotions, but also videos to be transparent in the processing of the products.

Finally, STRIK should communicate all of their sustainable initiatives on their website.

Aside from the ways of promotion, it is also very important to consider the content of the promotion. The product should match STRIK’s brand identity, of which quality and tastefulness are important aspects. Therefore, customers should never experience the product being made from recycled parts as something negative even though the sustainable aspect should always be central to the promotion, as the MVP testing implied that the sustainable aspect is something that appeals to almost every target group (chapter 4.3.3). Therefore, word choice is critical. At Verspillingsverukkelijk.nl [2019] several brands use smart word choices to explain that the product is from recycled materials, but in a positive way. These should be used as inspiration to promote STRIK’s new product line in a qualitative and tasteful way.
The final phase of the project includes the ‘present & validate’ phase. First, the final design will be presented, shaped based on the conclusions of sub-chapter 4.4. Then, the final design will be validated based on feasibility, desirability and viability, but also on the initially determined implementation criteria. Then, the entire graduation project will be discussed in which the limitations, the contribution to the research domain and the personal reflections will be included. A final project conclusion ends the last project phase.
When food is unnecessarily wasted, so are the impactful packaging, transportation, gas, ingredients and storing (refrigeration) that were used or put into the food.

5.1-PRESENTING THE FINAL DESIGN

FOOD WASTE LOOP

100% CIRCULAR

Over 12,000 kg of wasted food, with an estimated unnecessary emission of 40,000 kg CO₂ equivalent each year.

PRESENTING THE FINAL DESIGN

CLOSING THE FOOD WASTE LOOP

BY INTRODUCING

A NEW PRODUCT LINE MADE FROM REUSED WASTED PARTS

The product line closes the food waste loop so that less of the waste gets transported to the landfills. This potentially saves 6,800 kg CO₂ from the burning of STRIK’s current waste of food waste only, while preventing the already emitted CO₂ from the product production to get wasted.

The reused parts are considered as valuable ingredients instead of as waste, by calculating 50% of the original production and ingredient costs into the new products’ cost price. The new product line builds on the business model of increasing the in-store revenues through direct sales.

Optionally part of the new products’ profits could get donated to a local charity, chosen by the store that has sold the most products. This way employees are stimulated to help the product line succeed, while they are included in the decision-making of the charity. STRIK creates additional social value by donating to the community and by involving their employees.

REGENERATING THE FOOD WASTE LOOP

BY INTRODUCING

A PARTNERSHIP FOR ANAEROBIC PROCESSING

No opportunities for a business model

Employees should be educated about the correct way of separating the food waste in order to obtain >95% clean food waste stream.

Circularity goal = reducing the weight of food waste transported to the landfills.

The final destination for the inevitable stream of food waste, when all other measurements for narrowing, slowing and closing the food stream loop are taken. Can assure 100% circularity of STRIK’s food waste stream.

When food is unnecessarily wasted, so are the impactful packaging, transportation, gas, ingredients and storing (refrigeration) that were used or put into the food.

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Circularity goal = reducing the weight of food waste transported to the landfills.

The final destination for the inevitable stream of food waste, when all other measurements for narrowing, slowing and closing the food stream loop are taken. Can assure 100% circularity of STRIK’s food waste stream.
5.2. VALIDATING THE FINAL DESIGN

In order to reach the ‘innovation sweet spot’ (figure 11), it is important that all three aspects of feasibility, desirability and viability are taken into account. The following sub-chapters discuss how each of the aspects was ensured within the final design. The focus is mainly on validating the final design for the new product line, as the anaerobic digestion is a recommended future step after all other measurements are taken to narrow, slow and/or close the food waste loop. For additional validation, a short validation session was organised together with the CEOs.

5.2.1 FEASIBILITY

Feasibility refers to what is functionally possible (Brown, 2009; Dennehy et al., 2019). This is the only key metric that was not evaluated in the MVP testing phase, simply because the focus was not on whether STRIK could persevere with the concept but because the focus was on whether they should. However, the new product line made from wasted parts and products is something STRIK is already familiar with, as they have been doing something similar throughout the years with their Kruidcakes. This means there is no investment needed from STRIK in new techniques or new ways of producing. Lastly, according to the CEOs, the solution is something they could and want to implement within the next few weeks, all implying a high feasibility of the final design.

5.2.2 DESIRABILITY

Desirability refers to whether there is a desire of (potential) customers for the design. The new product line was tested on the desirability, revealing that customers are positive about the product (70%; N=10) and that they are likely to purchase such a product (47%; N=161). Additionally the CEOs mentioned they believe the solution fits their current product portfolio and would be a great way to show their customers about their sustainable innovations. This implies that there is a high desirability for the final design.

5.2.3 VIABILITY

Viability refers to whether STRIK could make a business model from the new product. From the MVP testing could already be implied that adjusting a product to promoting the sustainable story behind it would increase sales and people are willing to pay the same or even an higher price for such an adjusted product. Moreover, in chapter 4.4.3 ‘The price’, cost calculations are made in which the wasted parts are considered as valuable instead of as waste, so that the initial labour and ingredients put into the wasted part are included in the business model, increasing the viability of the final design.

5.3. BACK TO THE IMPLEMENTATION CRITERIA

In the initial analysis phase several ‘must’, ‘should’, ‘could’ and ‘won’t’ criteria were determined based on the company analysis. The final design should at least match the ‘must’ and ‘want’ criteria. Each will be discussed below.

5.3.1 THE FINAL DESIGN MUST

Match the current target group:
The branding tries to emphasize the quality and tastefulness of the new products, which are values current customers link to STRIK. Moreover, MVP testing showed that the older target group also responds positively to STRIK investing in sustainable products (MVP 2).

Stick to the brand identity and value proposition:
As mentioned above, STRIK emphasizes the quality and tastefulness of the product even though it fulfills a higher (sustainable) goal as well. There is consciously chosen for a more neutral, quality-like appearance while including transparent packaging parts to show customers the quality of the product.

Keep a profit-driven mindset:
By treated the wasted product parts as a valuable ingredient instead of a ‘waste’ product, the initial labour and ingredients put into the original product are included in the cost calculations of the new product. While reducing the environmental impact of their food waste, STRIK creates additional financial value by reselling the reused wasted parts.

5.3.2 THE FINAL DESIGN WON’T

Go outside of the existing or comparable market
The final design is something STRIK is already familiar with and that fits perfectly within their current market while possibly even attracting new target groups.

Grow beyond what they can handle
The product will only be stocked based on what is available in terms of food waste. This means some days there is more than others and customers are informed about this. This means that STRIK will never create more than they can handle.

5.3.3 SHOULD & COULD

The final design emphasized the sustainable story behind the product, playing not only into trends of sustainability, but also in that of being unique and distinctive through storytelling (Marktdata, 2017). It allows STRIK to include their employees in separating the food waste, in helping with the creation of new products from wasted parts but also by including them in the decision making for sharing part of the products’ profits to a charity of choice. Moreover, by adding a new product section to the existing store, growth in existing stores in stimulated. The promotion and advertising of the new product line will be adjusted based on the specific store, each emphasizing a different aspect of the product.
6-DISCUSSION, CONCLUSION & REFLECTION

Limitations, contribution, conclusion & personal reflection

6.1-THESIS CONCLUSION: BACK TO THE RESEARCH QUESTION

Let’s go back to the initially defined research question of:

“How should STRIK pâtisserie contribute to a Circular Economy, while at the same time creating additional economic value?”

As the Revamped Double Diamond model would lead us from a phase of “don’t know, could be” to one of “do know, should be”, we should now be able to answer the initially determined research question:

STRIK should move from a linear towards a circular economy by first focusing on the unnecessary greenhouse gas emission from their food waste. This is a familiar and controllable category to start with, while the environmental impact is large considering that while food is wasted, packaging, gas, transportation, ingredients and storing measurements are wasted as well. They should do this by creating a new product line made from wasted parts, in which the wasted parts are treated as a valuable ingredient instead of a wasted one. This way they will turn their waste into value by closing the food waste loop, thus building towards a circular economy while turning it into a profitable business model. A future step would be to partner up for anaerobic processing, so that when every measurement is taken to slow, narrow or close the food waste loop, the inevitable remaining stream of food waste is regenerated into compost or green gas, making the food waste stream 100% circular.

6.2-LIMITATIONS

Throughout the project, many different methods were used to find an answer to the research question. However, considering there was no prior research or data available from the company, throughout the process decisions had been made on what to focus on and what not to focus on, especially considering the rather short time span and the broad approach. This section dives deeper into where such situations occurred and how was dealt with them.

6.2.1 DEALING WITH BIAS

A first important aspect to consider is bias. With the prior knowledge about-and history with the company, the likelihood of bias occurring increased. In some cases bias was used as a privilege, to deductively pre-determine the categories for which information should be collected. However, it also led to quicker ‘tunnel vision’ and taking on a future-employee perspective instead of the perspective from an SPD student. To deal with bias as much as possible, the data was regularly validated by the employees and the CEOs. Moreover, in the case of MVPs, additional testing was done until the results did not simply depend on one outcome anymore. However, it is crucial that data, results and conclusions are constantly checked with the company, so that solutions developed with bias will not occur.

6.2.2 ANALYSING THE DATA

Throughout the project, several methods for data collection were used, amongst which ethnographic observations, interviews and quantitative data comparison. However, none of these were analysed on significance or coding patterns, mainly due to the lack of time. Even though the outcome of this report does not require analysing the data in such a way, considering the data is mainly used as indicator or to make direction suggestions, it can be helpful to revise or re-analyse the data if it were to be used in a broader, more generalized perspective.

6.2.3 NEED FOR FUTURE RESEARCH

As there was no prior data available about the company, all the data had to collected manually. However, considering there was so much data to collect, the overall collection of data was done with a broad perspective. Future research should dive deeper into the data per specific subject in order to make further conclusions on the numbers and statistics. STRIK could use this to learn from, focusing on optimization, cost control and efficiency.

This same goes for the carbon footprint analysis. Even though this analysis does conclude a graph with CO₂ equivalent emission numbers, the limited data available led to specific calculations intentionally including or excluding parts of the calculations. While the data is simply used as indicator to reveal the impact per category, in order to state facts about the data, future research should dive deeper into the entire end-of-life greenhouse gas emission per category.
6.3 - CONTRIBUTION TO THE RESEARCH DOMAIN

This project specifically focuses on circularity solutions tailor-made for STRIK patisserie, limiting the contributions to broader domains. However, this does not mean that the thesis does not contribute to the domain of strategy and design.

First, the lean approach for concept testing used within this thesis is considered a valuable way of testing which can and should be applied in other studies or companies as well. This rather rapid and cheap way of testing challenges your pre-conceptions, but most importantly, reveals interesting insights about the implementation of potential concepts. Especially for those companies that are sure their innovations will succeed, with this method they can easily test whether this is the case or not, before spending a lot of money on something that might never succeed.

Second, working with the Triple Layered Business Model Canvas instead of with the original Business Model Canvas is something companies should permanently switch to. The CO2 clock is ticking away and time is running out. Sustainability should not be a choice anymore, it should be part of your company’s strategy. Using adjusted models like the TLBMC as a standard will help companies implement sustainability and ethics at an early stage.

The third contribution is for the consultants or strategic product designers working with profit-driven SMEs. From working on this project I experienced the ‘power of data’. Especially when the data is about cost savings or potential revenues. A lot of companies are aware of pitfalls or opportunities within their company, but nothing is as strong as the data proving it. There were several moments where I surprised the company CEOs with data, even though they probably already knew this was happening. This way of projecting the data in an understandable way, and especially the costs that could be saved or the profits that could be increased, helps changing companies’ opinions about important matters or interesting innovations.

6.4 - PERSONAL REFLECTION

At an early stage in the bachelor’s program of IDE I figured I was more of an strategic entrepreneur than an actual product designer. Not only did I start my own sustainable fashion company in 2017 (after which I sold the entire label 2020), but I also found myself taking on a role of corporate entrepreneur during my internship at Heineken, working on several initiated sustainability- and efficiency-increasing projects. SPD was the (strategically) right fit for me as an Industrial Designer. When I was discussing a graduation project at Heineken on sustainability, I was in serious doubt. On the one hand I knew that my thesis could make a huge impact because of Heineken’s reach and capabilities, but on the other hand this would only happen if the report did not disappear in the major to-do-pile of projects big corporation like Heineken usually have. At the same time my involvement in the company of my parents in law (STRIK) grew as I co-managed the first ice-cream saloon in 2019, while they coped with sustainability issues themselves. This inspired me to take on the challenge of trying to implement sustainability in an SME instead of in a big corporate, which is in my opinion much more challenging considering the lack of expertise, the profit-driven mindset and the lack of financial capital available for such sustainability projects.

The graduation experience

“I started this thesis with a lot of pre-conceptions about personal concerns with the company and the projects’ outcome. Throughout the process I learned to focus on what is suitable from an IDE and SPD perspective instead of from a future-manager perspective”.

I’ve experienced what it’s like to start a project literally from scratch, as there was no prior data available and no student had been here to ‘pave the way’ a little bit. This was tough, challenging, but also something I definitely learned a lot from. At first this made me go way too broad and have more personal concerns with the project and its outcomes. However, with some guidance along the way, I learned to take on a consulting role with an SPD’s perspective instead of a future-manager’s one. I have gotten to know more and more about sustainability, definitely from an SME perspective, which has made me even more enthusiastic to try and find ways where sustainability and profits can go together.

A characteristic I discovered about myself is the perseverance to carry on for 5 months straight. Whenever I missed a week of work on the graduation project due to other work or circumstances, I would pick up the next week with 200% energy instead of postponing my deadlines. I should, however, be less stubborn in asking people for help. I
have always been the type of student that likes to try and fix it herself before asking someone, but in the last phase of the project I experienced that asking for help can be refreshing and actually inspiring, especially when you are too deep into something so that tunnel-vision is inevitable.

Finally, something I needed to force myself to do during the graduation project is focus. ‘Focus’ has been the guiding word during the project, while this is something I have always struggled with, especially when I need to stick to a page limit. My coaches have helped me so much in doing this. Even though it was a big step for me to leave out things and acknowledge that some things are not necessary or interesting enough for the report, I now see how much it has helped me focus and how it makes my conclusions and findings much stronger and clearer.

However, aside from all of the latter, the thing that has taught me most during the graduation project is focus. ‘Focus’ has been the guiding word during the project, while this is something I have always struggled with, especially when I need to stick to a page limit. My coaches have helped me so much in doing this. Even though it was a big step for me to leave out things and acknowledge that some things are not necessary or interesting enough for the report, I now see how much it has helped me focus and how it makes my conclusions and findings much stronger and clearer.

The STRIK experience
Throughout the entire graduation project I was kept free to do whatever I wanted. Data was available at any moment, I simply needed to show initiative to get it. I have gotten to know many people that are somehow related to the company and learned so much about why STRIK does something the way they do. This is something I would have never be able to learn in such a short time-span if I were to simply work at STRIK. Moreover, in collecting as much data as possible, I found even more interesting opportunities for improvements along the way. I am proud to take all of these learnings and personal developments into my next phase of working at STRIK and possibly taking over the company in the far future. And in case this graduation report would end up in the to-do-pile here as well, I can now own-handedly make sure the insights and findings from the thesis will be wisely used.

References

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APPENDIX 1

INTERVIEW TRANSCRIPT ASI - CEO 1

Interviewee: Freda Hinkle

Interviewer: Ted Knapp

Participant: CEO 1 (ASI)

1. Introduction:

Ted: Good evening. I hope you're all here. It's great to see so many people.

Freda: Thank you, Ted. I'm delighted to be here. I think we have a very interesting topic to discuss today.

Ted: Absolutely. Let's get started.

2. Main topics:

Freda: Sure, let's talk about the data collection during the Discover & Define phase of our project.

Ted: What kind of data are we collecting?

Freda: We're collecting information on the implementation criteria, the company ecosystem, social activities, and energy and material flow.

Ted: Can you give us an example of how this data is being collected?

Freda: We've been using a deductive approach with pre-determined categories to code the interview transcripts.

Ted: And what are some of the main findings from this data?

Freda: Well, some of the key findings include the importance of collaboration between different stakeholders, the need for efficient communication, and the role of technology in facilitating data collection.

Ted: Thank you for sharing these insights with us.

3. Conclusion:

Ted: That's all from me. Thank you, Freda, for your contribution to our discussion.

Freda: My pleasure. I'm always happy to share my thoughts and experiences.

Ted: And that concludes our session. Thank you all for attending.

Freda: Thank you for having me.

Ted: Goodbye.
1. General company observations
### Specific department observations

#### ACTIVITIES
- Preparing orders for distribution
  - Bakery in Malden, logistics department
  - Early in the morning between 06:00 and 12:00
  - Inside
  - Inside
  - Close
- Processing orders for the next day
  - Bakery in Malden, office
  - During the day between 13:00 and 17:00
  - Inside
  - Customer
  - Employee
  - Outside

#### ENVIRONMENTS
- Preparing orders for distribution
  - Bakery in Malden, logistics department
  - Early in the morning between 06:00 and 12:00
  - Inside
  - Close
  - Inside
  - High concentration necessary
- Processing orders for the next day
  - Bakery in Malden, office
  - During the day between 13:00 and 17:00
  - Inside
  - Outside
  - Customer

#### INTERACTIONS
- Preparing orders for distribution
  - One CEO loads logistics, other prep for bakery. First courier leaves the building before 07:00. If the loading is done, the courier driver does not know where the goods are.
  - All orders are packed, then checked by the logistics manager. The orders are then delivered to the couriers.
  - The courier driver does not know where to go.
- Processing orders for the next day
  - Preparing orders for distribution
    - Online: the courier driver gets a list of orders to deliver.
    - Inside: the courier driver gets a list of orders to deliver.

#### OBJECTS
- Preparing orders for distribution
  - A2B orders are packed in specific packaging, different than those from B2C or B2B.
  - The courier driver gets a list of orders to deliver.
- Processing orders for the next day
  - All orders are picked up by the courier driver.
  - The courier driver gets a list of orders to deliver.

#### USERS
- Preparing orders for distribution
  - Logistics manager (CEO)
  - Couriers
- Processing orders for the next day
  - Logistics manager (CEO)
  - Customers
  - Couriers
  - Employees
Is the courier here yet? When the store is filled with customers, the customer is here... One does the serving of customer.

In the store, we have two tasks. One does the relationship with our customers. It's nice to know what they're up to, and all of the other products are placed stock, ready to sell. The tables and chairs are put in place and the door is opened. The couriers have also delivered the orders that get picked up by the store employees so they can start with turning on the machinery and lights. They do this directly connected to the order processing system in the bakery where the logistics employee processes the order in the afternoon.

A lot of loyal customers come to the store early. Either to pick up orders or to purchase products. Most purchases in the morning are bread-related. The products are usually bread rolls or other items. These are also picked up in the morning. Store employees need to deal with customer complaints and customer ordering. They use the cash-register system to process the orders as this is directly connected to the order processing system in the bakery where the logistics employee processes the order in the afternoon.

At the Koornmarkt store, a lot of customers come to drink a coffee and have lunch while ordering a sandwich. These need to be served by the store employees. A lot of customers order food that is prepared in the store, such as coffee cookies and pastries. They do this directly with the suppliers or to the CEO. Ordering is done throughout the day. However, food stock ordering has to be done before 10:00 in this ordering system.

The store employees take initiative in contacting the CEO and suppliers for maintaining the stock.
4. Garbage analysis

Ethnographic observations from garbage disposal, combining data from all stores and the bakery

Ziekerstraat: Total collected food waste in 1 week: 5.6 kg + 7 filled crates of about 3 kg shipped back to the bakery. Mostly filled with bosehe bollen, vlaaien and cakes. According to employees an average disposal of around 3 entire loafs of bread per day.

Heyendaal: Total collected food waste in 1 week: 5.4 kg + 4 filled crates of about 3 kg shipped back to the bakery. About 4 entire loads per day of bread waste on average.

Wijchen: Total collected food waste in 1 week: 6.2 kg + 5 filled crates of about 3 kg shipped back to the bakery. About 4 entire loafs per day of bread waste on average.

Bakery: Total collected food waste in bins: 31 kg (excluding waste from stores). Mainly because of heavy materials (dough, cream, et cetera).

CONCLUSION: the numbers show that each store throws away about 40-50 kg of food waste per week of. This is in line with the 12,000 kg food waste calculated in the energy and material flow of analysis 5 (considering these numbers are from 4 stores and 1 bakery). Specific waste depends per day and per season as well (the latter especially in the bakery).
APPENDIX 2

supporting the implementation criteria

A: ADDITIONAL FACEBOOK

QUESTIONNAIRE OUTPUT - BRAND IDENTITY

Strik Patisserie

Waar denken jullie aan als je aan Strik denkt? Lost het ons weten in de comments, we zijn erg benieuwd!!

F01 nostalgic memory

Dat jullie eige zaterdag of laatste openingdag voor de feestdagen de winkelreis knappen konden voor ons een echte romantisch feesten was dat.

View 1 more reply

F02 fast

Dan hadden jullie alles weer vers als jullie weer open gingen.

F03 fast

F04 fast

View 1 more reply

Like Reply Message: 6w

F05 fast

Echt alles super lekker met een heerlijk kopje koffie.

Like Reply Message: 6w

F06 fast

De aller aller aller leukste topmee van Nederland: Strik.

Like Reply Message: 6w

F07 fast

Aan mijn schoenmaak. Die zocht altijd wel een reden om gezad bij Strik te komen.

Like Reply Message: 6w

F08 fast

Ik denk dan aan al dat heerlijke geur wat ze hebben en hoe mooi ze er al zijn te lopen.

Like Reply Message: 6w

F09 fast

Aan de heerlijke chocolade poffels die niet maar in het assortiment zitten! gemaakt worden.

Like Reply Message: 6w

F10 fast

Strik Patisserie Wie weet kwam ze ooit nog terug! Vannn!! We namen het mee in de assortiment vergaderingen.

Like Reply Message: 6w

F11 fast

Aan een echt manneken paard van goede kwaliteit.

Like Reply Message: 6w

F12 fast

Aan de lekkerste taartjes die An CAW.

Like Reply Message: 6w

F13 fast

Aan de heerlijkste kruimels. Foto heerlijk, ver.
According to the RTL Nieuws (2017), based on numbers from the Central Bureau of Statistics, “the elderlies are wealthier than ever”. And not only wealthier, but also healthier (in ‘t Veld, 2018). Women tend to live another 21 years as from 65 years old, and men another 19 on average (ibid.). This is one the reasons we have almost 3.2 million 65+ elderlies living in the Netherlands, 779,000 of which are even over 80 years old (Volksgezondheidszorg, 2018 - based on statistics from the Centraal Bureau Statistiek). The group of 65+ elderly have increased from 6% in the 19th century to 18% in the 20th century (ibid). Even though not all of the elderly experience this ‘becoming wealthier’ development, as those closer to 79 experience a much worse financial position coping with insurance costs and low retirement incomes (Skipr, 2017; Van der Meer, 2016). This means that the financial position within the elderly group differs significantly, with 35% having no savings at all, but 20% having over 30,000€ of savings (Nibud, 2018). Those between 65 and 70 have on average most to spend (Nibud, 2016), especially the coupled elderly closer to 65 that own the property they live in seem to be able to spend more and experience a wealthier and richer living situation (Nibud, 2018). This means that the ‘baby boomers’ under the elderly (65-73 years old) are considered the ‘wealthiest’ group within the group of elderly. Baby boomers are those people born between 1946 and 1964. This generation is known for their characteristics that they value a good price-quality ratio and have on average more time to do their shopping (Markteffect.nl, 2018). They are very price-conscious and are sensitive to honest and transparent information. They do less often groceries and prefer trustworthy brands because they value product quality (ibid). And for these trustworthy brands they have created a loyalty that makes it hard for competing brands to win them over (Neijland, 2017). The relationship is very important to these baby boomers, and they are very much willing to pay a little bit extra money for a good product and comfortable service (ibid). Personal attention is key to winning them over and with the right kind of attention stores can attract customers for life with these baby boomers. The activity becomes, the older they get, subordinate to the social activity (Neijland, 2017). Combining this with insights from the field observations and interviews (Appendix 1-A, interview A01&A02; Appendix 2-A, general observations, diary 2), a persona is created to represent the ‘elderly’ target group of STRIK. The persona is shown on the following page.

Esther and Jaap have been together since 1967. They met each other through high school in Nijmegen and stayed together every since. Jaap studied for real estate and Esther was a elementary school teacher. Esther started working less when they had their two children, Jaap retired at the age of 66 and Ingrid retired 2 years ago. Together they have a monthly spendable income of 3200 Euros. In a few years they will have paid off the mortgage on their house and have some savings left to spend on extras and their grandchildren. They love taking their grandchildren out to do fun things and spoil them whenever they can. They often go for a long walk through the park to get some exercise and fresh air, followed by a nice cup of coffee and tasty snack.

PERSONA, based on:
Field observations (Appendix 1-B, general observation diary 2) and personal impressions based on these.
Backed up by secondary data

€3200,- / mnth
enjoy life
routine shopping with in-store experience
exercise through out-door walks
spoiling grand children

PERSONA, based on:
Field observations (Appendix 1-B, general observation diary 2) and personal impressions based on these.
Backed up by secondary data

Esther (67) & Jaap (69)

picture: unsplash
YOUNG FAMILIES

According to numbers from the Centraal Bureau voor de Statistiek (2018b) there are 1,2 couples with younger children in the Netherlands. The biggest group amongst these are those of which one of the partners works full-time and the other works part-time (59.7%). These “dual earners” with children have a spendable monthly income of €3420. And with that, women are adding more and more to the couples’ monthly income (Centraal Bureau voor de Statistiek, 2017; 2018a). In 2016, 34% of the monthly income from dual earners with children came from the working women, which is 5% more than in 2006 (ibid). Dual earning couples with children spend about 48.000€ on yearly basis (Centraal Bureau voor de Statistiek, 2018b). Because of the lower fixed costs, dual earning couples spend more on food and recreational stuff (ibid). These couples with younger children fall within generation Y (born between 1980 and 2000). According to Sov.nl (n.d.), generation Y is known as the ‘foodies’ of which 80% wants to know where his food comes from and how it’s produced and 75% wants to try new food trends. 51% even avoids fast-food. Now that they have a job and children, they are looking for the most efficient shopping experience, as this generation lives a busy life with barely any time for groceries or other shopping habits (Markteffect.nl, 2018). Despite this, this generation does find himself regularly at specialty stores looking for the most efficient shopping experience, as this generation lives a busy life with barely any time for groceries or other shopping habits (Markteffect.nl, 2018). Manager of Marketing and Communication at the Dutch Bakery Centre (NBC) stated in Bakkersinbedrijf (2018): “there exists a growing group of consumers, mainly those young families with children of which both parents are working. For them, food is more than just filling a stomach. It has become a lifestyle for them, and they are willing to pay a price for that”. So despite their busy working lifes, Millennials are compensating by searching for shopping experiences, especially for food. In-store field observations and employee conversations supports these findings (Appendix 1-B, general observation, diary 2, employee S01). The work-life blend of these Millennials is very much encouraged by their ‘framily’, their network of friends and family. In contrary to baby boomers, this generation is not very brand loyal, simply because they know what else is “out there” (Neijland, 2017). The city is like a magnet to them, because everything is within reach, just the way they like it (ibid). They also prefer a somewhat healthier lifestyle, and according to research from the FleishmanHillard Fishburn (FFH), as mentioned by Duurzaamnieuws (2018): “93% of the millennials want to buy from companies that are target-focused, sustainable and environmentally conscious”. Maybe even more shocking, this same research emphasized that 56% of the millennials scrap companies of their list that are not operating in a sustainable way. Aside from this, millennials are creative, better informed, higher educated, entrepreneurial and more critical than previous generations (Kidsenjongeren.nl, 2016). All of the latter is combined into a representing persona on the next page.

Eva (34)

Eva (34) is mom of Kae (2) and Levi (3 months). She works part-time as Social Media Marketeer at a company in Nijmegen. Her fiancé, Robbert, works full-time as sales expert for Adecco. They met each other through mutual friends and decided to live together after a relationship of 3 years. Together they bring about €3500 to the table, of which part goes to the mortgage and other fixed costs, and part gets saved for later. Eva likes to do fitness in her spare time. She prefers a healthy lifestyle, but also wants to enjoy herself once a while, preferably in the surroundings of friends and family. She is often busy with work or with the kids, so she usually does her usual weekly grocery shopping right after going to the gym in the city centre at the nearest place possible. In the weekends she prefers going to the Eko plaza for her groceries, after which she sometimes makes a stop at the local bakery for some afternoon snacks, whenever friends and family are coming over. Eva always takes Kae and Levi to do her groceries, and likes to treat them once in a while. Eva prefers a healthy balance between her work and her personal life, so doing things together with Robbert or her friends is a must. She likes the independency of her own income, but also likes to spend it on things that give her joy. Lastly, sustainability plays an important role for Eva. She prefers taking the bike to her work or the city centre and invests her time in online shopping at sustainable brands.
C: BRANCHE TREND ANALYSIS ACCORDING TO DEPEST

A trend analysis could be interesting for STRIK to understand which trends to focus on in terms of innovation and growth, especially within the bakery industry. To create structure in discovering and presenting interesting trends, the DEPEST analysis tool is used as guidance (Van Boeijen et al., 2014) in addition to a set of product- and packaging related trends within the bakery industry. Figure 12 represents the collection of relevant filtered-out trends for STRIK. Such trends could be used to combine with innovative circularity initiatives in order to create a more attractive and viable recommendation as the environmental value gets increased.

From the thorough research, the trends that kept returning was ‘healthy food’, and especially ‘enjoying a healthy moment’ (Marktdata.nl, 2017; Dekker, 2017; Gommans, 2018; van der Werff, 2019). That means less sugar, less salt, more multigrain breads and more biological ingredients used in products. According to one of STRIK’s co-owners (Appendix I-A, interview A02) the purchase behaviour towards sugar-free products did change over the past years, with not only a visible increase of sold sugar-free products, but also an increased demand of such healthy products. However, STRIK does not believe that the biggest group of customers will continue coming to STRIK to enjoy a tasteful product despite its calories or salt-level. It is important coming to STRIK to enjoy a tasteful product (Marktdata.nl, 2017; Bakkersinbedrijf, 2018; Lindner & Maes, 2018; Schaap, 2019; Ordermentum Insights, 2019). Next to healthier products, trends are shifting towards sustainable products as well. And not only in terms of using less packaging, but also through diminishing food waste and making more use of local products (Marktdata.nl, 2017; van der Werff, 2019).

Other trendwatchers mentioned the importance of closely managing the younger consumer groups. Demographics are changing and with that consumer groups are becoming more and more specific and difficult to target even though these consumers are willing to spend money on the food-related products they purchase (Sonneweld.com, 2019; Bakkersinbedrijf, 2018; Retailinsiders.nl, 2019; fin.ni, 2017).

To conclude, there exist many interesting trends within the bakery industry that could be interesting for innovation and company growth. This overview will be used throughout the idea generation phase to make circularity implementations more desirable, feasible, visible and possibly more financially attractive.
APPENDIX 3
supporting the triple layered business model canvas

A: THE ECONOMIC LAYER

PARTNERS

The key partners for STRIK mainly consist of suppliers. It is the common buyer-supplier partnership that assures that you have a reliable source of supplies (Anastasia, 2015). These suppliers are not only the most obvious suppliers that deliver ingredients on a weekly basis, such as Beko, Hovenaar, Van Bijlak or ‘t Kruisennest, but also the important supplier of the software system (Martti Otao), the supplier of chocolate products (Van Nuen, Zingg & Dragee), the window decorator (Decora), the interior designer (Koning), the waste processor (M&M), the graphic designer (Studio Voorhuis), the printing studio (DM Prints), the refrigeration supplier (Janssen) and the overall product, ingredient and service supplier Hanos.

However, aside from the supplier partnerships, they also have very important partnerships with bakeries located all around the country through a collaborative association of bakers called ‘Patisserie College’. They purchase through a collaborative association of bakers located all around the country with bakeries according to the archetypes from Anastasia (2015). This means that there are certain key activities that are equal for each archetype. For production for example, this includes the product development, quality assessment and distribution, while for sales this includes for example the customer service, handling problems and assisting in sales. The concluding main activities include:

- Production
- Inbound logistics
- Outbound logistics
- Sales & Marketing
- Human Resources

ACTIVITIES

STRIK falls under the archetype of production and sales according to the archetypes from Anastasia (2015). This means that there are certain key activities that are equal for each archetype. For production for example, this includes the product development, quality assessment and distribution, while for sales this includes for example the customer service, handling problems and assisting in sales. The concluding main activities include:

RESOURCES

According to Anastasia (2015), key resources are “the main input that a company uses to create the value proposition, service its customer segment and deliver the product to the customer”. The four types of resources are physical resources (e.g. equipment, inventory, building, manufacturing plans), intellectual resources (e.g. brand, customer knowledge, copyrights, partnerships), human resources (e.g. employees) and financial resources (e.g. cash, credit). STRIK could benefit from using more of their intellectual resources of employee expertise while focusing on establishing suitable partnerships that benefit them in terms of time and effort release.

COSTS

STRIK does not closely manage the specifics of their costs, but does closely manage the overall cashflow. The CEO manages all costs and operates from a profit-driven mindset [Appendix 1-A, interview A01]. However, while manufacturing, inbound logistics, product design and product packaging are closely managed within the product cost-price, outbound logistics and marketing are not closely managed (Personal impressions from the general ethnographic research, appendix 1-B, diary 1 & 2). And these costs are very important to consider as they can have a great impact on the eventual profits. An example: a B2C customer ordered a cake of 25€ with the ‘standard delivery costs’ through the website. STRIK had to personally deliver it, because the location was not on route, resulting in a special delivery for an order of only 25€ [Appendix 1-B, specific observations, template 2]. These observations imply that STRIK closely manages their fixed and direct product-related costs, but should also focus more on the variable and indirect costs.

VALUE PROPOSITION

The value proposition is derived based on the value positioning from the company analysis (page 23). It includes a combination of what STRIK wants to offer its customers and for what reason the customers go to STRIK. The value propositioning is as follows:

“For wealthy elderly and wealthy young families, STRIK offers unique, craft pastries that are tasty and of high-quality, and give people a feeling of celebrating life to free themselves from their busy day-to-day life together with friends and family”.

RELATIONS

Relations focus on how to maintain the relationships with various customer segments (Anastasia, 2015). STRIK maintains these relationships in various ways. The bigger B2B customers are very important to STRIK. They clearly have found ways to maintain these relationship through for example customization, personal relationships, specific packaging rules, certain contracts, et cetera. However, they also try to make their B2C customer more loyal by providing for example customization in products, loyalty programmes and investing in personal relationships of employees. Usually, the relations are depending on 3 motivations: acquisition, retention or up-selling (Anastasia, 2015).

CHANNELS

According to Anastasia (2015), channels can be categorised into marketing, sales and distribution channels. Strik mainly uses the common channels for marketing and sales, such as social media, phone, website and in-store. However, there is another channel through which STRIK reaches their customers, which is through STRIK-brand retailers. These are B2B customers that re-sell STRIK products under the name of STRIK. The opposite type of B2B customers are own-brand customers, who sell STRIK products under their own name. These customers are not a channel of STRIK, as customers are not reached through them.

REVENUES

The CEO has a profit-driven mindset [Appendix 1-A, interview A01], which means that revenues are very important. There are usually two categories of revenue streams, the transaction revenue and the recurring revenue (Anastasia, 2015). STRIK has a transaction revenue model with fixed pricing as customers have a one-time payment for the product. Prices are fixed, but do change based on volume, customer segment and product feature. To increase revenues, STRIK mainly focuses on increasing the sales in-store as these provide the highest margins.

Appendix 3-A provides the data on which this layer’s insights and conclusions were build.
**SUPPLIES AND OUTSOURCING**

Supplies and outsourcing refers to “all the other various material and production activities that are necessary for the functional value but not considered ‘core’ to the organization” (Joyce & Paquin, 2016). One of these is for example packaging. It is key to getting the product from production to the end-consumer, but it is not necessary in order to consume the functional value (the product itself). Other important materials are water, gas and electricity. These are necessary to make the functional value, but not core in using or consuming the functional value. Based on the insights, together with the overview of materials, the use phase, the end-of-life and production, a material & energy flow was analysed.

**FUNCTIONAL VALUE**

According to Joyce & Paquin (2016) “functional value describes the “focal outputs of a service”. This includes all of the sold goods to customers. However, for STRIK, this is extremely difficult to calculate because of several different factors. First, the specific sales are not registered correctly. They do have a cash register system, but these are only the ingredients STRIK processes into new products itself, so these do not include the ingredients used in end-products they purchase from suppliers. Based on these insights, together with the overview of production, the end-use phase, the end-of-life and production, a material energy flow was analysed.

**MATERIALS**

According to Joyce & Paquin (2016), “materials refer to the biophysical stocks used to render the functional value”. They mention that introducing all materials into the canvas is not relevant, as the main aim is to select only the key materials to the organization and determine their environmental impact (Joyce & Paquin, 2016). Considering the functional value, the key materials are the products’ ingredients. It is important to consider which ingredients are most used within the production. The total numbers from suppliers show the key raw materials of dairy, flower, sugar, fruit and meat. These are the only ingredients STRIK processes into new products itself, so these do not include the ingredients used in end-products they purchase from suppliers. Based on these insights, together with the overview of production, the use phase, the end-of-life and production, a material & energy flow was analysed.

**END-OF-LIFE**

According to Joyce & Paquin (2016): “End-of-life is when the client chooses to end the consumption of the functional value and often entails issues of material reuse such as re-manufacturing, re-purposing, recycling, disassembly, incineration or disposal of a product”. In the case of STRIK, there is little to no effort in trying to recycle, reduce or reuse products. A stream of waste that often entails issues of material reuse such as the packaging, ingredient usage, disposal or energy and water usage from production (Joyce & Paquin, 2016). It is important to distinguish different usage stages and calculate their impact in order to understand how a new circular business model could benefit the company. The product journey and company ecosystem from the previous layer were used to distinguish key use phases. From this, it can be concluded that production, storage (refrigeration, disposal, packaging and transportation) are key use phases. However, production, preparation and transportation are already considered in other steps as these include the usage of gas, water, electricity and distribution. A remarkable use phase that keeps returning in every part of the ecosystem is storing the food, and specifically freezing and cooling. For this reason, refrigeration is considered a key use phase. In order to further calculate the impact of this usage, the distribution, environmental impact and environmental benefits, the emission inventory is calculated.

**FUNCTIONAL IMPACTS**

“Environmental impacts component addresses the ecological costs of the organization's actions” (Joyce & Paquin, 2016). While Joyce & Paquin (2014) recommend using the LCA method within their canvas, this project focuses on the carbon footprint, as was mentioned before. This means that the ecological costs in terms of human health, ecosystem impact, water usage, resource depletion, etc. are not taken into account. The environmental impacts will merely focus on estimating the CO₂, equivalent per category. Moreover, because it is difficult to obtain data, each category is specific in what is and what is not taken into account. The next pages describe the CO₂ calculations per category in detail.

**ENERGY & MATERIAL FLOW**

**PACKAGING, WATER, GAS, ELECTRICITY, INGREDIENTS**
**Explanation per category**

**INGREDIENTS**

It is commonly known that meat, and especially beef, is one of the largest polluters of our environment (milieucentraal.nl, 2019a). Contact with STRIK’s meat supplier Aarnoutse explained an average order of 13.5 kg half-and-half minced meat per week. This means that on a yearly basis, STRIK orders about 702 kg of minced meat. Company data collected about the total sold goods per store reveal that STRIK produces 18,779 saucijzenbroodjes and risolles (saucijzenbroodje with cheese) per year. This product is the main cause of our environment (milieucentraal.nl, 2019a). It is commonly known that meat, and especially beef, is one of the largest polluters of our environment (milieucentraal.nl, 2019a). Contact with STRIK’s meat supplier Aarnoutse explained an average order of 13.5 kg half-and-half minced meat per week. This means that on a yearly basis, STRIK orders about 702 kg of minced meat. Company data collected about the total sold goods per store reveal that STRIK produces 18,779 saucijzenbroodjes and risolles (saucijzenbroodje with cheese) per year. This product is the main cause of our environment (milieucentraal.nl, 2019a).

Numbers from supplier Beko revealed that there are several dairy-using products that STRIK often orders. Milk & cream is one of the largest, with a yearly purchase of about 20.482 kg, not even including the milk & cream that is already processed in other end-products ordered. Moreover, STRIK yearly purchases about 8.660 kg of butter. Both of these dairy products have an emission factor of 2.0 (milk) and 11.4 (butter) kg CO\textsubscript{2}eq/kg (Blank consultants, 2019). Other ingredients that seem to be key for STRIK’s production are egg, sugar and wheat/four, with emission factors of 3.6 (egg), 0.48 (sugar) and 2.3 (wheat) kg CO\textsubscript{2}eq/kg product (van Goor den Held, 2018; Rijanieme et al., 2011).

A final important supplier is Van Eldijk, which delivers fresh fruit almost every day. Yearly numbers from van Eldijk revealed a total of 2,278 kg fresh fruit ordered yearly, with a rather low emission factor of 0.5 kg CO\textsubscript{2}eq/kg fruit according to Blank consultants (2019). With all of this data, an overview of emission per key ingredient can be calculated (figure 13). It is important to mention that the emission factors were determined based on a cradle-to-cradle approach. This, because these ingredients are further processed by STRIK into new end-products, so including the emission from consumption of these ingredients would not be realistic.

![Figure 13: Key ingredients compared based on weight, emission, emission factor and costs](image)

The most crucial part of the ‘storing’ section includes the refrigerating and freezing of products. According to Climate smart (2014) “refrigerant emissions vary greatly and can account for up to 90% of emissions for some businesses”. That is why the refrigerant category is often an area where businesses can make a real difference in reducing not only their power bill savings, but also their greenhouse gas emission (ibid.). Both the direct emissions, those related to refrigerant leakage, and the indirect emissions, resulting from primary energy consumption, have a significant impact on the environment (Abdelaziz et al., 2012). Each refrigerant-using machine differs in terms of used gasses, charge rate, leaking percentage, et cetera in a way that the manufacturing process, the leakage over the operational life of the equipment, and the disposal at the end of the useful life of the equipment determines the HFC and PFC emissions (Greenhousegas protocol, 2005). And these gases have 100-year Global Warming Potentials (GWP), which are 140 to 11,700 times that of CO\textsubscript{2} according to the Greenhouse gas Protocol. In other words, their potential impact on climate change can be so significant that any reduction of these gases can have a large potential benefit (Greenhousegas Protocol, 2005).

Contact with STRIK’s own refrigerant supplier mr. Berns, from Berns Machines b.v. expert in cooling- and freezing systems, explained the current situation in the Netherlands about refrigerants. According to him, “every refrigerant has its own input to the CO\textsubscript{2} effects and thus global warming”. Moreover, Berns explained that the most important numbers for determining the impact are the GWP values, depending on the type of refrigerant used, and the amount of charge necessary. “If you multiply the GWP values by the refrigerant charge, you get the ‘nominal refrigerant refill’”. This value determines how often the machine needs to be checked and if they need to be checked. According to Stek (2017), the lower boundary for yearly check is 1 Tonnes of CO\textsubscript{2} equivalent. If the CO\textsubscript{2} equivalent exceeds this number, the system or machine needs to be checked every year. If the CO\textsubscript{2} equivalent exceeds 5 Tonnes, it needs to be checked twice per year and if it exceeds 500 Tonnes, it needs to be checked 4 times per year. If the system has a leakage detection system, the number for checking can be halved (Stek, 2017). In order to understand the impact the machinery and cooling systems of STRIK are having, a complete list of refrigerant-using systems was made per store, calculating the CO\textsubscript{2} equivalent. Of those that are significantly high enough to be needing yearly checks, the data is provided by the supplier in order to determine the actual emission of the refrigerants. The calculation list of the biggest using relevant equipment and their emission is shown in graph 4. This table gives an overview of types of refrigerant using equipment, their GWP values and the matching leakage values, all guided by a template from the Greenhouse Gas Protocol (2015a). This template however gives leakage percentages per type of equipment in a very wide range. Based on information from expert Berns about service checks...
and detected leaks, for each equipment and assembly are not included due to a lack of reliable information. Moreover, this overview is merely an indication of the effects of refrigerants used, so including only operational aspects will fulfill the purpose. A total emission of 12,022kg CO₂ equivalent on a yearly base can be concluded from these calculations.

From the company ecosystem analysis (layer I of the TLBMC) can be concluded that all waste gets transported back to the bakery where it gets combined and collected. Part goes to waste collector and assembled for producing new food products. M&M waste processor Rutten mentioned "STRIK has two waste streams that we process, one of which is 'general waste' and the other is 'paper waste'." According to numbers provided by M&M, STRIK disposes about 23,176kg of general waste and 7,311 kg of cardboard waste each year for a total price of €4356.60. The garbage analysis ethnographic observations imply that the general waste of 23,176 kg consists of 40% paper, 20% plastic, 15% other waste and a big 30% food, mainly due to the large weight of food waste compared to cardboard and plastic. All of this waste gets transported to the landfills and burned. According to waste processor Rutten, over 90% of the collected landfill-waste goes directly to the ARN in Weurt. Waste emissions can be calculated in various ways. It can be done with the ‘supplier-specific method’, the ‘waste-type-specific method’ of the ‘average-data method’ or the ‘average-data method’ in order to make recycling economically feasible, recycled products and materials must have a market’.

The garbage analysis revealed that there is barely any cardboard waste from STRIK’s own packaging in the cardboard waste stream, neither is there in the general waste stream. This implies that mainly the consumers are accountable for the disposal of STRIK’s food packaging. However, that does not mean that STRIK is held unaccountable for the emission due to packaging usage.
Packaging is considered an important part of the supplies & outsource section from layer 2 of the BMC. The following section will dive deeper into the packaging usage of STRIK. Moreover, both in the bakery as well as in the stores the paper waste share in terms of volume within the general waste stream is significantly high. It consists mainly of fat-free sheet paper, baking paper and cleaning paper coming from the bakery, but also some milk trays, printed paper (which are eco-labelled) and napkins coming from the stores. Many of these paper types are not suitable for recycling, as they have been exposed to foods and beverages (Mielieubarometer.nl, 2019b), but some types can be recycled.

In order to calculate the emission from disposed paper and cardboard waste, an estimation was made based on the types of paper and their share within the waste stream. The emission factors were determined based on the milieubarometer.nl (2016). These numbers show an emission factor of 1.21 for regular paper and 0.0060 for eco-labelled paper. According to the packaging information from the paper types, only print and poster paper have an eco-label, while all of the others can be categorized under the 1.21 emission factor. With this, a total emission of 8.975 kg CO₂ eq was concluded (graph 6) for the paper waste within the general waste stream, taking into account all life cycle stages from production to usage (Mielieubarometer.nl, 2016).

2: Plastic waste
The plastic waste from the stores are mainly coming from STRIK’s own plastic packaging while the plastic waste from the bakery is mainly from suppliers’ packaging (ethnographic observations, garbage analysis, Appendix 1-B). This implies that a generalized emission factor for specifically plastic packaging from Sevenster (2007) could be used as the waste stream merely consists of packaging plastics. This emission factor takes into account every stage from the cultivation of raw materials to manufacturing and producing and eventually the waste processing. The total CO₂ emission is calculated in graph 7 and concludes a total emission of 16.005 kg CO₂ eq for plastic waste within the general waste stream. Even though this emission factor includes that part of the plastic that gets recycled, even though STRIK does not recycle its plastic, and moreover numbers are from over a decade ago, it does give an indication of the CO₂ waste from plastic usage.

3: Food waste
As mentioned before, food waste accounts for 30% of the total general waste stream. This is mainly due to the heavy weight of food waste compared to cardboard or plastic (ethnographic observations, garbage analysis, Appendix 1-B). From these numbers can be concluded that 6,953 kg of food waste is burned at the landfills (30% of 23,176 kg general waste). However, the food waste stream of STRIK consists of more than simply the part that gets disposed with the general waste. Waste is usually a large emission source for food businesses, not only due to the internal waste the company generates, but also because of the indirect (unnecessary) organic waste that gets disposed by the customers at home (Climate smart, 2014). Moreover, a third stream of food waste gets reused by STRIK itself for making ‘kruidcakes’.

A kruidcake is a cake made especially from wasted pastry products. Company data concluded a total yearly production of ±3,200 kg of kruidcakes. The kruidcake recipe (according to STRIK’s bakers), uses 67% wasted pastry products. With the given that a kruidcake weighs about 480 gram, one can conclude a total reusage of 1,030 kg food waste. Part of the reason not all food is reused for kruidcakes is because some products cannot be used, such as products made from whipped cream or custard (ethnographic observations, garbage analysis, Appendix 1-B). On the other hand, some store employees are more dedicated to shipping back unusable products for reusing than others who easily throw away products that could still be useful in a way (ethnographic observations, garbage analysis, Appendix 1-B).

Finally, most of the bread loafs wasted get donated to local animal farms, as was mentioned before. All of this means that STRIK has 4 main waste streams:
- the part that gets disposed by STRIK itself
- the part that gets disposed by consumers at home
- the part that gets reused in products
- the part that gets donated to local farms

According to the Dutch Central Bureau of the Environment, as mentioned before, the top 3 products that have the biggest impact on the environment if disposed are meat, dairy and bread (Mieliebarucentraal, 2019). These three product categories count for 30% of the total environmental impact of waste (Ibid.). Even though dairy and meat are included in the ‘ingredients’ section, they will not be included in the waste emission calculation, simply because of the lack of data available about the share of ingredients within the waste. In the case of bread, however, there is more data available on usage and waste. Therefore, the ‘food waste’ section includes:
1) the entire end-of-life emission for STRIK’s wasted bread; 2) the emission from burning consumers’ estimated bread waste; and 3) the emission from burning part of STRIK’s own ‘other’ food waste. Overall, only those sectors will be included that are considered unnecessary and controllable by STRIK.

1) the entire end-of-life emission for STRIK’s wasted bread

According to STRIK’s CEO, STRIK throws away about 7% of all the bread they buy and produce (Appendix 1-B, general observations, diary 1). From the company data on yearly bread purchase numbers and order processing numbers can be concluded that STRIK processed almost 75,000 kg of bread into their ordering system.
Considering the internal disposal rate of 7%, a total waste of 5,200 kg of bread on a yearly basis can be assumed. Most of this bread waste gets picked up by local animal farm keepers, as was mentioned before. When trying to calculate the impact STRIK has with their bread waste, it is important that the entire life cycle, from raw ingredient to end-of-life treatment is included. Espinoza-Orias et al. (2011) is one of the few who calculated the entire greenhouse gas emission from a loaf of bread, concluding a CO2 equivalent between 1,057 and 1,100 kg CO2 per 800 gram loaf of bread. Within this calculation, every stage is taken into account, from raw material cultivation to waste management. This also means that the study takes into account the greenhouse gas emission of ingredients such as wheat, yeast and salt. To add, the study includes processes such as transportation, a 10% consumer waste rate, the emission due to the plastic packaging, freezing and cooling of the bread and even consumer toasting, all according to numbers about existing consumer behaviour and manufacturing processes (Espinoza-Orias et al., 2011). Figure 14 represents the study’s findings per section and the share of each stage within the life cycle of bread. As can be seen, the exact carbon footprint depends strongly on the type of bread, being white, brown or wholemeal. These emission factors were used in order to calculate the emission from STRIK’s bread waste. However, some adjustments were made to the waste management number. While Espinoza-Orias et al. (2011) considers a 10% consumer waste, for 800gr loaf of bread. Those sectors that are cut in half are that of ingredients, consumption, wheat cultivation, waste management and packaging, and the others remain the same as for the 800gr loafs. Finally, only those breads of which STRIK either produces or purchased more than 100 pieces per year are considered. This way the emission factor from Espinoza-Orias et al. (2011) is more accurate as the similarity between the breads calculated by the study and the breads used within this calculation increases.

Figure 14: Carbon footprints of white, wholemeal and brown bread produced according to Espinoza-Orias et al., 2011.

STRIK’s disposed breads a 100% disposal rate can be assumed. This, because the entire loafs of bread are disposed as they are not sold to customers. This does however not mean that the consumption stage can be neglected, because STRIK employees also freeze and heat up bread sometimes, especially when bread tends to not get sold (Appendix I-B, ethnographic observations, garbage analysis), so this stage will still be included even though the customer does not get to use the product. Moreover, as almost all of the loafs of bread currently get donated, adjustments were made so that the waste management is neglected in this section.

STRIK sells more than only loafs of bread, but these products do dominate the bread product range. Therefore, only the loafs of 800g or 400g bread were included and per loaf was determined whether it is white, wholemeal or brown bread. It is however too short-minded to simply divide the emission factor in half for the 400g loafs of bread, because factors like transportation, retail and manufacturing remain the same whether it is a 400 or 800gr loaf of bread. The study from Østergaard & Hanssen (2018) amongst ±1000 Norwegian respondents revealed that a significantly high 97% of consumers reported to change the original packaging of the purchased bread, with the majority replacing the original packaging with a plastic bag, or using both the plastic bag and the original packaging to protect the bread. This same research concluded that 42.1% of the high-wasters would pay over 20 cents extra per loaf of bread for packaging that increases the freshness of the bread at home (Østergaard & Hanssen, 2018).

Considering the latter, it is thus suggested that 20% of the bread purchased by consumers gets disposed. According to Milieucentraal (2019), only 50% of this food waste gets disposed with the organic waste stream, resulting in 50% of this food waste gets disposed with the organic waste stream, resulting in 50% that gets transported to the landfills. With a 7% disposal rate of STRIK’s bread, 93% of the bread does get sold to consumers. Following the same procedure as the previous calculation, but now exclusively focusing on the emission from 50% burned food waste with an emission factor of 0.98 kg CO2 eq/kg food waste, a total emission of 6.129 kg CO2 eq from consumers’ burned read waste can be concluded. Graph 9 presents the calculation including all of the bread products with their weights, type and specific emission factor.
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<td>113</td>
<td>41.5</td>
<td>400</td>
<td>164.08</td>
<td>944,113</td>
<td>156</td>
<td>294.532</td>
</tr>
<tr>
<td>Cranberry bread</td>
<td>49</td>
<td>41.5</td>
<td>400</td>
<td>164.08</td>
<td>944,113</td>
<td>156</td>
<td>294.532</td>
</tr>
</tbody>
</table>

Graph 8: Emission calculation of STK's bread disposal behavior (%)

Graph 9: Emission calculation of consumers' 20% bread disposal behavior (%)
3) the emission from burning part of STRIK’s own ‘other’ food waste
The emission calculation from burning STRIK’s food waste not only focuses on bread. However, it does not take into account the production, ingredients and usage of the non-bread food products either due to lack of available data. Therefore, only the emission from burning the food waste is included. In order to do this correctly, the total of 6.953kg non-bread food waste is considered with an emission rate of 0.98 kg CO$_2$ eq/kg food, leading to a total burning emission of 6.814 kg CO$_2$ eq.

To conclude
Adding the 6.814 kg CO$_2$ eq of the emission from STRIK’s burned food waste to the 6.129 kg CO$_2$ eq of the emission from consumers’ bread waste and the 5.368 kg CO$_2$ eq from STRIK’s own bread waste, concludes a total emission of 18.311 kg CO$_2$ eq. Even though this number does not include the full life cycle of the non-bread food products, meaning the number is in reality far over 20k (±40k), it does give insights to the magnitude of the environmental impact of food waste, considering bread waste takes up about 35% of the entire food waste share as a total food waste of 12.361 kg is concluded based on the 6.953 kg food within the general waste stream, the 5.200 kg food going to local animal farms and the 1.030kg food getting re-manufactured into kruidnacks.

To add, as 7% of the bread gets wasted by STRIK, the yearly revenues from the bread suppliers show that STRIK throws away over €10,000,- each year from purchased bread products only. Adding this to the waste processing costs (30% of 4.356,60), a total cost of at least €11.307.16 derives from this unnecessary food waste. Unnecessary food waste is thus a large emission source for STRIK as well, just as Climate smart (2014) stated about food companies.

TRANSPORTATION
As concluded from the usage phase, as well as from the distribution step within the BMC, transportation plays an important part considering the environmental impact of STRIK. According to Chapman (2017), “transport accounts for 26% of global CO$_2$ emissions and is one of the few industrial sectors where emissions are still growing”. Oil is still the dominant fuel source for transportation and road transport accounts for more than 80% of the total energy usage by the transport sector [Chapman, 2017]. Because of this dependency on fossil fuel, road transportation remains a major contributor of greenhouse gases. Even though an inclusive distribution emission calculation would include all of the emission from the distribution of suppliers, to even that of employees and customers. However, the focus is on company-owned vehicles first, as this is something STRIK can more easily control compared to the other categories.

According to department specific observations from the ethnographic research in appendix 1-B, STRIK owns 4 company vans, two light to medium duty transporters and two light duty passenger vans. The transporters are used to deliver orders between 07:00 and 12:00, 6 days per week. The passenger vans are used by STRIK’s management to drive from store to store. According to the mileage numbers per vehicle provided by the supplier for STRIK’s vehicles, both passenger vans drive between 20,000 and 25,000 km per year.

The transporters, however, always drive their own route and return about 2-3 times to reload in the bakery. One of them drives the ‘city route’ and the other the ‘outskirts route’. According to Company Data about the vehicles mileage, the transporter that drives the outskirts route drives about 30,000km per year, and the other transporter about 20,000km per year. Personal impressions from the ethnographic research (Appendix 1-B, department specific observations) have indicated that the efficiency of the routes is very low. At times couriers drive over 50km simply to deliver one order.

In addition, the route planning is done entirely manually by the CEO, without any technological help in efficient route calculations.

The environmental impact of transport is not limited to vehicle emissions only, known as ‘tank to wheel’ (TTW). In fact, the production and distribution of fuel from oil, known as ‘wheels to tank’ (WTT), contributes its own share of greenhouse gases [Weiss et al., 2000; Mizsey & Newsom, 2001; Johansson, 2003]. Both approaches result in a total and inclusive ‘well to wheel’ (WTW) greenhouse gas emission (Chapman, 2017). Calculations are shown in graph 10. These numbers show an emission of 20.365 kg CO$_2$ eq per year. The emission factor for TTW is vehicle-specific and derived from autoweek.nl (2019). The emission factor from WTT is derived form co2missiefactoren.nl (2018), and is dependent on the type of gas and the amount of liters used per year. Within this table, the emission factor of Dutch diesel is used (ANWB.nl, 2019).

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Kms/week</th>
<th>Build year</th>
<th>mileage per oil</th>
<th>mileage last recycled</th>
<th>km/year</th>
<th>Fuel Type</th>
<th>CO2l/100km</th>
<th>CO2l/litre</th>
<th>CO2l/km</th>
<th>CO2l/1000 km</th>
<th>CO2l/10000 km</th>
<th>CO2l/kmhoop</th>
</tr>
</thead>
<tbody>
<tr>
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<td>VF-T73-T</td>
<td>04/2016</td>
<td>122488</td>
<td>0</td>
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<td>D</td>
<td>0.17</td>
<td>5.214</td>
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<td>0.624</td>
<td>1.340</td>
</tr>
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<td>G</td>
<td>0.12</td>
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<td>7.5</td>
<td>0.624</td>
<td>1.000</td>
</tr>
<tr>
<td>Dacia Dokker</td>
<td>VF-S89-L</td>
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<td>0</td>
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<td>F</td>
<td>0.108</td>
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<td>1.269</td>
<td>5.2</td>
<td>0.624</td>
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<td>Volkswagen Caddy</td>
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<td>3.986</td>
<td>1.472</td>
<td>6.5</td>
<td>0.624</td>
<td>0.419</td>
</tr>
</tbody>
</table>

Graph 10: Emission calculation of transportation

PACKAGING
According to several authors, the paper- and cardboard industry is often an underestimated category when considering CO$_2$ emission. Correspondent author Klein Lankhorst (2019) mentions: “the paper industry emits more CO$_2$ than the aviation industry”. In fact, this industry is the third largest emitter of greenhouse gases that contribute to global warming (NRDC, 2006). Once a piece of paper is produced, used and finally disposed to rot away at the landfills, toxic gas methane (CH$_4$) gets emitted, which is four times as harmful as CO$_2$ (van Dis, 2018).
Company data from packaging supplier Havelaar have showed that the yearly amount of packaging purchased by STRIK is 848,928 unique items (Graph 11). Per item is concluded whether it is fully made of cardboard or fully made of plastic or whether the packaging is part plastic and part cardboard, such as cake boxes with a plastic window. These numbers are converted into the total cardboard and plastic weight share by determining the amount of material through product dimensions and calculating this by the specific density per used material. From this, one can conclude that 84% is made from cardboard and 16% is made from plastic which concludes a total of 3,691 kg cardboard and 727 kg plastic ordered on a yearly basis.

Research from Sevenster (2007) concluded cardboard emission factors derived from emission calculation throughout all production stages. They make distinctions per type of cardboard, amongst which food & beverage cardboard is one of them. This type of cardboard is treated and coated so that the packaging consists of PE in addition to the cardboard pulp itself (Sevenster, 2007). STRIK’s cardboard boxes are all treated and coated as well. Moreover, according to contact with Havelaar, none of the packaging consist of any eco labels such as the FSC label or EU-label, which means that a reduction of both the environmental- as well as the social impact of the cardboard is not considered. Even though there could always exist differences compared to reality, the concluded food & beverage cardboard emission factor of 1.18 kg CO₂ eq per kg cardboard is used for STRIK’s packaging, resulting in a total cardboard emission of 4,364 kg CO₂ eq.

Then, as for the plastic share, it is important to consider each type of plastic used. Even though Sevenster (2007) concluded a general emission factor of 3,453 kg CO₂ eq per kg plastic, the calculations are based on the emission from each unique product with its own type of plastic as can be seen in graph 11. This results in a total emission of 2,904 kg CO₂ eq on a yearly basis.

Even though many authors have emphasized that the beneficial function of packaging in terms of reducing food waste outweighs the actual environmental impact of the packaging itself (Østergaard & Hanssen, 2018; Williams & Wikström 2011; Silvenius et al., 2014; Sevenster, 2007), that does not mean the emission of the packaging material should be neglected. Packaging is used to protect food from bacteria and damage but also to provide consumers with nutritional information (Coles 2003; Marsh & Bugusu, 2007). That means that packaging cannot be as easily reduced since it fulfills such an important function. On the other hand, the right packaging can help make consumers behave in a way that they reduce less of their food, aside from the regular food containing function the packaging holds, according to Østergaard & Hanssen (2018). It is important for STRIK to consider not only its own packaging usage, but also the effects of packaging usage and possible improvements of packaging in order to slow the packaged foods’ life cycle.
Gas
The Dutch Government has stated that by 2050, all Dutch households need to be free from gas. Even though this does not necessarily concern the bigger organizations yet, it is inevitable that laws against using gas in industrial usage will follow as well. The reason the government wants to be gas-free is because, as according to the US Environmental Protection Agency (EPA), combustion of fuels in stationary (non-transport) combustion sources results in the emission of the greenhouse gases carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). And as mentioned before, these GHG’s are very harmful to the environment considering their addition to global warmth. That means that in order to establish viable CO₂ reduction implementations, it is important to consider (partly) diminishing the biggest gas users.

In order to calculate the gas usage, the electricity provider Main Energie provided the monthly gas bills of one store and the bakery. However, from the other stores the specific gas usage in unknown because the lot owner combines the usage within the rent bill. The gas usage from the stores in Dukenburg and Wijchen should be about half of that in Ziekerstraat and Heyendaal, whereas Heyendaal and Ziekerstraat use somewhat the same amount of gas each month. With this, graph 12 gives the total CO₂ equivalent emission coming from gas usage, based on company data, concluding a total emission of 43.122 kg CO₂ eq based on a yearly gas usage of 22.816 Nm³. The emission numbers are based on an emission factor for natural gas of 1.89 kg CO₂ per Nm³ gas derived from co2emissiefactoren.nl (2018).

Water
As for water usage, this is an essential element of the material flow. The water usage can be found through the monthly water bills from the water provider. Even though the water itself does no harm, it is merely the processes to clean and rinse the water that have the biggest impact on the environment (van Breda, 2018). However, according to Milieucentraal (2019a), “winning, cleaning and transporting water does cost energy, but water companies already use relatively sustainable sources of energy”. They mention that, even though it is always good to consider your unnecessary water usage, in many cases cold tap water is the most sustainable solution compared to bottled water or warm water (Milieucentraal, 2019a). All of the latter is the case whenever taking a carbon footprint approach. LCA approaches for example do consider water an important source of impact. However, as this project is taking the carbon footprint approach, the water usage is included in the material flow, but excluded from the greenhouse gas emission calculation due to the low environmental impact. From the monthly water bills, a total water usage of 1.649 Nm³ is assumed.

Electricity
As for electricity, Climate smart (2014) pointed out that “electricity, while being a relatively small emission source for businesses in the food industry due to the low emission intensity of BC’s power grid, often corresponds to one of the highest operating costs”. That is why focusing on this area offers some easy and obvious opportunities for cost savings (ibid.). Not to mention that STRIK is already using 100% green energy, according to Main Energy employee Berndsen stating “as for your electricity, this is currently fully green as it is generated through hydropower”. This means the actual emission from electricity usage is significantly low, while the costs are quite high. However, contact with Government representative Wijnakker revealed that the fact that the government’s desire is to be gas-free, “puts a lot of extra weight on the electricity providers, as gas-users will be replaced by electricity users”. According to Wijnakker, the government wants households and companies to eventually use as much resources as they can generate with their zero-waste policy, so there is a balance between what we sustainably generate and use. However, currently the electricity demand is rising because of electrical replacements for gas-users, such as electric cars, electrical ovens and electrical boilers. We are in need of reducing our electricity usage because providers simply cannot handle it anymore if we keep going, which will be a lot more harming to the environment than the generation of ‘non-sustainable’ electricity itself, as they need bigger processors, bigger cables and more central electricity points according to government representative Wijnakker. To conclude, electricity usage does need to be included in the energy and material flow, but can be excluded from the greenhouse gas emission calculations as the actual emission from STRIK’s ‘green’ electricity usage is close to zero (co2emissiefactoren, 2018). Electricity bills from energy supplier Main Elektra concluded a total usage of 451.701 kWh energy per year, with a total cost of €50,503.56.

Graph 12: Emission calculation of gas usage
STRIK does take action in terms of local communities. Most of their suppliers (fruit, bread and meat) are local, small enterprises. Moreover, STRIK donates most of their bread waste to local animal farms. Aside from this, STRIK invests quite some time and effort in local charities, such as charity events or charity foundations. They are always open to people with charity initiatives wanting to work together with STRIK, either by sponsoring or giving price reductions. Moreover, STRIK sponsors local sport clubs and always stimulates activities and communities in the neighbourhoods of their stores. They actively try to be part of these neighbourhoods and offer the local people something they like or even something special (through neighbourhood product offers in the local papers). To conclude, STRIK is very active in terms of local communities and most of the time without a financial incentive.

EMPLOYEES
This section considers the role of employees as a core organizational stakeholder (Joyce & Paquin, 2016). For STRIK, employees are core to the organization. However, unfortunately STRIK does not actively invest in employee trainings or education. This could lead to less employee loyalty, more absence, lower employee satisfaction rate and this way less long-term viability (Joyce & Paquin, 2016). Most of STRIK’s current employees are low to averagely educated with an average age of 45 (Appendix 1-B, general company data). Over 50% of STRIK employees are customer-facing. This means that profits highly depend on employees’ performance. STRIK could benefit significantly from investing more time in their employees’ satisfaction, performance and knowledge.

SOCIAL IMPACTS
According to Joyce & Paquin (2016), “the social impacts component addresses the social costs of an organization”. A frequent discussed social impact of the bakery sector is obviously the threat of obesity amongst consumers and the health problems from such baked products (Wageningen University & Research, 2019). Furthermore, STRIK holds part of the responsibility for the winning of ingredients or traditional baking techniques. With their use of dairy, sugar, fruit and wheat (amongst others), they are partly responsible for how these ingredients were cultivated and produced.

SOCIAL VALUE
According to Joyce & Paquin (2016), “social value speaks to the aspect of an organization’s mission which focuses on creating benefit for its stakeholders and society more broadly”. From this can be concluded that STRIK actively works on providing quality and craftsmanship to customers in order to improve the satisfaction and experience, but even more importantly, to include the communities and neighbourhoods surrounding their stores.

SOCIAL BENEFITS
According to Joyce & Paquin (2016), “the social benefits are the positive social value creating aspects of the organization’s action”. As mentioned before, STRIK actively invests in community development. Moreover, with their considerate location choices they invest in the infrastructure development within these neighbourhoods but also in the creation of employment. Currently, STRIK is already using cacao from a supplier that works with certified cacao beans. These beans are ethically cultivated and the farmers are paid fairly (Callebaut, 2019a; Callebaut, 2019b). Moreover, STRIK supports ‘Bake For Life’, an organization that educates people from third world countries within the bakery sector. Aside from this, STRIK mentions to only use natural ingredients in their almond pastes.

SOCKETAL CULTURE
According to Joyce & Paquin (2016), “the societal culture component recognizes the potential impact of an organization on society as a whole”. STRIK values a culture of socialism, in which people come to enjoy STRIK’s products together with family, friends or simply neighbourhood acquaintances. STRIK stimulates this culture in their products, stores and advertisements, as well as through their employees investing time in customer relationships.

SCALE OF OUTREACH
According to Joyce & Paquin (2016), “the scale of the outreach describes the depth and breadth of the relationships an organization builds with its stakeholders through its actions over time”. STRIK actively builds on expanding the breadth of their relationships as they are currently one of the biggest pastry suppliers to most Food, Service and Catering companies throughout Nijmegen. Through email notifications, physical acquisition and custom-made folders they build on increasing the depth of these relationships.

Appendix 3-A provides the data on which this layer’s insights and conclusions were build.
Supporting the ideation phase

APPENDIX 4

reduce the unnecessary usage of food products?

Incentivize sustainable behavior of employees to increase sustainable behavior and reduce negative impacts. Not only to motivate employees to change to become more sustainable.

Close

When handing in waste

Correctly separate ingredients

Reduced disposal

Launch campaign - something that is not so classy, so make consumers think

Ingredients that require less resources or with shorter shelf dates. Implementing sensors to decrease anything wasted.

Other food waste

Use local smart technology and send data automatically to smart sensors when possible.

Correctly separate ingredients

Making an ice cream recipe with the weakest ingredients.

Create new - or redesign - products to keep in bigger batches.

Reduce waste and reuse leftovers.

Business models - price new product for low cost of used products and ingredients.

Bakery with any online ordering platforms.

Compost to local green electricity. Work with partners that decrease food waste.

Increase the product range and waste processors with overlapping ingredients.

Design window for new products to keep in longer fresh.

Eat something "taste" cost again with your face on it.

More attractive, less break towards external customers.

Secure new window for biogas or green electricity from old bread.

Reduce food waste to make customers become stronger customers and to differentiate from competition.

Creating subscription models in addition to logistic stock to reduce the bread waste.

Suitable for student houses, but also for elderly centers.

Create customer loyalty by providing discounts when ordering based on subscription model.

Combining it with videos of recipes for old bread.

Become the go-to brand when people want to get information and the way drawing them to website and exposing them to new products and ideas as well.

Brand exposure people linking brand to knowledge - as such as don’t drink and drive campaign from Heineken.

Educational campaign

Provide outside videos of recipes for old bread.

Making an ice cream recipe that is not so classy, so make consumers think

Selling cookies in the best selling ways.

Saving consumers think when to make these decisions.

Interesting as STK has a growing group of loyal customers and dig up most social media. They are considered a trustworthy brand with years of expertise.

Implementing smart tools to measure and explain spillage to employees.

Making an ice cream recipe with the weakest ingredients.

Stocking new products that will compete with new products from outside.

Advantages of new products, new product range, and keep the customers engaged.

Already ready for engaging examples (1 within your industry and 1 outside your industry) and discuss.

PLAYING INTO FRIENDS

INTERESTING EXAMPLES

Educational campaign

Bakery with any online ordering platforms.

Bread based on attractive model

Implementing smart tools to measure and explain spillage to employees.

Smart savings

Marketing on line streamlined with smart technology, employees to decrease disposal.

Identify new - or redesign - products for new market.

New product range from new materials and ingredients.

Business models - price new product for low cost of used products and ingredients.

Bakery with any online ordering platforms.

Selling cookies in the best selling ways.

Interesting as STK has a growing group of loyal customers and dig up most social media. They are considered a trustworthy brand with years of expertise.

Implementing smart tools to measure and explain spillage to employees.

Making an ice cream recipe with the weakest ingredients.

Stocking new products that will compete with new products from outside.

Advantages of new products, new product range, and keep the customers engaged.

Already ready for engaging examples (1 within your industry and 1 outside your industry) and discuss.
As mentioned, the brainstorm session and analogy thinking revealed a wide range of potential concepts. These concepts were classified on impact and achievability in the concept selection worksheet from the Circular Design Guide (2019), based on the method from the MacArthur Foundation (2016). In order to do so, first a session for achievability was held with one of STRIK’s store managers. Then, the impact was determined using the strategy hierarchy ladder (Konietzko et al. 2020) and the emission calculations from chapter 2.3, layer 2. The following section includes the note-taking from both sessions.

**Classification of achievability**

**Date:** 06-12-19  
**Participants:** STRIK Store Manager  
**Duration:** 60min

**Communicate how to keep products longer fresh**  
Possibly easy to achieve, as STRIK has wide range of loyal customers and many Facebook followers.

**Discount on almost-expired products**  
Moderate easy to achieve. Requires effort from employees, so find out whether they have the time and opportunity to do so.

**Adjust products for better servings**  
More difficult to achieve. Recipes are usually not so easy to change, especially not for bread as this is purchased at a supplier. Moreover, STRIK does still want to stimulate purchase obviously.

**New product line with wasted left-overs**  
Moderate easy to achieve. STRIK is already doing something like this with the Kruidcakes, so adding some more products would be not that difficult.

**Educational campaign about the impact of food waste**  
Probably easy to achieve, as STRIK has wide range of loyal customers and many Facebook followers. Only in need of expertise about food waste and understanding what is it people want to know.

**Facebook challenge to reduce waste**  
Easy to achieve, as STRIK has many Facebook followers.

**Sealing of products to delay expiry date**  
Moderate easy to achieve. Would require investing in some machinery for sealing and some adjustments in terms of storing, stock-keeping, distribution and ordering. However, these would not be that difficult as there is not one clear way STRIK does all of this now anyway.

**Aerobic digestion/composting partnership**  
Easy to achieve. Garbage needs to be separated and employees stimulated to separate correctly.

**Provide recipes to consumers with expired or left-over products**  
Easy to achieve, especially when using the expertise of bakers. Possibly look at other programmes that do this as well (Robbert van Beckhoven, 24 Kitchen, etc.). Stick to format. That will probably require more effort. Overall easy to achieve, depending on the way you do this.

**Too good to go**  
Easy to achieve. Important to guide employees in what to put in the box and what not (we do not want unnecessary ‘giving away’ of products).

**STRIK’s own mystery box**  
Easy to achieve with wide range of customers and social media followers.

**Stimulate employees to use products longer by providing exact expiry date information per product**  
Easy to achieve. Mainly necessary to get all employees on the same level of knowledge.

**Stimulate good disposal behaviour of employees**  
Easy to achieve. Employees want to be involved and with the right education they will help wherever they can.

**Vegetarian replacements for products**  
Easy to achieve. Saucijzenbroedjes are biggest group of meat-using products at STRIK. They would simply require replacing the sausage with a vegetarian one. Would not demand that much effort.

**Replace most impactful ingredients in bestselling products**  
More difficult to achieve. Would require selecting products, evaluating impact per ingredients, finding replacement, testing flavours and behaviour during production and changing recipes in systems as well. A lot of steps to take.

**Collect and re-purpose food waste together with Patisserie College members**  
Difficult to achieve. Even though Patisserie College is accessible and easy to reach, it is difficult to initiate something as everyone is always busy and has their own schedule.

**Partner up with company that reuses bread waste for new products**  
Easy to achieve. Basically already doing this, but now with companies that pick up the bread for their animals or charity. Would need to find suitable partner, the rest is rather simple.

**Own Aerobic digestion/composting at location**  
Difficult to achieve. Would require quite an investment and finding partners to donate compost to as well as someone that manages these processes. This is quite far away from STRIK’s current operations and expertise.

**Arrange perfect circumstances for product storage**  
Difficult to achieve to as all equipment needs to be adjusted for each product. Time consuming and large investments needed.

**Use longer lasting window decoration**  
Easy to achieve. One time investment in long-lasting products. These can be reused over and over again.
Classification of impact
Communicate how to keep products longer fresh.
Reduces food waste by extending product life. Impact is high, but only if enough consumers are reached and willing to participate.

Discount on almost-expired products
Reduces food waste internally, but one could suggest that there is still some food waste from the product externally as consumers buy it at their latest ‘freshness’ state. This means that the impact is moderate to low.

Adjust products for better servings
Optimises the usage of natural resources as it uses less resources in production while possibly decreasing consumers’ disposal because the servings are better. Especially a high impact for bread.

New product line with wasted left-overs
Re-manufactures wasted left-overs into new products. Re-manufacturing usually has a lower impact than for example optimising resources and ‘using less’, because it requires additional resources during the re-manufacturing. Moreover, not it very much depends on the type of food waste. However, on the other hand, it could provide a solution for a large part of the food waste stream, increasing the overall impact because of quantity. The impact is thus considered low, but with the possibility to be high.

Educational campaign about the impact of food waste
The impact could be high, reducing consumers’ food waste, but only if enough customers are reached.

Facebook challenge to reduce waste
The impact is relatively low as it involves a short-term solution from a one-time innovation. Moreover, consumers must be reached and willing to participate.

Sealing of products to delay expiry state
This would only have an impact if the stocking systems are changed as well. If that is the case, food waste is reduced by simply stacking based on demand. However, this would only be effective for a selection of products, therefore the impact is considered moderate to low.

Aerobic digestion/composting partnership
Even though the impact is usually not that high for the recycling of food waste into compost, for STRIK the impact could possibly be large as they currently burn most of their food waste. However, in terms of impact this would be the final destination after trying to make the food waste stream circular in other ways (reducing, reusing, re-manufacturing).

Provide recipes to consumers with expired or left-over products
The impact could be moderately high, making consumers reuse their left-overs, but only if enough customers are reached.

Too good to go
Reduces food waste internally, but one could suggest that there is still some food waste from the product externally as consumers buy it at their latest ‘freshness’ state and the likeliness of consumers wanting all products in the box is low. This means that the impact is moderate to low.

STRIK’s own mystery box
See to good to go.

Stimulate employees to use products longer by providing exact expiry date information per product
As this possibly reduces the food waste of STRIK, the impact could be high. However, as it only concerns part of the product range from STRIK, it is suggested that the impact will never be very high.

Stimulate good disposal behaviour of employees
Easy to achieve. Employees want to be involved and with the right education they will help wherever they can.

Vegetarian replacements for products
As this option optimises the usage of natural resources the impact could be high. However, STRIK does not use that much meat, only for a few products, so the overall impact for STRIK would be low.

Replace most impactful ingredients in best-selling products
As this option optimises the usage of natural resources, the impact could be very high. Especially when looking at the best-selling products.

Collect and re-purpose food waste together with Patisserie College members
While usually the impact of repurposing or recycling waste is not as high as other strategies, due to the large quantity from the Patisserie College members, the impact could be very high.

Partner up with company that reuses bread waste for new products
Usually the impact of recycling or re-manufacturing is not as high as other strategies. However, since bread is such an important part of STRIK’s food waste, the quantity can increase the impact.

Own Aerobic digestion/composting at location
Even though the impact is usually not that high for the recycling of food waste into compost, for STRIK the impact could possibly be large as they currently burn most of their food waste. However, in terms of impact this would be the final destination after trying to make the food waste stream circular in other ways (reducing, reusing, re-manufacturing).

Appoint short-lasting products to be finished in-store
This would reduce the food waste as it extends products life-cycle. However, as it only concerns part of STRIK’s product range, the impact is considered moderate to low.

Subscription model for bread products
This would reduce STRIK’s food waste as they have better insights in how much to order. However, there will always remain a selection of customers that desire in-store purchases, so the impact is considered moderate to low as it does not solve the bread waste problem entirely.

Smart systems to decrease spillage
As this option optimises the usage of natural resources the impact could be high.

Automatic stock checking and ordering based on stock
This option optimises the usage of natural resources by ordering and producing only the necessary. Therefore the impact could be high.

Packaging that keeps products longer fresh
This option reduces food waste by extending the product life-cycle. However, in some ways STRIK is already using packaging to keep products longer fresh. Optimized packaging for other product categories could have a high impact.

Decrease product range
On the one hand decreasing the product range could have a high impact, because of production benefits. However, on the other it does not decrease sales, so waste will still appear. This would only have a large impact if the product range is decreased to a selection of products that can be re-manufactured or have a longer expiry date.

Packaging per serve
Even though it does on one hand decrease the food waste both internally as well as externally, it is questionable whether the efforts and additional resources needed weigh out the food waste. Therefore the impact is considered moderate to low.

Arrange perfect circumstances for product storage
Even though food waste could be reduced by extending the product life-cycle, it is questionable whether the added resources for creating these perfect circumstances weigh out the food waste. Therefore the impact is considered low.

Use longer-lasting window decoration
This option optimises the usage of natural resources by extending the life-cycle of such decoration products. However, as this only concerns such a small range of products, the impact is considered low.
APPENDIX 5

Supporting the MVP testing

ASSUMPTIONS

The first concept for building towards a circular food waste stream is the creation of an educational web-page for consumers, this way focusing on reducing external food disposal. This web-page would be implemented into the existing web-shop of STRIK, hopefully creating traffic and possibly increasing STRIK’s online sales. Even though previous analyses suggest this could be an interesting concept, it is important to learn whether STRIK customers find it interesting as well and whether it actually leads to increased web-shop sales, testing the desirability and viability of the concept. The corresponding hypothesis are HA1 and HA2.

BUILD

A commonly used approach for testing an MVP website is a landing page (Bank, 2014 in Design & Dev.). This page should explore whether potential customers are interested in what it is they are interested in. The respondents for testing the landing page are reached through STRIK’s Facebook page. The landing page is built using Unbounce and measurements are done using Hotjar, Facebook and Unbounce. The landing page is kept free from design and based on a simplified wire-frame. It includes a fact related to money savings (Graham-Rowe et al., 2014; Brook Lyndhurst, 2007), a ‘call-to-action’ section with a subscription button, a ‘specific interest’ section including recipes, storing tips and expiration date information and a section including an online offer directing respondents to STRIK’s webshop through a ‘buy button as a call-to-action. Figure 15 shows the landing page design and figure 17 shows the Hotjar performance.

“More than 10% of STRIK’s customers would be interested in information from STRIK about how to reduce food waste”

“More than 10% of STRIK’s customers visiting the food waste web-page is interested in STRIK’s online offers as well”

LEARN

With a 0% subscription rate and a 0% “click-through-rate” from the landing page to STRIK’s web-shop, the outcomes suggest that there is little desirability or viability for a food-waste web-page. However, the results did show a 16% conversion rate of the ‘more information’ button for recipes. Even though the key metrics were supposed to be tested using the pre-determined methods (email subscription and CTR to STRIK’s webshop), in reality it is too short-minded to assume no desirability simply based on one measurement. Especially when it comes to web-pages, as there are many different aspects that affect a website’s conversion rate, amongst which the design, content placement, use of images, and many more (Fernandez, 2019; Parravano, 2018). Therefore these results ask for some further experimenting in order to see whether there actually is no desirability, or that the web-page or the Facebook post is just not presented in a desirable way.

ADDITIONAL TESTING

BUILD ROUND 2

First, all of the statistics from the Facebook posts of the last 4 months were summarized in order to make conclusions about the Facebook post performance directing to the landing page. From these, conclusions were drawn about average performance and best performing posts. Then, a first additional measurement is done checking the average click-through-rate (CTR) of STRIK’s Facebook posts including link-posts. In the case of the landing page post, 28 out of 515 people (5.4%) who could have seen the Facebook post had clicked on the link going to the landing page. To see whether this is high or low, two other ‘link-clicking’ posts were compared. The first link-clicking post taken into account is one with a link to a news article about a new STRIK store. The second link-clicking post taken into account is one directing followers to the online web-shop through a link.

Then, as a second additional measurement, two additional posts about food waste were compared to the original landing page post on their “call-to-action” conversion rate. This, because from the Facebook statistics could be concluded that visual posts usually get...
a higher reach and engagement. If the call-to-action conversion rate of such visual posts is higher than the call-to-action conversion rate from the original landing page post, one could assume that visuals might play an important role in customer desirability.

**LEARN ROUND 2**

The additional tests show that the CTR for the food-waste landing page is higher than the average CTR of other link-clicking Facebook pages. However, the interest based on a ‘call-to-action’ remains very low, also when posts are presented more visually. Followers might show a little interest in information about food waste, but seem to lack enough interest to actually put effort into it. While the reach of the visual presentations is higher, the engagement rate remains the same for all posts containing food-waste information. This rate is somewhere between 6.4 and 6.6%, which is slightly higher than the average engagement rate of 5.3% from all Strik Facebook posts in the last 4 months (N=64). However, the most interesting assumption can be made based on the web-shop post. With a low reach and the lowest CTR and engagement, it is suggested that Facebook followers are not that interested in the web-shop yet. This means that, even though followers might enjoy information about food-waste once in a while, without having to put too much effort into it, it is likely that the viability of such educational concepts is low. Customers are not yet interested enough in STRIK’s online web-shop to gain financial benefits from the combination of an educational page guiding customers to the web-shop.

**MEASURE ROUND 2**

- **Average engagement:** 5.3% (out of 64 posts in 4 months) - Highest engagement for videos, bakers-in-action and prize-winning posts.

- **News article post**
  - Reach: 3.776
  - Engagement: 10%
  - CTR: 2.8%

- **Web-shop post**
  - Reach: 326
  - Engagement: 1.8%
  - CTR: 1.2%

- **Visualized post 1: call-to-action comment emoji**
  - Reach: 1.021
  - Engagement: 6.3%
  - Call-to-action: 0.6%

- **Visualized post 2: call-to-action comment recipe**
  - Reach: 2.480
  - Engagement: 6.6%
  - Call-to-action: 0.2%

**Figure 15:** Landing page basic design

**Figure 16:** Additional visual post 1 with call-to-action

**Figure 17:** Hotjar results
ASSUMPTIONS
The second MVP is the physical concept including a new product line made from wasted products and product parts. Even though there are several successful stories about companies bringing a product made from waste or left-overs to the market (Verspillingisverrukkelijk.nl, 2019), it is important to test whether STRIK’s customers are ready for such products as well. And just as important, whether customers are willing to buy the product for a certain price, despite their level of interest. To test the concept on desirability and viability, hypothesis HB1 and HB2 are constructed in order to test these key metrics.

BUILD
To test the desirability of the concept, a physical in-store test was done using prototypes (figure 20). In each of the STRIK stores three possibilities for products within this new product line were presented, from which customers could take a 10% discount card for products from the new product line. Then, to test the viability of the concept, the existing Kruidcake product was adjusted in order to check whether sales increased if the story behind the product was promoted more. This is done by adjusting the existing packaging of the kruidcake for one that tells the circular story behind it.

While packaging is an important factor in the decision-making (Estiri et al., 2010; Ansari et al., 2019), the prototype was designed by combining existing (successful) concepts (Verspillingfabriek lecture, 2019 - figure 18) together with STRIK’s branding (figure 19).

LEARN
From the results can be assumed that both the desirability as well as the viability is high. Hypothesis B1 and B2 can be accepted as on average more than 10% is interested in the new product line (N=449) and more than 15% of sales increased when the product was provided with packaging explaining the circular story behind it in each STRIK store. However, despite the positive outcomes from the tests, simply focusing on two measurements to conclude a desirable and viable product can be too short-minded. Not only because part of the sales increase could be due to drawing any type of attention to the product, but also because the tests were done at a specific moment instead of throughout the year. Additional testing was done to collect more insights about the desirability and viability of the concept. A second additional test measures quantitatively the interest through an online survey. A third additional test measures qualitatively whether people in-store would purchase the product.

ADDITIONAL TESTING 1
As additional research to gain more insights about the desirability and viability of the concept, first an online quantitative survey was distributed through social media and email. This survey exist of two versions, one of which includes a bag of bread crisps without marketing while the other includes a bag of bread crisps with information about the circularity and sustainability behind it. The bag of bread crisps were inspired by an existing product from ‘Say Yes to No Bread Chips’ (Volkskrant, 2016). This marketing included a quote (‘waste is delicious’), information about what the product is made of (high quality left-overs of bread) and a stimulant (together against food waste), see figure 21. Respondents were asked to rank the product based on likeliness to purchase (5-point Likert scale, Saunders (2007)) and the willingness to pay a certain price. The questionnaire design can be found in figure 21.
**LEARN ROUND 2**

The results from the online survey suggest that people are more likely to purchase a product if the (sustainable) story behind it is communicated. Moreover, with almost 50% of a total number of 77 respondents answered that it is likely they will purchase the product made from bread left-overs. Interesting is that people are probably not willing to pay much more for a product of which the sustainable story behind it is communicated. On the other hand, they are also not willing to pay less, which can be interesting for STRIK. It is likely that people would pay a ‘regular STRIK price’ for a product made from recycled parts, ingredients or products, increasing the viability of the concept. Moreover, the likeliness of purchase increases with more than 15% for the promoted product. Even though this survey only focuses on one specific type of product, in which personal taste, impulse purchasing and other factors are not taken into account, and the results are not tested on significance and reliability, together with the measurements of round 1 it does indicate that there is a desirability for the concept. A final round of tests will qualitatively research whether there is a desirability for the product line through in-store conversations with customers.

**ADDITIONAL TESTING 2**

**BUILD ROUND 3**

Additional qualitative research was done in-store with STRIK customers (N=10). A brief semi-structured interview guide was prepared asking customers about the willingness to purchase a product from the new circular line and their willingness to pay extra. Questions were kept as open-ended and neutral as possible so that customers were left free to give their unbiased opinion about the product line (Holbrook et al, 2003). To make the questions more tangible, the mock-up of the new packaging for Kruidcake was used as an example. Interviews were held in all three STRIK stores. The interview diaries can be found in figure 22.

**LEARN ROUND 3**

From the additional qualitative research can be implied that STRIK customers posses a high desirability for the concept. With a 7 out of 10 positive reaction towards the concept it is likely that current customers are ready for a new circular product line. Not only were respondents positive, they were also willing to pay the same price or even a higher price for such products compared to regular (unsustainable) products. The results suggest that STRIK should remain transparent in the circularity behind the product to inform the more critical customers. Moreover, as the adjusted packaging could draw more attention it could be interesting to create a separate section of such products that will catch customers’ eye in-store. However, even though questions were asked as neutral as possible, there still exists the possibility that respondents experienced the acquiescence response bias and simply consenting with any statement (Holbrooke, 2003). Therefore this testing session will not be considered lonesome, but in combination with the results from the others MVP tests as well. All of these tests’ results together imply a high desirability and viability for the new concept.

See figure 22 for full respondent diary

- 7/10 positive towards concept
- 6/10 familiar with Kruidcake
- 6/10 would pay more or the same for new concept

- “I do see the product being part of STRIK’s product range as society is changing towards wanting more of such products from their local shops” - participant 3
- “What exactly happens to the food left-overs? How is the product made exactly?” - participant 7
- “I would like to see even more information on the packaging about how it’s been made” - participant 5
- “I am not sure about the concept. I do not like Kruidcakes at all…” - participant 4

- “The product would probably draw more attention with the adjusted packaging” - participant 5
- “I think it is smart that STRIK is investing in such initiatives. We need more of such initiatives, especially in Nijmegen” - participant 6
- “The product would probably draw more attention with the adjusted packaging” - participant 5
- “I think it is smart that STRIK is investing in such initiatives. We need more of such initiatives, especially in Nijmegen” - participant 6
- “I do see the product being part of STRIK’s product range as society is changing towards wanting more of such products from their local shops” - participant 3
- “What exactly happens to the food left-overs? How is the product made exactly?” - participant 7
- “I would like to see even more information on the packaging about how it’s been made” - participant 5
- “I am not sure about the concept. I do not like Kruidcakes at all…” - participant 4
Sinds 1937

Prototype design

Inspiration from the Verspillingfabriek

Figure 18: Inspiration from the Verspillingfabriek (2019) and Verspillingsverrukkelijk.nl (2019)

Figure 20: Prototype design

Figure 19: Inspiration from STRIK’s current branding

Figure 21: Online questionnaire design and results (Dutch): likeliness of purchase versus willingness to pay for promoted product (left) and non-promoted product (right)

Table: Qualitative research in-store about desirability of new product line (N=10)

<table>
<thead>
<tr>
<th>Date / Time</th>
<th>Store</th>
<th>Age</th>
<th>Familiar with Kruidcake?</th>
<th>Insights</th>
</tr>
</thead>
</table>
| 04-01-2020 | Heyendaal | 32 | yes | Very positive towards new concept of the new product line. No remarks about products being made of “left-overs” in negative way. Positive concept for product now that information is provided. Price such products if STRIK’s product range.
| 04-01-2020 | Heyendaal | 71 | yes | Positive towards concept, but dislike for specific product Kruidcake, so negative towards his specific type of product. Probably not likely to buy such products, but stands behind initiative and idea of sustainability.
| 04-01-2020 | Heyendaal | 56 | yes | Positive towards new concept of the new product line. “I like how STRIK is also investing in such initiatives” [direct quote participant]. Does see the product being part of STRIK as society is changing towards wanting more of such products. However, would not pay more for such a product. Would pay the same price as it is.
| 04-01-2020 | Heyendaal | 62 | no | Neutral towards concept. Didn’t really understand it even after explanation about concept. Too focused on specific Kruidcake product, which according to respondent she had never bought before.” After tasting product respondent reacted positive about taste. However, would not buy it quicker with adjusted packaging.
| 04-01-2020 | Zeekershoat | 26 | yes | Positive about concept. New崻er sense that companies can turn waste to wine on waste stream. Would definitely pay more for sustainable product. Would like to see even more information on the packaging about how it’s been made. Product had never caught respondent’s eye in store, despite weekly visit to the store and familiarity with the product. Liked with new packaging it draws more attention...
| 04-01-2020 | Zeekershoat | 35 | no | Very enthusiastic about the concept. Would like to see more products like this. Explains how the know beer brewing company that uses old bread as well “It needs more of such initiatives, especially in Nijmegen”, would definitely not pay less and maybe even more for concept - likes taste of Kruidcake.
| 04-01-2020 | Zeekershoat | 31 | no | Neutral towards concept. Asking questions about what exactly happens with the food waste and why not just sell the pre-made product. This is still not a positive towards sustainable initiatives, but critical about trustworthiness. Difficult to taste Kruidcake. Would pay more for sustainable initiative.
| 04-01-2020 | Zeekershoat | 34 | yes | Woman with kids. Explained she does groceries across street at Ekoplaza as well, so concept like this about trustworthiness. Did like taste of Kruidcake. Would pay more for sustainable initiatives, but critical towards wanting more of such products. However, would not pay more for such a product. Would buy it quicker with adjusted packaging.
| 04-01-2020 | Zeekershoat | 70 | no | Critical towards product. Had never seen this Kruidcake before in the store. Difficult to imagine other products. Questions about what is in there. Old mention that price is lower she would probably buy it.
| 04-01-2020 | Wijchen | 53 | yes | Knew Kruidcake from loyalty program. Had bought it before using saved up STRIK points. Likes concept of sustainable marketing behind it. Would not pay more, but would buy it quicker with adjusted packaging for same price or lower price.
A SWILL container costs 54,04 € per month per container, excluding the 30% discount provided by Milieucentraal.

- **Assumptions**

   The third concept is considered a “final destination” for the inevitable resulting stream of food waste as this concept will probably not deliver any financial value even though it does add environmental value. The food waste stream gets regenerated into compost, green gas or green electricity using a partnership for anaerobic digestion/composting. It is important that first all other measures are taken in order to decrease the food waste stream going to the waste processor. For the concept to assure full circularity of STRIK’s food waste stream, all of the latter will be tested according to hypothesis HC1 and HC2. Moreover, it is important that the financial aspect is considered as well to assure no major investments are necessary.

- **Build HC1**

   In order to test the hypothesis, two methods were used. A first is conducting two qualitative interviews with potential partners able to provide anaerobic digestion/composting for STRIK’s food waste, known by waste processors as “organic waste”. Amongst the partners chosen are the market leader in terms of sustainable waste processing, Renewi, and a smaller local waste processor, Milieu Service. Both companies were invited for an orientational conversation. To keep the conversation as open-ended and natural as possible, no interview guide was used. However, three questions were prepared in order to get the necessary answers for accepting or rejecting the hypothesis. The questions included information about what happens to the organic waste. Moreover, about whether the organic waste is 100% recycled into green resources. Third, what the prices are for processing organic waste with them. The interview was transcribed and translated on the spot by a second interviewer to assure reliability. The most important insights from the interviews can be found in the measurement section.

- **Learn HC1**

   From the qualitative interviews and corresponding e-mail information send afterwards (see measurements) can be learned that potential partners do assure that 100% of the organic waste gets recycled. Moreover, in terms of costs, is does not have to be expensive to recycle organic food waste for regeneration green resources or compost. In fact it could save a lot of effort for STRIK as processors can pick up the waste at store locations. In most cases the organic waste is processed into compost, otherwise in green gas or green electricity. There are no requirements for the food waste stream, just that the stream is clean and free from packaging and other non-food products. Based on these insights, hypothesis 1 can be accepted. Partners can assure recycling 100% of the organic waste stream.

- **Build HC2**

   In order to test the hypothesis HC2, the disposal behaviour of organic waste was observed during one week. A special bin was placed in each STRIK store with a poster mentioning “dispose all food waste here”. Moreover, employees were briefly instructed about that they should separate the food waste from all other waste. During the collection a diary was kept. Within this diary some note taking about the quality of the organic waste streams was taken each two days. Moreover, additional conversations about employee experiences with separating the food waste was noted as well. The insights from the diaries can be found in the measurement section.
What we learned is that employees are very much dedicated to separating the food waste correctly. However, there might be a lack of understanding which types of waste are in fact organic and which not. Moreover, it is possible that employees do not experience a strong need to separate some of the packaging from the food in times of stress or chaos. It is assumed that is employees would be educated better about the types of food waste and how important it is that the stream is clean, it is likely that they put more effort into separating correctly. The third hypothesis HC3 is added.

In order to test hypothesis HC3, additional information was provided to each of the employees through informative posters. These posters included information about STRIK’s incentive, but also practical information about what can and cannot be thrown away provided by the organic waste processing partner (Figure 23). These posters were laminated and placed above the food waste bins. Moreover, this was communicated to each employee as well. Again the bins were collected during one week each two days and additional conversations were held.

Figure 23: Provided additional information for garbage separation
IDE Master Graduation
Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student’s IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student’s registration and study progress.
- IDE’s Board of Examiners confirms if the student is allowed to start the Graduation Project.

** STUDENT DATA & MASTER PROGRAMME **

Save this form according the format “IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy”. Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1!

family name: Hunink
initials: F.N.
given name: Feline
student number: 4300599
street & no.: Groesbeekseweg 52A
zipcode & city: 6524DE
country: Netherlands
phone: 0623324969
email: fien.hunink@gmail.com

** SUPERVISORY TEAM **

Fill in the required data for the supervisory team members. Please check the instructions on the right!

** chair: Erik-Jan Hultink
department / section: 

** mentor: Jan Konietzko
department / section: 

2nd mentor: Maurits van Geenen
organisation: STRIK patisserie
city: Nijmegen
country: Netherlands

comments (optional): 

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

Your master programme (only select the options that apply to you):

IDE master(s): [ ] IPD [ ] Dfi [ ] SPD
2nd non-IDE master: [ ] [ ]
individual programme: [ ]
honours programme: (give date of approval)
specialisation / annotation: [ ] Honours Programme Master [ ] Medisign [ ] Tech. in Sustainable Design [ ] Entrepreneurship

IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30
APPROVAL PROJECT BRIEF
To be filled in by the chair of the supervisory team.

chair: Erik-Jan Hultink

CHECK STUDY PROGRESS
To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: 90 EC
Of which, taking the conditional requirements into account, can be part of the exam programme: 0 EC
List of electives obtained before the third semester without approval of the BoE:

name

date

signature

FORMAL APPROVAL GRADUATION PROJECT
To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **.
Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

• Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
• Is the level of the project challenging enough for a MSc IDE graduating student?
• Is the project expected to be doable within 100 working days/20 weeks?
• Does the composition of the supervisory team comply with the regulations and fit the assignment?

Content: APPROVED  NOT APPROVED

Procedure: APPROVED  NOT APPROVED

name

date

signature

IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30

Initials & Name: F.N. Hunink

Title of Project: STRIK towards circularity - what goes around, comes around
STRIK towards circularity - what goes around, comes around.

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

**INTRODUCTION**

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

Despite the economic benefits the industrialization has provided over the previous years, the concerns about the negative effects this industrialization has on our natural environment are significantly increasing (Dean & McMullen, 2007). In other words, we are in desperate need of sustainable development, known as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (Brundtland, 1987; Pacheco et al, 2010). And this figures, as nowadays more and more policies, laws and regulations are changing Dutch organisations’ strategies towards implementing sustainable development. The big cities in the Randstad of the Netherlands have already been implementing radical laws and regulations for a few years, but now the government of the eastern cities are following as well with laws like the obligation of firms to inform about their sustainable activities and energy savings ("Informatieplicht voor bedrijven en instellingen I RVO.nl I Rijksdienst", 2019). According to Dylick & Hockerts (2002), as cited by Weissbrod & Brocken (2017), for many firms it is easiest to operationalize sustainable development from an efficiency perspective. Weissbrod & Broken proposed that approaches such as the lean startup approach building on Blank (2013) and Ries (2011) can be key to radical innovation for sustainability in large firms. Moreover, according to Bocken et al (2018) “experimentation is key to helping companies make the first steps with low risk and resource investments to reduce uncertainties of how value is created, delivered and captured in this radical shift and provide obtain continuous (organizational) learnings towards a circular and sustainability transition”. To conclude, especially for those companies that are new to the implementation of sustainability development, radical innovation through a startup approach and experimentation can be key elements in order to increase a company’s activities in sustainability and find the value of sustainable development in terms of economic, social and environmental values (WCED, 1987, p.37).

Keeping the latter in mind, one SMB company that is struggling with the implementation of sustainability is Strik patisserie, a famous pastry bakery located in Nijmegen. The owner of Strik, Maurits van Geenen, is educated as a pastry chef and has a passion for entrepreneurship, but no personal affinity for-, nor experience with, sustainability. Together with his wife only they decide on what happens within Strik. There are no local managers or department managers that have a say. The entire company is run by the two owners, resulting in extreme prioritizing while neglecting some other important aspects like the value of sustainability. With over 50 employees working in 4 pastry shops, 2 ice cream shops, 1 central bakery and deliveries to many clients throughout Gelderland every day, Strik is a well-known SMB with a large impact in many ways. However, they do not yet act out on their impact in terms of sustainability, even though Strik can use engagement in sustainable activities not only as a tool to reduce their emission, focusing on the environmental value, Strik will also benefit from the economical- and customer values that investing in sustainability could bring along according to the Triple Bottom Line, originally coined by John Elkington in 1994. By understanding the company as a system, the greenhouse gas emission can be determined and calculated as according to Greenhouse Gas Protocol (2004) - (fig 1 shows a schematic example of a GHG emission inventory). Opportunities for reduction can derive from creative sessions with the company and the conclusions from the GHG emission inventory. Then, by using small, low-key experiments in the lean startup methodology (fig 2), the project will focus on implementing and improving those ideas with an eye on the desirability, feasibility, viability, circularity and economic value.
introduction (continued): space for images

image / figure 1:  Greenhouse gas emission template, according to Greenhouse Gas Protocol (2004)

image / figure 2:  Lean startup approach, adapted from Ries (2011) and Blank (2013).
**PROBLEM DEFINITION**

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

STRIK is experiencing the increasing pressure of not only laws and regulations, but also their customers’ demands and expectations in terms of sustainability. With no experience, nor time by the company’s owner to engage in sustainability activities, there are many (missed) opportunities for the company to increase not only the environmental value, but with that also the customer values and even efficiency and financial values. STRIK is in need of implementing environmental value in order to increase their overall organisational performance while reducing their greenhouse gas emission.

The company will be thoroughly analysed on their current activities, but also their current greenhouse gas (GHG) emission through a GHG inventory. Then, because of the findings and conclusions from this analysis, opportunities for reduction will derive. By comparing existing cases that already implemented circularity, a circularity deck is created which will be used in a creative session with the company’s management team for ideation. These ideas and opportunities will finally lead to a process of experimenting and iteration with an eye on desirability, feasibility, viability, circularity and financial benefits. Throughout the experimentation process, the changes will be measures on which further recommendations and iterations can be made, leading to a final presented recommendation report explaining the possible losses and gains from different implementations.

**ASSIGNMENT**

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in “problem definition”. Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, .... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

The main goal of the graduation project is to find ways to increase the company’s environmental value while the financial value is increased as well either through cost reduction or profit increase. In other words, experimental implementation of circularity is initiated in order to reduce the GHG emission (decrease CO2) while increasing EUR in terms of profits or reducing EUR in terms of costs.

The initial business analysis will include determining and understanding the organizational structures, operational boundaries (organisational activities and processes) and the business context through techniques such as supply chain analysis, value chain analysis and journey mapping. These analysis will eventually lead to an overview of the material and energy flow within the company and form the foundation of calculating the company’s GHG emission, leading to a reveal of most interesting emission reduction opportunities. Then, through comparing different existing company cases, a circularity card deck is created in order to do an ideation session with the company management team and find other viable and feasible opportunities for emission reduction. To continue these ideas are implemented and iterated upon through low-risk experiments measuring the impact and effects of ideas in terms of the desirability, feasibility, viability, circularity and financial benefits. Then, the results can be concluded and presented in an understandable way, preferably in the form of a descriptive yet visualized report that can be used to communicate to the authorities and government as well.
PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

The planning consists of several phases, based on the mentioned theory in which a thorough analysis of the company and the company’s current situation leads to idea generation and experimentation of findings in order to test and iterate on the validation of these ideas with low risk (fig 3.1 and 3.2 - see final page for bigger version of both). At the end of December, there will be a Christmas break. I will then be working in the bakery and still continue to analyze and experiment, but just in case times are too hectic to gain valuable information during those weeks, I mark them as the christmas break in which focus will not necessarily be on the project. Moreover, even though the process is visualized as a linear project (see planning), it will occur more organically, going back and forth to different phases as can be seen in figure 3.2 as well. Working days will be from Tuesday to Saturday, with Sunday and Monday off (these are the least busy days for the bakery).
MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

I have always had a passion for entrepreneurship, but in the last couple of years sustainability became part of this entrepreneurial passion as well. This started to grow more and more after starting my own sustainable fashion company in 2017 and after finishing my internship at Heineken where I initially started at the function of merchandise, but quickly moved my way into the 'Heineken circularity team'. When they asked me whether I wanted to graduate on a circularity project at Heineken, I was really enthusiastic. But the more I grew into it, the more I started to realize that even though the impact I would be able to make at Heineken would be huge, the chances of the project ending up in a drawer for many years was also very possible. That's when I started shifting more towards the SMB companies, and finally realized that the perfect graduation case had been right in front of me all this time. Since 2012 I've been occasionally working at the bakery of my parents in law, and last year I helped setting up their first ice-cream saloon. It wasn't until that moment that I realized how big of a company STRIK actually was and how many things could be improved or changed within the company. The possibility of someday taking over STRIK keeps growing everyday, but I keep mentioning to my parents in law how I want to do things differently. With an SPD background and passion for sustainability, efficiency and innovation, the best way to do so is to actually take the time to dive into the company and start tackling the current problems the way I was educated to. So, this led me to finding the perfect graduation project. One that combines my passion for sustainability with my passion for entrepreneurship while being able to actually make a difference and own-handedly benefit from my ideas and work. STRIK has the funds to try some experimental things, the challenging 'profit'-mindset of a small business owner and the reputation to try new things without harming the overall company image. This project couldn't have suited me any better.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

See next page for added images (bigger resolution)
AN INTRODUCTION TO THE COMPANY
including the history, scope, target group, brand image, etc. All things necessary to understand what kind of company STRIK is.

UNDERSTANDING THE COMPANY

UNDERSTAND & OBSERVE
- organizational structures
- operational boundaries (organisational activities and processes)
- the business context

CALCULATE & IDENTIFY
- calculate emission per scope
- determine CO₂/€ per element
- find most interesting areas for GHG reduction

CASE COMPARISON
IDENTIFY
- existing opportunities for GHG emission reduction
- create circularity deck for ideation session

IDEA GENERATION
INVOLVE & CREATE
- Expose company to circularity cards in creative session, so that the company gets a grip on what would be feasible and viable opportunities for GHG emission reduction.

TEST & ITERATE
EXPERIMENT, MEASURE, IMPROVE

CONCLUDE & PRESENT

Figure 3: project planning overview phases (left fig 3.1, right figure 3.2)

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