

AALBORG UNIVERSITY

SEMESTER PROJECT

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# Reduction and Optimization of Food Waste in Supermarkets using B2B and Technology

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**Abstract**

This report identifies the drivers and barriers that companies are facing when wanting to digitally improve and reduce food waste. It analyses the market and develops an initial design for a business model that is used to create prototypes later in the design phase. Four prototypes are made, and each represent a different environment and therefore design. The environment of each prototype is based on relevant discoveries relating to technological possibilities and problems within supermarkets. Using a theoretical approach, each prototype is designed in a way, that attempts to overcome some of the barriers that companies are facing when trying to make digital changes.

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# 1 Summary

The following report investigates the business surrounding how food that is at risk of becoming waste is handled in supermarkets, and then attempts to design a business model that can help reduce food waste. The findings of the analysis made it clear, that the entire food supply chain has interests in both digital solutions and in reducing food waste. It was also made clear, that digital solutions in fact can help reduce food waste. Through the analysis, I found that there exist barriers that make it difficult for companies to capitalize on these potential solutions, and that is why it has not been done. Through the analysis, I found a potential market for food that is currently not managed by any third-party companies, except for the supermarkets themselves. These are e.g. refrigerated goods, that the supermarket attempts to sell at discount prices before they pass their expiration dates. I created an initial business model that attempts to utilize this, by creating partnerships with supermarkets, receiving these products and then reselling them as a service offered to the supermarket. Using relevant theory and methods, I then went through a design phase in order to try and further expand the possibilities of the business, using the findings from previous chapters. I created four different scenarios, each representing a business model prototype, taking relevant factors such as technological possibilities and problems into account. I tried to find a way to get past the aforementioned barriers, that keep companies from adapting digital solutions. For each of the prototypes, I used a process logic known as effectuation and three newly developed logics within business process management, to try and argue for how processes and infrastructure should be built and how agents should act within the company. From this, I found that effectuation and the three new business process logics have more in common than I initially thought. I then did a discussion, where I elaborated upon the most relevant sections of the report and finally wrote a conclusion.





## 2 Introduction

### 2.1 Introduction

Problems related to food waste products have been a topic of interest for years and potential solutions are still being developed by both scientists and retailers. In Denmark, households, manufacturers, retailers and suppliers produced a staggering 814.000 tons of food waste in 2021 alone [1]. The majority of food waste happens during the supply chain - not at households. In fact, 70% of the food waste produced in Denmark in 2021 happened during production, manufacturing or in the hands of retailers. This amounts to 567.000 tons of food (or 96 kg per dane) that never even makes it to the consumer[2]. This puts a dent in our responsibility as humans as 2.37 billion (or 1/3 of the world's population) did not have access to an adequate amount of food in 2020 [3]. This number, despite ongoing efforts to reduce food waste, actually increased by 320 million between 2019 and 2020. Arguably, this result may have been influenced by the COVID-19 pandemic [4], which on a positive side-note has opened the eyes and increased the efforts towards sustainability in certain food supply chains [5]. Water and oil consumption used during production and manufacturing as well as plastic waste also contributes negatively to the environment [6]. These environmental effects combined with a growing responsibility in consumers regarding sustainable food [7-9] has boosted the efforts of companies around the globe to reduce their carbon emissions [8, 10], leading to more sustainable solutions.

Living in the 21st century, a lot of these efforts are targeted towards finding or developing new digital and/or technological solutions. A lot of companies have already made digital advancements within their supply chain with respect to for example automation of orders, forecasting using data, and product tracking[11], but find it difficult to adapt to newer and the constantly evolving digital world. On the other side of the supply chain, supermarkets have begun to develop technologies that increase the accessibility consumers have to their products. This also concerns food that is at risk of becoming food waste. One app in particular allows its consumers to see the availability and the amount of food at risk of becoming food waste and in what particular supermarket they can purchase it [12]. Appliances such as these have proven, at least to a degree, to reduce the food waste within the food supply chains and directly between supermarkets and their consumers, however, it does not solve the problem as a whole. As a result, the following report will be investigating potential solutions limited to the food waste problems experienced by supermarkets specifically. This will be done through an analysis of the environment and supermarket suppliers, from which a design phase will be enacted to incorporate important discoveries, such as technology-related opportunities and problems that supermarkets are currently experiencing.

**2.1.1 Phrasing**

Food sold in supermarkets at discount prices due to it being close to its expiration date will in the follow report be referred to as second chance food (SCF).

## 3 Problem Formulation

This section first formulates the overall problem of how digital appliances can help solve a part of the food waste problem. It then specifies a particular area of interest, followed by a number of research questions used to further narrow the necessary investigation required to answer the problem.

### 3.1 Problem Statement

Food waste is a problem that occurs throughout all segments in the entire food supply chain. Attempting to solve this problem as a whole would prove too great of a task for this project. As a result, the following report will be narrowing its focus and try to find solutions for the problems encountered at the very end of the food supply chain. As it is impossible for supermarkets to forecast the exact amount of food they must supply themselves with to meet consumer demands, it is inevitable that overstocking and thus food waste can occur. By investigating how supermarkets currently manage their SCF and food waste, it may be possible to find alternative, possibly, digital solutions.

#### 3.1.1 Overall Problem

What problems are supermarkets currently facing within their SCF business and do they struggle adapting to digital solutions? Is it possible to establish a business that further bridges the gap between the SCF business and the digital world?

##### 3.1.1.1 Research question 1

If there exist a market, then how where is it? Is it possible to find existing technology or methods capable of potentially reducing food waste in supermarkets?

##### 3.1.1.2 Research question 2

How does a business utilize such technology and how should it be designed? What are the requirements and why is it favorable for supermarkets?

##### 3.1.1.3 Research question 3

Does there exist relevant theory that can be applied to the design phase of the business model?

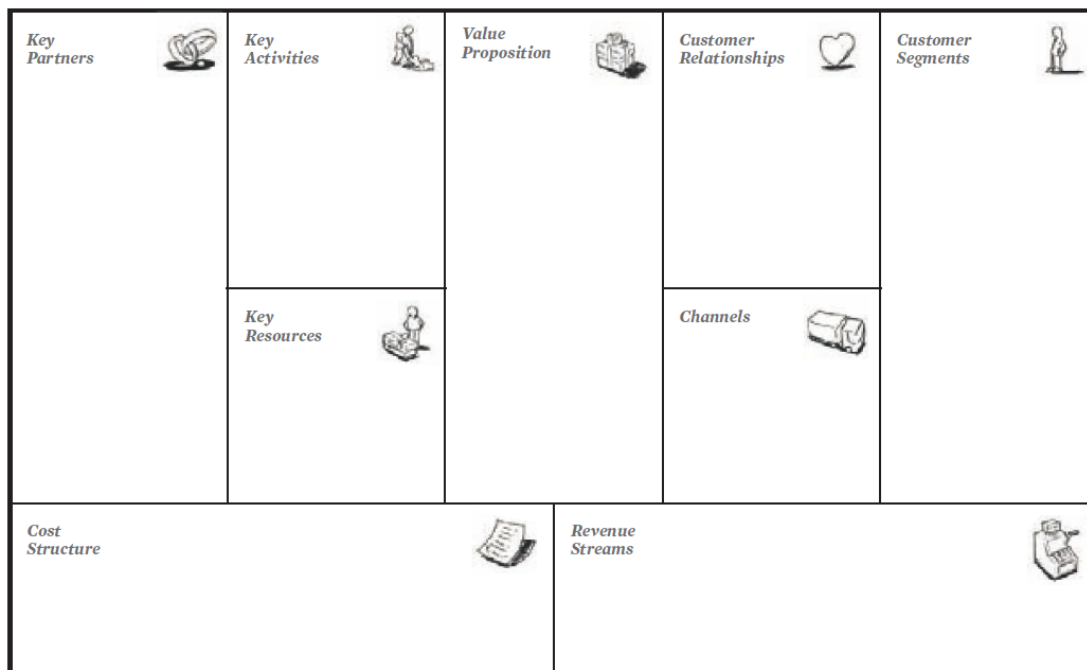


## 4 Preliminaries

### 4.1 The Canvas model

A template that can be used to design a business model is the the business model Canvas created by Osterwalder and Pigneur, [13]. The Canvas model may be used as a blueprint to help detail the key elements and value chain of the relevant business. The model incorporates nine areas of interest as depicted in Fig. 4.1. Each of these are useful researching areas when designing the business model for a particular business.

**The Business Model Canvas**



**Figure 4.1:** Empty Canvas model (Inspired by Osterwalder & Pigneur[13])

The nine areas of interest are depicted in blocks of their own and their features depend on the business. These will help identify important knowledge such as who our customers are and what is our relationship; whether we have any key partners and/or suppliers; what resources we have at hand and what activities do we perform in order to generate value; what costs we have and through what streams do we generate revenue; and how we reach our customers.



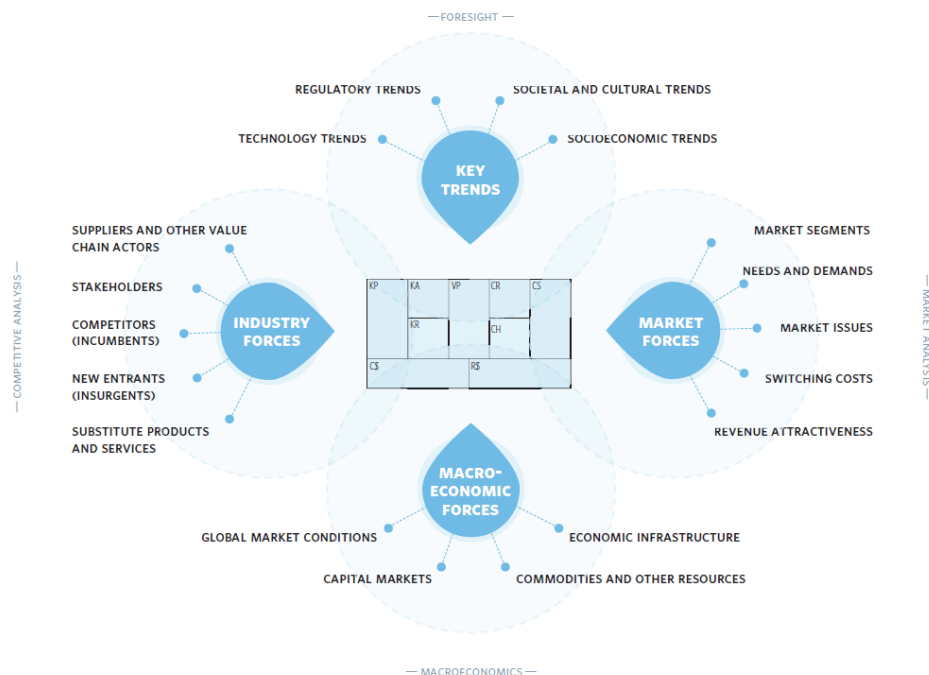
# 5 Methodology

## 5.1 Initial Business Model Design

In order to answer the questions depicted in Fig. 4.1, it is necessary to understand the business area I am trying to incise. The following section will analyze the environment of the business and later use that knowledge to design an initial business model.

### 5.1.1 Business Model Environment Analysis

As the analysis I will be conducting involves investigating In order to understand the environment of a business is, a framework known as The Business Model Environment (BME) can be used. The BME is useful when searching for opportunities within the environment of a potential business. The BME is a framework suggested by Osterwalder and Pigneur, and is very suitable for businesses with close relations to new technology [13].



**Figure 5.1:** Figural representation of the BME, by Osterwalder and Pigneur [13].

I find this to be an appropriate model based on research formulating the existing drivers for digitization within companies in the food supply chain [14]. It is also important for companies to have a flexible and adaptable business model [13] and this especially goes for companies that are transforming digitally [15]. Understanding plausible changes in the environment of a business lessens the difficulty of adopting requirements caused by external forces. The model defines the external environment as a “design space” that helps shape or adapt a business model to possible future changes [13]. The analysis is used to investigate four environmental areas: market forces, industry forces, key trends and macro-economic forces, which can be used to decorate the business model canvas, as depicted in Fig. 5.1.

#### 5.1.1.1 Market Forces

**Market Issues:** There is an increased interest within consumers to buy more sustainable food, as the younger generations’ willingness to pay (WTP) are higher than that of the older generation [16]. One of the key drivers behind this consumer behavior is related to an increasing trend of environmental responsibility [17], depending on how the consumers identify themselves and their social environment [18]. As such, organizations are forced to adapt, if they wish to remain competitive and maintain a positive brand. The availability of information for the average consumer only serves to strengthen the importance of a positive brand, as individual opinions are capable of spreading like wildfires. Additionally, as consumers become increasingly more adapted to technology, so does the necessity of a market that further incorporate that same concept. The interest in food waste has been growing over the years. This is due to multiple reasons, some of which are concerns on how food waste has economic and environmental costs, resource conservation, and an increasing interest in food supply chains to progress towards more sustainable activities [19]. It is also necessary for larger companies to remain competitive in the market. These reasons are key factors capable of triggering digital transformation within organizations in the food supply chains, despite how difficult that often is [15]. Research also show that there is a general lack of knowledge of just how much new digital solutions could help improve the environment through a food waste reduction; that people tend to resist new technology; and that especially smaller or medium sized companies are afraid to take risks associated with digitization and tend to wait for success stories [14].

**Market Segments:** If the idea is to act as an intermediary between suppliers of SCF and consumers, then there are two primary customer segments. These are our supermarket partners that supplies the business with SCF products and the consumers that buy these products. Because of this, the business is regarded as a multi-platform. Suppliers can be segmented into their individual supermarket chains. Relevant supermarkets will be elaborated upon in section 5.1.2. Consumers can be segmented into a great variety of individuals, such as: vegetarians, vegans, pescatarian, discount-oriented, environmental-oriented, health-oriented, people concerned about animal well being or eco-products and many more [20]. SCF products exists in all kinds of variations and is therefore suitable for most types of consumers. Some consumers are more important than others though,



as consumers who are environmentally- and/or discount oriented (also known as 'green' consumers [21]) typically tend to value sustainability-related attributes in the food that they purchase and consume, and when performing food-related management decisions. An increased WTP within younger consumers [16] when compared to an older generation may suggest that the old habits of buying non-sustainable food are in decline. Taking the younger generations increased trend of environmental responsibility, as stated in Market Issues 5.1.1.1, and 'green' consumers into account, I believe these two types of consumers are primary targets.

**Needs and Demands** The digital services currently provided by the considered supermarkets 5.1.2 happen through social media, their own personal apps and websites. These services provide consumers with information about discount products, news, offers, competitions, local information and more [22–24]. There is a clear interest in these services as the Netto+ app alone has accumulated more than 500.000 downloads, approximating to 1/12 of the danish population. This implies that there is a consumer-demand for digital services. This holds especially true after the Covid-19 pandemic, as more consumers began to purchase their groceries online instead [25]. These online purchases were in the form of either delivery or pick-up, and the ordering methods varied depending on the generation. 80%, 66% and 52% were purchases done on a computer for boomers, generation X and millenials respectively and 13%, 27% and 40% were purchases performed on a smartphone for the same generations respectively. Following this logic, there seems to be a decline in the use of computers and a rise in the use of smartphones for services like these. Mobile services, as the currently available supermarket apps, are thus in high demand and their popularity seems to increase. Some consumers have begun occasionally purchasing their groceries online [26]. The groceries are then either picked up by the consumer (in a similar fashion to BilkaToGo, further elaborated upon in section 5.1.1.2) or delivered directly to the consumer. According to an exploratory study, consumers perceive online grocery shopping to be more environmentally friendly, as they supposedly make less spontaneous purchases, thus resulting in reduced food waste [27].

**Switching Costs and Revenue Attractiveness** It is difficult to discern what exactly causes consumers to defect to competitors within the SCF business. Accessibility of SCF products is highly dependent on the particular store, not the supermarket chain as a whole. This is because the popularity of individual stores influences how swiftly SCF gets purchased. One may assume this can cause consumers to defect to competitors in the search of alternative sources of SCF. Another consideration is the brand of the store. Generally speaking, products in one supermarket chain may be more expensive than those in another, due to their different visions with respect to concepts such as being eco-friendly, keeping up a brand and more [28]. If two companies with different visions were to sell their SCF at the same location, it may result in competitive advantages based on consumer behavior. This further segments consumers, as there are those with a high WTP and eco-friendly mindset who does not mind the more expensive alternative. There are however, also those with a lower WTP and/or different mindset wishing for

the cheaper alternative. The supermarkets of the Salling Group [29] have introduced a concept in their apps, that allow consumers to view SCF products locally. This includes what the product is, how many of them there are, what store it is in and the distance to that particular store. Services such as these amplify the influence of digital solutions competitively as they ease consumers accessibility to SCF.

#### 5.1.1.2 Industry Forces

**Competitors and new entrants** *Netto* has in collaboration with FødevarerBanken developed an app termed "Mad Skal Spises" [30]. This might have been one of the closest competitors, as the app was developed not to only be beneficiary for Netto, but for its competitors as well. The idea of digitizing a solution for SCF by incorporating multiple chains shares many similarities with my current business idea. The app however, only serves as a SCF location guide as it does not offer consumers the ability to purchase any products. It is capable of locating different supermarkets in the users immediate region and showcase the SCF supply. It should be noted that the app seems to no longer be available. Instead, as briefly mentioned in 5.1.1.1, the supermarkets of the Salling Group has introduced this very concept into their own apps, allowing their consumers to only view the SCF of the Salling Group supermarkets. *Motatos* is an online company with visions of saving food and money and to reduce carbon dioxide [31]. The company sells products that has been overproduced, received faulty packaging, are seasonally dependent, SCF or passed its expiration date. One of their decisions has been to exclude refrigerated goods. This has allowed them to deliver their products through a partnership with ordinary shipping companies, as there is no need for cooling during transportation. This service offer their customers with two types of delivery at the cost of a small fee: to the nearest post office or direct home-delivery. This is a strength because they have access to effective and experienced shippers, but also an opportunity as they are missing the entire 'fridge market'. *Motatos* primarily sell best before (BB) products, as their actual expiration date tend to go beyond the labeled one. *WeFood* is a company similar to *Motatos* and follows the same visions. Contrarily though, *WeFood* is a physical store that sells everything from clothes to refrigerated goods. They do not have delivery services and are primary managed by volunteers such as retirees [32]. The company currently has 6 stores located in Denmark, in four different cities. One of these cities is Aalborg. The company is collaborating with Nemlig.dk and the Salling Group, and in particular Føtex. Their revenue is donated to humans in need in corporation with Folkekirkens Nødhjælp. Finally there is *TooGoodToGo* which is the biggest competitor of all. It was founded in 2015 and has since then gone international. The company connects customers to restaurants and stores that has a surplus of food, allowing the customers to purchase food at discount prices through their mobile application. The customers then have an open time period where they can visit the restaurant or store and get their food. *TooGoodToGo* primarily concerns itself with pastry and vegetables, allowing supermarkets to sell their surplus of goods everyday at discount prices before it turns stale.

**Substitute Products and Services** Similarly to *Mad Skal Spises* and contrarily to third party companies, a new and potential future competitor are the supermarkets themselves. Bilka has since 2017 been working on a project known as *BilkaToGo* [33]. BilkaToGo is a service that lets consumers purchase their groceries online or through their app and pick them up prepackaged in the company's drive-in. This concept greatly reduces shopping time, as the consumers will not have to physically search for their products. The service has a fee and depends on how much packaging is necessary. The concept had a lot of success in 2019 when the Covid-19 pandemic happened as it allowed consumers to purchase their products without the contagious risk shopping otherwise had. The service is currently run by 18 of the company's total 19 stores. SCF products are not directly involved in this service, but it allows the company to reduce its potential amount of SCF by packaging the food that is at risk of becoming SCF. There is also the current business models used by the companies to sell their SCF. This is because the companies may believe that their own way of dealing with SCF is more effective than what I propose.

**Suppliers and Stakeholders** Because the goal of the business is to be an intermediary between supermarkets and consumers, all supermarkets are viewed as potential suppliers. The business is heavily dependent on its suppliers and has limited possibilities as it is based on the number of supermarkets. Discussing the optimal suppliers are done in section 5.1.2. Even though the current business idea has two primary costumer segments (the suppliers and consumers) the only stakeholders are the suppliers as it is their products that are at risk. Depending on the size of the business it is also necessary to have a multitude of employees who will be important for the success of the business.

### 5.1.1.3 Key Trends

**Technology Trends** Technological trends can be found by investigating competitors or looking at consumer demand. 5.1.1.2 briefly mentions BilkaToGo who's service is both web- and app-based. Based on the findings in 5.1.1.1 and [25], the demand of services adjusted to smartphones is clearly increasing. Alexa, developed by Amazon, is a state-of-the-art voice assistant capable of performing services based on voice-input from users. Recently, it has become possible for consumers in select cities to order groceries through voice in Alexa and have them delivered home [34]. This is a step further than BilkaToGo, as consumers no longer needs to look for the products on their computer or smartphone. Depending on the type of SCF that is sold, my business needs the ability to keep products in their right environment. WeFood and ordinary supermarkets keep their bakery dry by concealing it in bags or closed off cabinets. Technology is first properly introduced when there is a need for keeping products either cool or warm. Large freezers and refrigerators are commonly used to keep diary and meat cool, while varying heaters are used to keep food warm. A type of transportation vehicle is also necessary, as SCF has to be moved from the supermarkets to the station. Depending on transportation time and SCF type, adding cooling and/or heating devices to the transport vehicle may be necessary. The ability to scan products in order to fetch a price is also necessary.

The most common way to do this is using universal product codes (UPC). The UPC is typically used to encode the barcode of a product with its reference number and UPC company prefix [35]. This is done so it is possible to identify who the brand owner are and help the owners reference particular products. The barcode is a printed symbol used to convey data, typically through the use of a scanner. When the barcode of a product is scanned its price is fetched from a database which can be used to sell the product. While barcodes are used in practically all supermarkets, it has its limitations. It is slow to read multiple products as each code has to be scanned individually and at close range [36]. Additionally, they store a very limited amount of data and are prone to damage as they are printed on paper. These limitations motivated Amazon to develop a Dash Cart [37], which automatically scans products when they are placed in a consumers cart by using weight sensors and cameras. This technology allows consumers to skip the checkout line and grants them an overview of the current total price while shopping. Alternatively, it is possible to utilize a radio frequency identification (RFID) system. This technology has few limitations and functions similarly to barcodes. In order to utilize RFID a scanner and transponder is needed. The scanner consists of an antenna and receiver - differentiating it from an ordinary barcode scanner that only functions as a receiver. When scanning a transponder (or tag), the scanner sends a radio signal that activates the tag. Once activated, data is sent back to the antenna of the scanner.

Barcode	RFID tags
Direct line of sight between scanner and code required	Capable of identifying products without scanner and tag being in line of sight
Proximity between scanner and code must be close	Proximity between scanner and tag varies between inches and meters away, depending on the tag and scanner
Read-only data and unable to be updated	Capable of updating data in real time
Able to identify the type of product	Able to identify the specific product
Unable to be tracked – must be done manually	Can be tracked automatically
At risk of damage due to wear or environment	Ability to cope with crude environments
Barcodes are read slower than RFID tags and must be read one at a time.	Very fast reading of tags – multiple tags can be read simultaneously

**Figure 5.2:** Comparison of barcodes and RFID tags (Inspiration [38, 39])

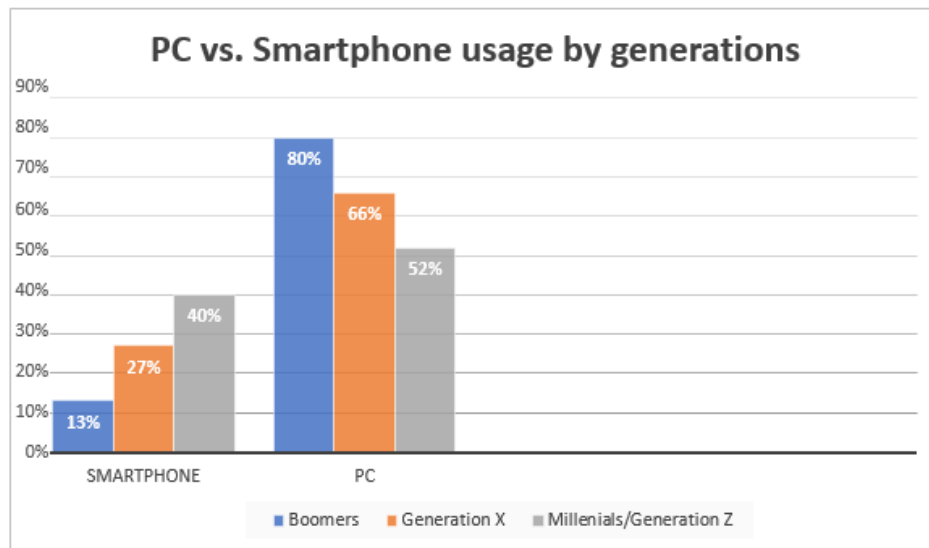
Fig. 5.2 depicts a comparison of barcodes and RFID tags. What truly differentiates a RFID system from barcodes, is the ability to identify specific products from one another, even if they are of the same brand. Including such information in a database system allows a business to know exactly whether or not a specific product is in their warehouse, store or if it is sold. Because supermarkets are not using RFID's, the process of locating and applying discounts to SCF is currently done manually. Sources suggest that by utilizing RFID it is possible to achieve a 78% reduction in time spent manually checking merchandise [40]. Due to the uses of RFID's I decided to contact Prosign which is a company that specializes in the deployment of RFID systems [41]. I got in contact with their CEO, Michael Jensen, whom I spoke to about the possibilities of using RFID's in a supermarket. I asked him whether it was possible to locate and display information about

SCF on the scanner if all products had RFID tags, where to he answered it is. He added that it is possible to only display products that had short shelf time left, e.g. 48 hours. He further added, that it all depends on how the database of the company is structured.

**Regulatory trends** As the current primary goal of the business idea is to re-sell SCF, it is especially important to pay attention to rules regarding expiration dates. In Denmark, depending on the food it can have three types of shelf lives. These are: *last day of use*, *best before* and products with no expiration dates. Following the rules and guides set by Foedevarestyrelsen and Foedevareguiden, food labeled with last day of use can be dangerous to eat after its expiration date due to bacterial growth and must be discarded (and not sold) if the expiration date is passed [42]. These types of food are typically fresh meat and fish. Food labeled as best before used to follow a similar set of rules as food with last day of use, however, retailers has since 2014 been allowed to continue selling these products, typically at discount price. These products vary greatly with respect to their shelf life and type, and include dairies, canned food, flour, juice, soda, jam and more. Food with no expiration has no indication of when it is too old, and may theoretically be sold at any date. These include sugar, salt, vinegar and more. It is important for companies in the food value chain to follow these rules and regulations not only for the well being of consumers but also because Foedevarestyrelsen performs occasional free inspection visitations. If a new company is left with negative remarks from each of the first three visits, they are forced to have two additional fee-based inspections, in order to motivate improvements [43]. I will argue that extra attention needs to be made by companies that primarily concerns themselves with SCF or similar products, as it makes up the majority of such a company's income. As such, taking actions that can help prevent food from spoiling, prevent spoiled food from being sold or retrieve potential harmful food that has already been sold are important.

**Societal, Cultural and Socioeconomic trends** As stated in Market Issues 5.1.1.1, there seems to be a shift in consumers' societal and cultural trends as newer generations of consumers has an increased WTP in regards to sustainable food and an increased environmental responsibility when compared to older generations. Considering the findings in Needs and Demands 5.1.1.1, there seems to be a generational shift in how consumers interact with technology when ordering groceries online. I have decided to visualize this shift in in Fig. 5.3, which depicts the increasing trend of using smartphones vs. PC.

The prices of food and energy (and therefore also SCF), has as of February 2022 spiked to an all time high due to the Russian invasion of Ukraine. 33% of the total worldwide wheat production happens in Russia and Ukraine [44], causing e.g. meat prices to increase due to the increased costs of feeding animals. Due to the war, nobody in Ukraine is capable of cultivating the land nor grind the grain. This in itself is a problem, however the primary concern is the sudden stop of worldwide transportation of goods through Odessa, the main port city in Ukraine. A large variety of goods has increased massively in price due to this sudden stop, among some of which are vegetable oil, gas, energy and meat. The western countries' has carried out sanctions towards Russia in response to the



**Figure 5.3:** Differences in how generations order groceries online (data from [25])

invasion, which also threatens the import of Russian goods. In return to these sanctions, Russia is threatening the western countries with their own sanctions, one of which is the complete halt of gas and energy export. A recent study of the war [45] suggests that the first and most important step is to ensure that the existing food supplies in rich countries are used efficiently. In other words, it has become even more important to reduce food waste as, despite the suffering the western world is experiencing, the situation in poorer countries is much worse. This strengthens two of the problems that food waste has caused over the years, namely: unnecessary waste that results in both supply chain and consumer losses and the moral responsibility of not wasting food when someone else could have benefited from it.

#### 5.1.1.4 Macro-economic Forces

**Global market conditions** Despite the plummeting of the global economy caused by the Covid-19 pandemic and war in Ukraine, Denmark is still in an exceptional position economy-wise. Denmark managed to maintain a GDP growth rate of 7.4% between July of 2019 and January 2022 [46]. The exact forecast of how the war in Ukraine will affect the Danish GDP growth rate in the future is difficult to discern, despite it likely being negative. However, considering the country experienced slight growth during the pandemic and only a tiny loss of -0.1% between January 2022 and the 16th of May 2022, there is reason to argue for a possible growth - though less than previous years. Globally, the pandemic caused high unemployment rates e.g. increasing the rates from 3.5% to 15.2% in the US in the first quarter of 2020 [47]. A similar spike happened during the same period in Denmark, though only from 3.5% to 5.5% [48]. Despite these spikes, the unemployment rate is now back to 3.6% in the US and surprisingly better than ever in Denmark sitting at just 2.5%. Despite this, similarly to most other countries, Denmark is



still experiencing a massive price inflation on gas, energy and food products.

**Capital markets** Acquiring funds for a start-up that helps eliminate a worldwide concern, such as the disposal of edible food, can be done through multiple means. One method is through the potential suppliers of the business. If they believe in the business and it in addition to helping them sell their surplus of SCF also positively impacts the company's corporate social responsibility (CSR), they may be willing to help fund the business. Another method is investigating venture and/or public funds. In Denmark, one such venture fund that fits the business idea is Northcap [49]. Northcap is a company that invests specifically in IT related B-2-B-2-C start-ups. Similarly to venture funds, public funding is also an option, and one such company is Capnova who among other fund software innovations that help existing businesses become more green [50]. I would argue public funding to be the optimal choice initially, as they tend to invest much earlier than venture funds. In Denmark, including Capnova, there is currently 4 public funds and the initial investment is typically between 3-4 million DKK, depending on the business [51]. A third option is to fund the business yourself either by yourself or through a bank.

Another topic of interest is crypto currency and the blockchain technology behind it. Crypto currencies are digital tokens that hold real value and typically purchased through real money (similar to gold). There exist a large variety of different currencies, most of which serve their own purpose. Holders of these currencies contain them in a secure online (or physical USB) wallet, and can buy products or services from providers that offer payment through these currencies. Bitcoin, the most famous of the currencies, offers immediate peer-to-peer payment, global payments and very low or no payment fees [52]. These currencies work outside of banks enabling individuals without a functioning payment system to suddenly have one. The blockchain technology behind crypto currencies is an incredibly secure ledger, making it optimal for financial systems [53]. I believe it is important to consider the future possibilities of blockchain technology and the ability to pay for food (and other) products through these digital currencies.

**Commodities and other resources** Denmark is among the leading countries in wind energy, exploiting the wind resources of both the Baltic and North seas. This strength has further allowed the country to up its ambitions with respect to reaching greenhouse gas (GHG) emission neutrality, having set the goal of reducing GHG emissions by 70% in 2030 [54]. Because of the damage GHG emissions causes to the environment, the increased trend of environmental responsibility in consumers and the GHG emission goals set by the country, I believe it is important for existing and new companies to strive for green energy solutions and perform actions that may reduce emissions within the companies. Because of the rise in external energy prices the conservation of food may prove to be more expensive than previously, thus it may be beneficial to consider internal energy solutions like solar cells or other uses of the environment.

**Economic infrastructure** The economic infrastructure of Denmark is strong. In Aalborg alone, there is a high accessibility to both suppliers and consumers. Gathering

SCF for the business must be done in a type of vehicle that is able to keep products cool during the travel time. Using a vehicle to gather SCF from one or multiple supermarket chains should be relatively simple. An interesting subject however, is how the SCF should be collected at the different supermarket locations. This will be further elaborated upon later in section 5.2.3.

#### 5.1.1.5 Findings

The analysis indicate that environmental responsibility and sustainability is trending within consumers. It also shows an increasing interest in the use of smartphones over PC, based on generation. Supermarkets are interested in digital solutions and reducing food waste, however have difficulties overcoming certain barriers, and tend to wait for success stories. Despite this, there are clear drivers, as their consumers are trending towards a more greener future. Companies are also becoming more environmentally aware, and food waste is not just bad for the environment, it is also an economic waste. Covid-19 has influenced the degree of which how much consumers use digital tools and the prices of food as increased due to the war in Ukraine. These are relevant considerations, as they may influence future technological possibilities and prices of SCF. Based on the findings, I believe that there exists a potential market for SCF in the form of dairies, meat and other products that supermarkets are currently placing in their *"soon to expire"* basket in their stores. If a business acts as an intermediary it is heavily dependent on its suppliers, similarly to e.g. TooGoodToGo. Based on the research, I could not find any competitors that collect the above mentioned type of SCF and has a physical store, except for WeFood. I believe it is possible to create unique business model from this, because none of the competitors take advantage of the SCF mentioned above. Considering the trend of environmental responsibility and Denmark's ambitious GHG goals, I believe it may be wise to consider green energy solutions such as solar cells, electric vehicles and others.

#### 5.1.2 Relevant Partners

In order to find appropriate business partners, I have decided to initially look at the different supermarket chains' size, yearly food waste, turnovers and growth. The greater they are in size the more stores they have which leads to more SCF. The more food waste they have, the greater the need for a solution and thus a potential partnership. More food waste should also result in more SCF supplies for a potential business. Finally, the reason for looking at the different turnovers and growth is to estimate the general success of the different supermarket chains. Following this, the chains will be categorized based on concepts i find important for my business idea. The categorization will help compare the different chains and thus find out which of the partners are most important. The concepts are: "Green Vision", correlating to how much effort a company has put forth towards food waste issues and environmental problems; "Stores in Aalborg", marking the presence of the different chains in Aalborg, taking their size and numbers into account; "Seeking Partnerships", which is based on how actively the different chains are looking



for or already have developed partnerships with other companies with respect to SCF and/or food waste solutions; and "Growth", which depicts the general success of the company and may help grant a consumer perspective. I will be investigating the following supermarkets: The Salling Group (Netto, Bilka and Føtex), Coop (SuperBrugsen and Fakta), Rema 1000, Lidl and Aldi.

	Total stores	Stores in Aalborg	Food waste 2019	Turnover 2020 in DKK	Growth 2020
<b>Netto</b>	522	16	2,33%	23.600.000.000	6%
<b>Bilka</b>	19	1	2,10%	-	-
<b>Føtex</b>	104	5	2,83%	-	-
<b>Rema 1000</b>	357	16	-	23.400.000.000	11,5%
<b>Fakta</b>	370 (2019)	12	-	8.100.000.000	- 5%
<b>Aldi</b>	185	4	-	3.700.000.000 (2018)	-
<b>Lidl</b>	126	4	-	5.000.000.000	-
<b>Super Brugsen</b>	300 ~	6	-	-	3,5%

**Figure 5.4:** Comparison of supermarkets [55–65]

As mentioned above and depicted in 5.4 I have only included some of the supermarket chains that exist in Denmark and entirely excluded individual merchants. The reason for this is twofold. Firstly, I based it on their presence in Aalborg, as this is the city where the initial collaboration will take place. Constructing a system for a partner that (due to their size) is incapable of supplying enough SCF would ultimately lead to failure. Secondly, I believe that supermarket chains (compared to merchants) are ahead of the curve digitally, potentially opening the viability of more sophisticated solutions within my own business. I decided to include Bilka despite there only being one store in Aalborg, due to the magnitude of its physical size. As depicted, some of the information was not available. The inability to find the turnovers for Bilka and Føtex stems from the fact that they are part of the Salling Group. The Salling Group consists of 9 chains and through my search only the accumulated turnover for all 9 chains was available, except for Netto [62]. Despite only finding the accurate growth of four chains, most companies are in fact in growth [58–60, 63]. There seems to be a common agreement that this is partly thanks to Covid-19. The Salling Group provided a representation of each of their supermarket chains food waste between 2014 and 2019 [55], showing an accumulated approximate decrease of 40% in food waste since 2014. Rema 1000, as an individual chain seems to be very successful with a growth of 11,5% compared to its primary competitor (Netto) which only achieved 6%. Fakta lost 5% in growth, which is surprising based on the success of its competitors. The turnover of Lidl used to be very similar to that of Aldi's, but has seen a significant increase in recent years [58]. Despite Aldi not being as successful as Lidl and being deficit, it still had growth and reduced its deficit in 2020 [60].

Following the above research I have decided to exclude Bilka and Aldi. Amongst the Salling Group, Bilka had the overall lowest food waste and only one store in Aalborg. I therefore, despite its size, I believe it is unfit as an initial partner for this project. Aldi was ruled out despite its many similarities with Lidl. The primary reason for this is their

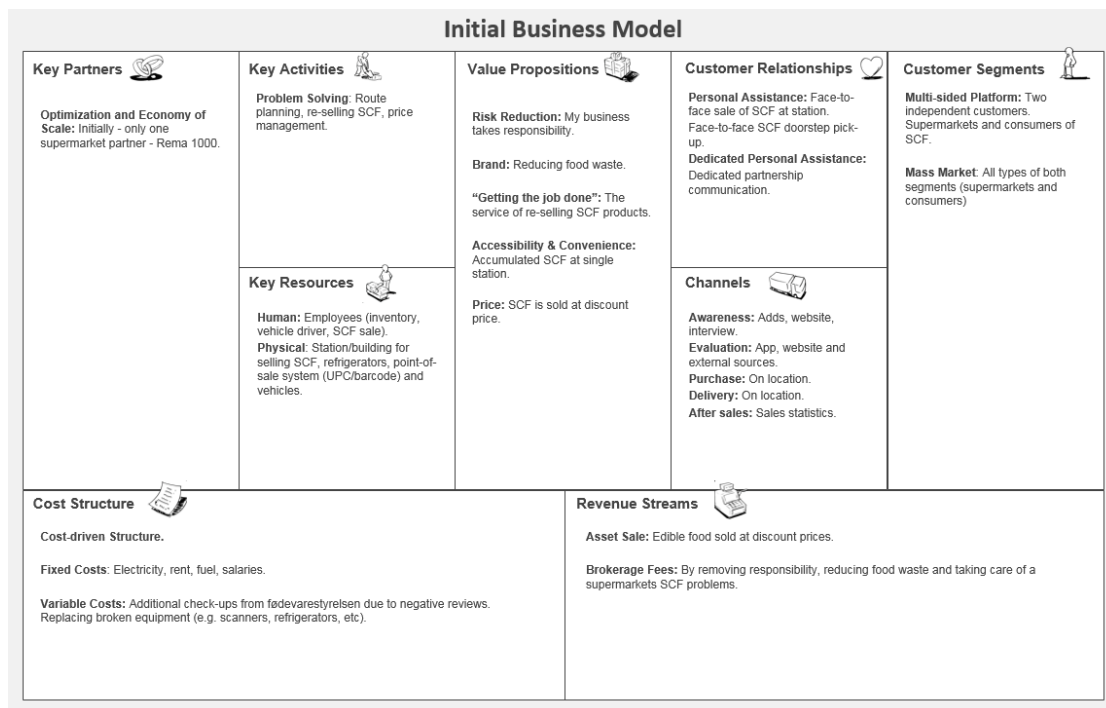
difference in turnover. Deciding which of the companies had the best Green Vision was done by investigating the varying efforts of the companies. I found that Netto, Føtex and Rema 1000 are quite evenly matched. Rema 1000 however, has been fighting food waste longer than the others (since 2008) and received awards for its battle [66]. All three companies promote and share the importance of food waste on their individual websites [67–69], and have common goals to reduce the food waste by 2030 while simultaneously finding alternative uses for food that do end up as waste. Fakta, SuperBrugsen and Lidl do not seem as internally involved as the formerly mentioned despite having a food waste awareness section on their websites. I decided to then look at how many stores the different companies had in Aalborg. Despite Føtex and Lidl being fairly evenly matched, I would argue that Føtex is more important due to their difference in physical size. Rema 1000, Netto and Fakta were quite evenly matched. I investigated "Seeking Partnerships" in two ways. First I looked if the different chains utilized external partnerships to accommodate for their SCF and/or food waste and secondly whether or not they were actively seeking new partnerships. I found that only Rema 1000 is actively seeking local partnerships [67] despite all chains having undergone partnerships with TooGoodToGo. Rema 1000 specifies an example including two of their stores in Copenhagen that have undergone a partnership with an organization known as: *Projekt Hjæmløs*. The organization is supplied by SCF in two ways: an individual from Projekt Hjæmløs manually drives to the stores and collects SCF, and Rema 1000 supplies extra SCF that e.g. gets damaged in the warehouse. Employees at Projekt Hjæmløs then cooks warm food every week for the homeless of the city. The fact that all companies have undergone a partnership with TooGoodToGo implies, despite not actively seeking it, they are in fact willing to receive external help. Finally there is the question of how Digitally Developed the different chains are. Each company have their own personal app that offers discounts, news, lotteries and more. Rema 1000 has begun to incorporate a system that allows consumers to scan their own products to fetch prices, add them to a basket and then pay using a QR-code as they leave the store - thus skipping the process of waiting in queues [70]. Additionally, as previously mentioned in 5.1.1.2 The Salling Group has developed a system that allows consumers to see all SCF in the chains' individual stores, allowing consumers to navigate to a particular store based on its SCF if they so wish.

Based on the above research I have concluded that the optimal initial partners for this project is ranked as: Rema 1000 > Netto > Føtex > Fakta > Lidl > SuperBrugsen. Despite this ranking, I decided to contact all of the companies. Unfortunately they were unable set time aside for an interview.

### 5.1.3 Initial Canvas design

The following model depicted in Fig. 5.5 is my first business model design. The model should be interpreted from the perspective of a newly established business, where a partnership only has been made with a single Rema 1000 store.

The model depicted in Fig. 5.5 offers the following value propositions: for the supermarket there is a risk reduction, as the responsibility of making optimised uses of SCF is no longer in their hands. Depending on the success of my business', this will improve the



**Figure 5.5:** Initial business model canvas design, template from Strategyzer[71]

brand of the supermarket as their food waste will be reduced. In addition, the service of re-selling the SCF 'gets the job done', as the supermarket no longer has to be concerned with labeling the food with discounts and trying to sell it. Consumers are given a single location, where they can browse among the SCF from the supermarket. With only one supermarket partner, this offers no purpose yet, but if more supermarket suppliers are willing to become partners, it will be convenient for consumers as SCF from multiple sources can be found in one place. Furthermore, I believe that it can be considered a value proposition that all products are sold at discount prices, as it gives consumers a reason to prioritize my business over others. There are two customer segments, hence the business is a multi-sided platform. There are the supermarket suppliers and the consumers of SCF. The value propositions offered by my business, initially fits the mass market of both of these segments. In order for these value propositions to be successful, some key activities must be performed. This involves route planning, so that the truck driver knows what supermarkets that are in possession of a surplus of SCF. This again, will first really matter once multiple partnerships has been established. Then there is the activity of re-selling SCF, which can be done by an employee at the station. I will not be considering imitating WeFood by using retirees and volunteers, as I believe they are motivated by the idea of donating the revenue to humans in need. Then there is the activity of price management. This is necessary, as each product will need a price that in collaboration with the individual supermarkets has been decided upon. Once a price has been decided it is fixed, but can be updated if necessary. In order to perform

these activities and sell the SCF, certain resources are necessary. These include human resources in the form of a truck driver, inventory managers, and employees to re-sell the SCF. A truck driver is needed because someone has to drive to each supermarket and collect the SCF pre-packaged by the supermarket employees at their doorstep. Inventory managers may be needed, depending on how many products that has to be managed. The amount of employees that are re-selling the food also depend on the inventory and general success of the company. It may be possible to have the same employees do both inventory management and selling SCF. There are also physical resources which will need attention. These are a location for the station/building where the truck driver will unload SCF, which is then managed at the inventory level and finally sold at the same location. There is also the technological requirements of vehicles, refrigerators, fridges, and a point-of-sale system. These are necessities in order to collect the SCF, keep e.g. meat and dairy cool and finally sell them. Because SCF is sold face-to-face at the station the relationship between the consumer and business is regarded as personal assistance. Depending on how the SCF is picked up by the truck driver (handed over by a supermarket employee or simply left to be taken at the doorstep), a face-to-face type relationship may also occur here. Dedicated personal assistance is offered to the supermarket, as price management needs to be done in collaboration. Furthermore, the supermarket should be offered sales statistics of their products. In order to create awareness among consumers I believe it is important to utilize adds through social media and possibly through the supermarket partners. Having the adds connect to a website that elaborates the goals of the business, location and shows product examples (maybe even current inventory) is also important. Technologically, these adds and the website should be usable on both PC and smartphones. Interviews should be conducted with potential supermarket suppliers, in order to establish partnerships. In order for consumers to evaluate the company, I believe having an app is very important. As noted in 5.1.1.1, the Netto+ app has had massive success. The app should optimally function in a similar manner to the Mad Skal Spises app, except there would only be one location to find the SCF. External sources such as *Trustpilot* [72] can be used by consumers to evaluate the business through personal ratings. Both purchase and delivery should for consumers initially happen at the station location. For supermarkets, the value propositions are delivered in the form of services at the individual supermarkets and at the location of the station, where the SCF is sold. Sales statistics, as briefly mentioned earlier, is offered to the supermarkets as a post-purchase service. The structure of the business is cost-driven, as the amount of profit that can be generated is limited by the amount of supermarket partners and the successful sale of SCF. Thus it is optimal to minimize costs wherever it is possible, such as in the case of having employees be both inventory managers and at the cash register. The fixed costs are electricity, which is needed at the station to keep products cool, keep the point-of-sale system going and so forth. Rent for station is also necessary, and the same goes for fuel to the truck and salaries to the employees. Not all variable costs can be known prior to their appearance, but I believe it is important to focus on hygiene and the standards set by fødevarestyrelsen. Especially when working in a business concerning food close to its expiration date. Replacement of broken equipment is of course also a variable cost. Then there is revenue streams. The primary earnings come from re-selling SCF at the

station. In turn for selling food for the supermarket, my business takes a percentage of the earnings of each SCF product. Furthermore, supermarkets are required to pay a small brokerage fee, for my business to take on the responsibility of selling their SCF and hopefully improve their brand.

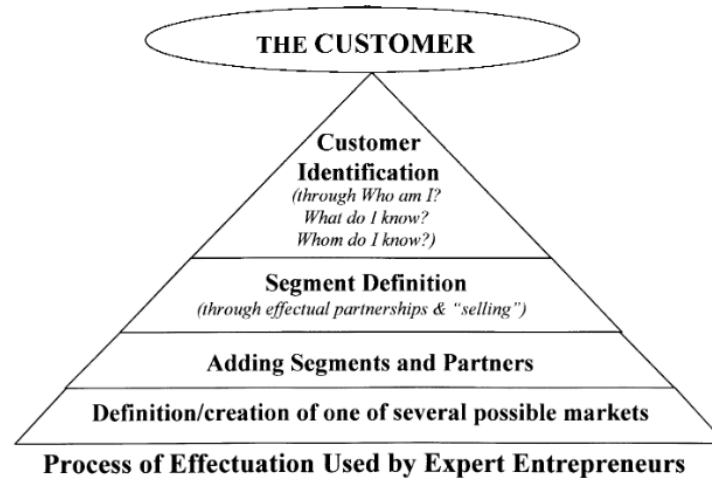
## 5.2 Creating Prototypes

I have now analysed the business model environment 5.1.1 and the potential partners of the business 5.1.2. Following that, I developed an initial business model 5.1.3 based on the analysis and partners. The model targets a market that has no direct competitors. Following the model is a description that details its content. The following section will now introduce effectuation in the context of business model design; an empathy map, which is conducted on a Rema 1000 in my vicinity; and three new business process management logics (BPM). Using the process of effectuation, the empathy map and the new BPM logics, four scenarios will be created onto-which I will apply the Blue Ocean strategy.

### 5.2.1 Applying Effectuation

Based on the findings in 5.1.1 it would be possible to design a business model that to a degree fulfills the goals of the problem statement. However, due to not having done a proper interview with a potential supplier, I find this to be lacking. I believe it is important to not only consider the market I am trying to access, but also what effect it would have if the value propositions were to actually be implemented. Saras D. Sarasvathy introduced two concepts known as effectuation and causation back in 2001 [73]. Causation concerns the ability of a company to predict and thus control the future, whereas effectuation contrarily is about only controlling the future we know rather than trying to predict it. Causation is thus closely related to the analysis in section 5.1.1. I believe effectuation to be an important addition to the design process, due to the logic behind it. Effectuation can be generalized by four principles [73]: *Customer Identification*, concerning the resources at hand. It corresponds to the upper triangle in 5.6, and I will conduct an analysis of this using an empathy map following this in section 5.2.1.1. *Affordable losses* consists of a cost-driven experimentative attitude towards strategies. It is better to have more options in the future and be flexible, than to maximize returns in the present. *Partners rather than competitors*, concerns the idea of being cooperative rather than competitive. By motivating co-creation with potential threats, rather than competing, it is possible to eliminate uncertainties and ease market accessibility. Then there is *leveraging contingencies*, which concerns leveraging unexpected contingencies in the market rather than trying to be prepared for them. The approach to this is cyclical and can help control contingencies when predictions does not work.

Because of how difficult it is to accurately predict future digital solutions (due to the sheer amount of possibilities), and because existing drivers for food waste prevention within the food supply chains are likely to trigger digital solutions 5.1.1.1(further enhancing digital transformation), I believe resource conservation to be incredibly important. Thus,



**Figure 5.6:** Sarasvathy made a model comparing Causation and Effectuation. This is only the Process of Effectuation part of the model [73]

instead of excessively trying to predict and prepare for a variety of possible futures, I believe it is important to look at what we can do through experimentation.

Following the logic of how experts pursue the process of effectuation, as depicted in Fig. 5.6, my problem statement gives rise to one of several possible markets within the SCF business and my analysis in 5.1.1 has already defined the plausible segments and partners. Arguably, section 5.1.2 may be used as customer identification, however, I believe it is important to extract information at a smaller and more specific scale. Thus, following this I will conduct an empathy map 5.2.1.1 for a singular Rema 1000 in Aalborg. I believe the process of segment definition, adding further segments and considering partners depicted in Fig. 5.6 has already been done in section 5.1.1 and 5.1.2. Thus, I will in the following section be conducting an empathy map in order to identify a specific customer. Following that, the definition/creation of additional markets will be done through scenarios.

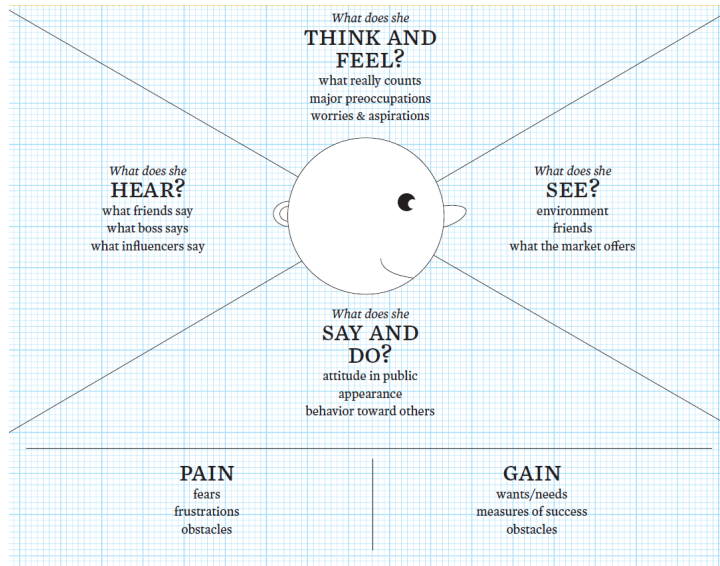
### 5.2.1.1 Empathy Map

The empathy map, depicted in Fig. 5.7 is a tool used to create a profile for a customer. It helps define the customer environment, aspirations, behavior and concerns, which can help design better value propositions, customer relationship and ways to reach the customer [13]. This is very useful, as it will help me identify the customer, which as depicted in Fig. 5.6 is the very first step following the process of effectuation.

I will be conducting the empathy map on a Rema 1000 that from a business perspective is a possible customer. This is based on the fact that it is in Aalborg, that it is in a populated location, that I have been to the store personally and the results in section 5.1.2. The supermarket is a Rema 1000 at Godsbanen 2 in Aalborg, Denmark. I will be trying to answer a set of questions, presented by Osterwalder and Pigneur [13], in order to define the empathy map for the particular Rema 1000. As depicted in Fig. 5.7, the



questions are: "what does the customer see?", "what does the customer hear?", "what does the customer truly think and feel?", "what does the customer say and do?", "what is the customer's pain?" and "what does the customer gain?". There is a nice symmetry between customer identification in Fig. 5.6 and Fig. 5.7, as the effectual process is concerned with the perspective of the entrepreneur, while the empathy map is concerned with the customers .

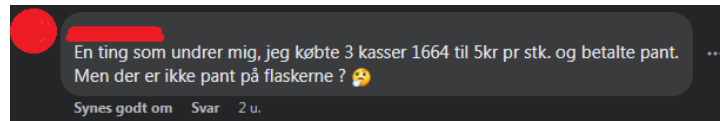


**Figure 5.7:** Empathy map, by Osterwalder and Pigneur [13]

The investigation will be performed by through physical observation at the supermarket, questioning employees and online research.

The store is next to a very busy city road close to the center of the city and is surrounded by sidewalks and cycle paths. There is a parking lot for cars and one specifically made for bikes. In addition to people who drive to the store, this makes it easily accessible for both cyclists and pedestrians as well. I observed consumers of all three types enter the store. I noticed a car entering and leaving the parking lot because it was full. Employees within the store are most of the time in close proximity to consumers. Additionally, the store has an online presence on Facebook. This presence allows for direct online communication between the store and its consumers. This opens for opportunities and risks, as it exposes the store to criticism of individuals, such as depicted in Fig. 5.8, where a consumer notes a bad experience. I rarely noticed responses from the store, which for some may be perceived as bad service. Because social media are capable of influencing the brand of a store, I believe it is important, particularly if you have an online presence, to deliver quality customer service. Despite not answering to criticism, they use a language combined with emojis that represents a positive and energetic mood. They also posted images of their employees, whom seemed smiling and welcoming. As briefly noted in 5.1.1.3, Fødevarerstyrelsen is a big influencer within the food supply chain. During the last four check-ups, the store has only received positive 'smileys', which indicates good

maintenance[74].



**Figure 5.8:** Consumer complaining about paying extra for a particular product on Facebook [75]

Inside the store, I observed two employees cycling between the following different tasks: helping consumers, refilling food stocks, managing the cash register, accumulating leftover bakery, putting price-labels on SCF and cleaning. I found the accumulation of bakery interesting, which motivated me to ask the employee for the reasoning. According to the employee, leftover bakery is donated, though she could not answer me to whom. I also interacted with the employee who were labeling the SCF, and I was told that if any SCF crosses its expiration date it is either donated somewhere or discarded as trash. Further questioning led to the elaboration of how the employee on some days spent between 20 and 30 minutes finding and labeling SCF. I decided to investigate the refrigerated SCF, and found two different products that in fact had passed their expiration dates, while most others were either on its final expiration date or one day prior to it. Both employees were positive, smiling and energetic, which quite fittingly represents how the store acts online on Facebook [75]. I decided to get in touch with the sous-chef of the store, Nikolai Nielsen, whom I asked a couple of questions. I asked a question referencing the food waste ambitions set by Rema 1000 and the concept of 'being green' as noted in section 5.1.2, to which he answered that those definitely matter. He argued that, from his experience, higher earnings tends to result in lower amounts of food waste. He was unable to elaborate further, so I can only assume he is referencing that higher earnings equals more food sold and therefore less waste, despite stock supply orderings vary. Due to the conversation I had with one of their employees I decided to ask him what they exactly did with their SCF if it passed its expiration date. He told me, that the amount of SCF that ends up as trash is in fact quite low. This is because they donate the majority as animal feed, especially fruit and vegetables. The only food that they discard, is food that is potentially hazardous due to damaged packaging or becomes so after its expiration date (e.g. meat). He added that their bakery section typically is sold out, before they get to donate any of it. Furthermore adding, that it is different for every Rema 1000, arguing that some other Rema 1000 may discard an entire cart of food on certain days. We ended the conversation after I asked a final question regarding if they faced anything he thought was troublesome regularly, whereto he promptly answered no. He was in fact very happy about how everything was going.

### 5.2.2 Business Process Management

Business process management (BPM) has for years been used by countless companies to help manage the (re)design of processes. The concept is based on three logics: process modelling, infrastructural alignment and actors. A recent article written by Baiyere,



Salmela and Tapanainen, uncovers some of the tensions that a company in digital transformation may be experiencing when following the classical BPM logics [15]. They introduce three new logics based on the originals, namely: *light touches*, *infrastructural flexibility* and *mindful actors*. Light touches is concerned with how the general process logic of BPM is very strict and rigid, and argues that processes should be easily modifiable and therefore only receive 'light touches' when modifications are necessary due to e.g. contingencies. Infrastructural flexibility is about how the infrastructure of a company should be able to swiftly orchestrate its information technology in a way that makes it amenable to e.g. a changing environment. In a similar fashion to light touches, these orchestrations should be relatively easy to perform. It can prove difficult for bigger companies if their ERP system lacks the flexibility to accommodate for changes. Finally, there is mindful actors, which concerns the individual agents. The users of the infrastructures and the performers of the processes. The point of this logic, is to put the concept of procedural processes on hold, and allow individuals to adapt and improvise in unexpected situations.

### 5.2.3 Scenarios

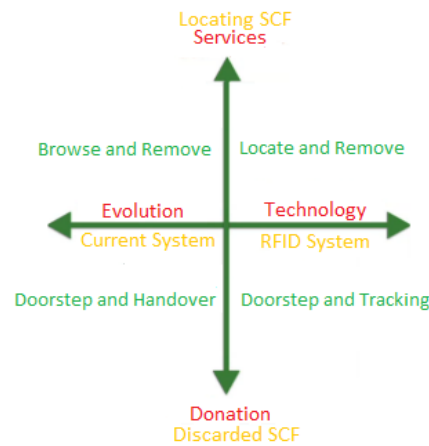
Scenario-guided business model design is a tool introduced in [13]. It can help either design new business models or further innovate and adapt existing models. Scenarios are used to help describe future environments in which a particular business model may prove useful. It is important to note, that these type of scenarios are not used in an attempt to predict the future, but rather to help designers imagine possible futures [13]. This means that it fits quite well with the effectual thought processes. It is particularly useful, given the issues that arise within companies in digital transformation, as having prepared a multitude of adaptable scenarios for different futures can make the adjustments more fluent. Osterwalder and Pigneur suggests two types of scenarios. One is built based on customer insights and the other on future environments. Creating environments for the different scenarios is in my case most useful, as they can be used to illustrate the technological possibilities in the future. Osterwalder and Pigneur does not introduce specific instructions on how to create future scenarios, but simply base it off business criteria. Because of this, I will be using the scenarios model introduced by Aaen [76] depicted in Fig. 5.9. Following the model, I will be decorating each axis with questions that will help create intersections between the different scenarios. The yellow text corresponds to the situation, i.e. the context and our understanding of the problem. The red text is my contribution, solution or design meant to solve the problem. The questions are formulated based on the analysis done in 5.1.1 and 5.2.1.1. Each quadrant thus depicts a scenario from which a business model prototype can be created.

In the following section I have used the considerations from findings in 5.1.1 and 5.2.1.1, and based my scenarios on how my business can utilize services, technology and existing activities and problems within supermarkets to create attractive solutions.

As depicted in Fig. 5.10, I have come up with four different scenarios. Browse and Remove, Locate and Remove, Doorstep and Handover, and Doorstep and Tracking. I will be elaborating each of these scenarios later with their respective model.



**Figure 5.9:** Model used to create scenarios (Ivan Aaen, 2022 [76])



**Figure 5.10:** Decorated Scenarios model

The context or situation of the problem is thus *Current System*, which is a representation of how supermarkets currently use UPC and barcode scanners. *Locating SCF* is based on the effectual research from findings in 5.2.1.1, where I observed and consulted workers spending approximately 30 minutes locating and adding discount labels to SCF products. *RFID System* is inspired from 5.1.1.3, and represents a future where supermarkets have begun to utilize RFID systems. *Discarded SCF* relates to the problem that SCF is discarded rather than donated - in contrast to e.g. bakery products, as stated in 5.2.1.1. The solutions to the problems are *evolution*, which is the act of investigating trends and possible futures I as a business must be prepared to adapt to. *Services* concerns proposing new value propositions in the form of services that can solve the problem. *Technology* is the act of deploying system(s) capable of optimizing existing processes and utilize the benefits surfaced by supermarkets use of RFID systems. *Donation* is a solution meant to

combat the currently discarded SCF, while maintaining or improving the current donation strategy currently used by supermarkets.

#### 5.2.4 Appliance of the Blue Ocean Strategy

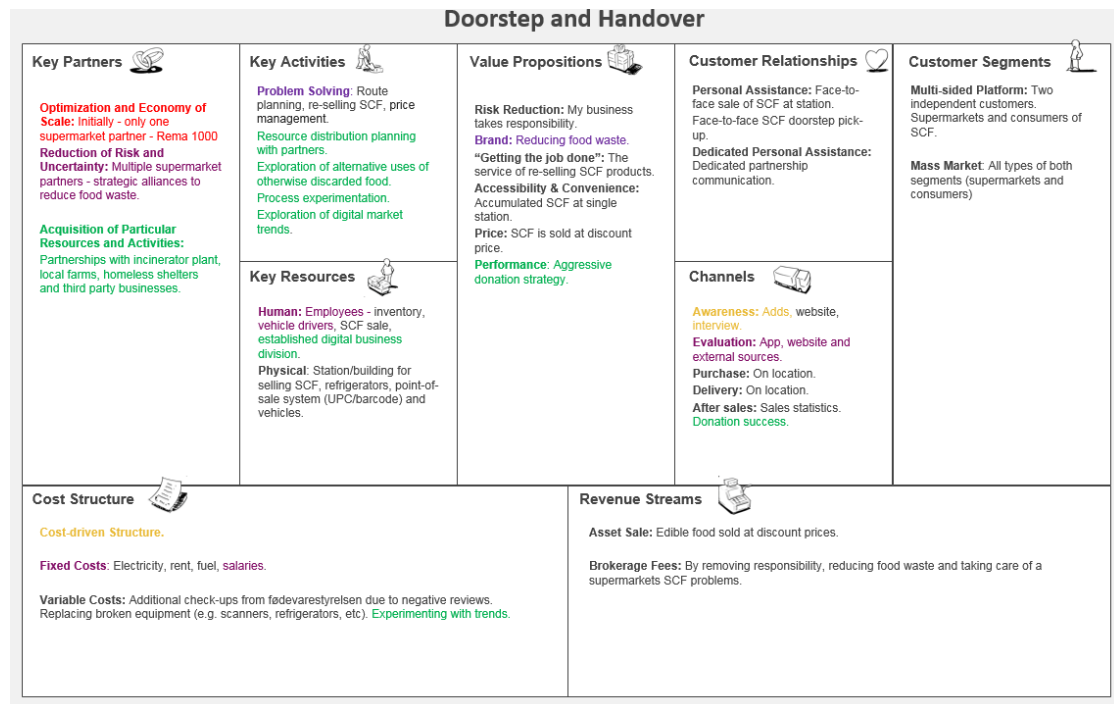
The Blue Ocean strategy [13] will help create value innovation in the business model by lowering costs (by pruning low value generators) and increasing value by replacing pruned elements with alternatives. This can help create adaptation strategies in cases where the environment of the business unreliable. The Blue Ocean strategy involves performing actions to the business model features. These actions involve eliminating, reducing, creating, or raising the features. The following section will present different scenarios where actions are denoted by a color scheme to illustrate the changes that are made to the features in the original business model, depicted in Fig. 5.5. The actions made to the features are denoted by the following color scheme:

- **Green:** feature is created.
- **Red:** feature is deleted.
- **Yellow:** feature is reduced.
- **Purple:** feature is raised.
- **Black:** feature is stays the same.

Some general information that concerns all of the prototypes. In each of the prototypes, the cost-driven structure is reduced, as in all of the models there are cases of needing more employees, resulting in higher salaries. The single supermarket partner Rema 1000 Godsbanen 2, in key partners, is deleted - but not removed as a partner, just as a feature. The feature "Reduction of Risk and Uncertainty" is created in all models, and concerns creating partnerships with multiple competing supermarket chains, in order to collaboratively reduce food waste. In this strategic alliance, Rema 1000 at Godsbanen 2, is also included. Problem solving in key activities is also raised in all of the prototypes, as all of them have features added. In channels, adds and interviews are reduced in awareness. This is because the models represent a different point in time, where multiple supermarket partners has been attained and the business already have created some awareness. Evaluation in channels is raised along with its features, as app development, website improvements and so forth become more important, the more users it has.

##### 5.2.4.1 Doorstep and Handover Model

The Doorstep and Handover prototype depicted in Fig. 5.11 is a model based on the idea that no technological changes has been made to the supermarkets infrastructure. The focus of the model is to explore the digital market and go beyond the currently used donation strategy in supermarkets. The name of the model stems from the fact, that SCF is collected at the doorstep of the supermarket and then whatever SCF that is not

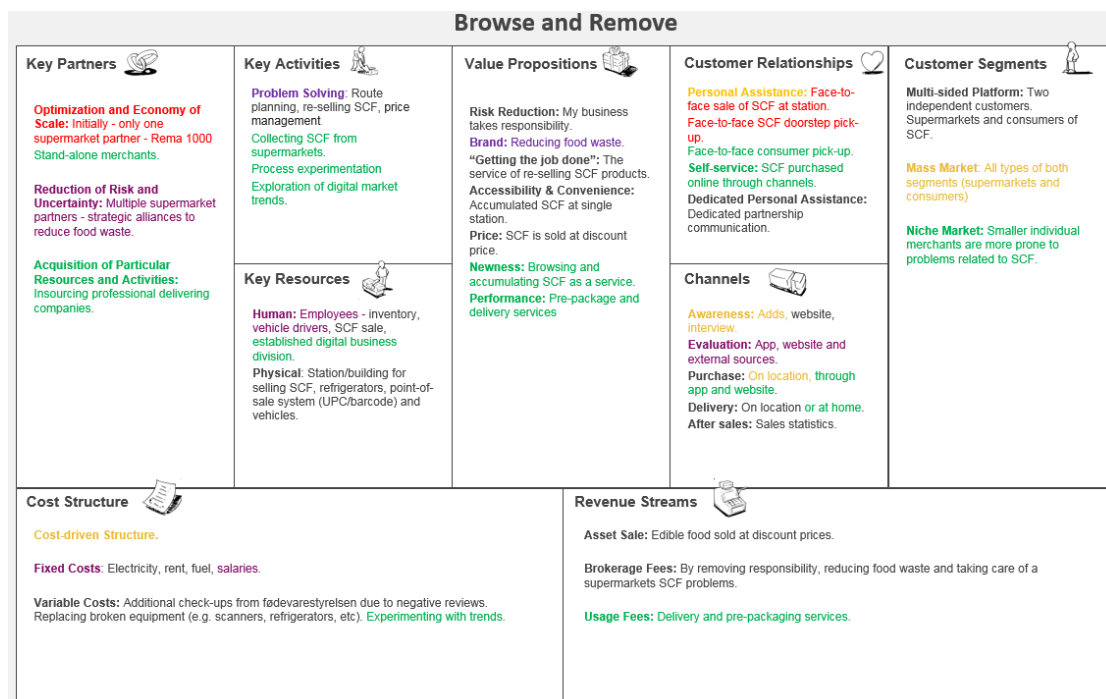


**Figure 5.11:** Result of applying blue ocean to the Doorstep and Handover Model.

sold gets donated/handed over to other parties. I created a new performance-based value proposition which purpose is to make optimal use of otherwise discarded SCF. Following an effectual mindset, I created a feature in key partners that can help the model adapt to changes in the environment and expand the possibilities of donation. Cultivating partnerships with local farms, homeless shelters, incinerator plants or other third party businesses, will ease the adaptation between them. If, for instance, a new third party opportunity arises, having experimented with other similar parties is likely to leverage contingencies allowing for easier adaptation through light touch re-modelling. Despite this adaptation not necessarily being linked to a digital transformation, this sort of logic is closely tied to light touch processes. This is because light touch processes are bound by the concept of being easily modifiable, swaying from the otherwise strict and rigid modelling logic processes tend to follow. An example of an opportunity where leveraging the contingencies of third-party activities could help is "Projekt Hjemløs" presented in 5.1.2. Hazardous food that supermarkets would discard can have alternative uses, such as being used as compost or fuel for incinerator plants. Anything edible should be donated to homeless shelters or third party partners, such as Projekt Hjemløs. In key resources I decided to raise the number of employees, as additional vehicle drivers may be necessary when distributing donations. Arguably, donations should not have a cost - thus it may be more beneficial to have the receipts collect the food themselves. This is why resource distribution planning is added in key activities. Another important resource is employees for a digital business division. Exploring and experimenting with existing and

new digital and technological trends, will once again help to deal with contingencies. The goal of this division is to enable infrastructural flexibility, allowing for swift rehabilitation of IT infrastructures in cases of necessary digital adaptations. E.g., by exploring and experimenting with business opportunities found through the data collected from different consumers and existing technologies, it is possible to leverage IT-related infrastructural changes, i.e. increase infrastructural flexibility. This follows the principle of affordable losses quite nicely, as it focuses on opening future opportunities rather than maximizing on present returns.

#### 5.2.4.2 Browse and Remove Model



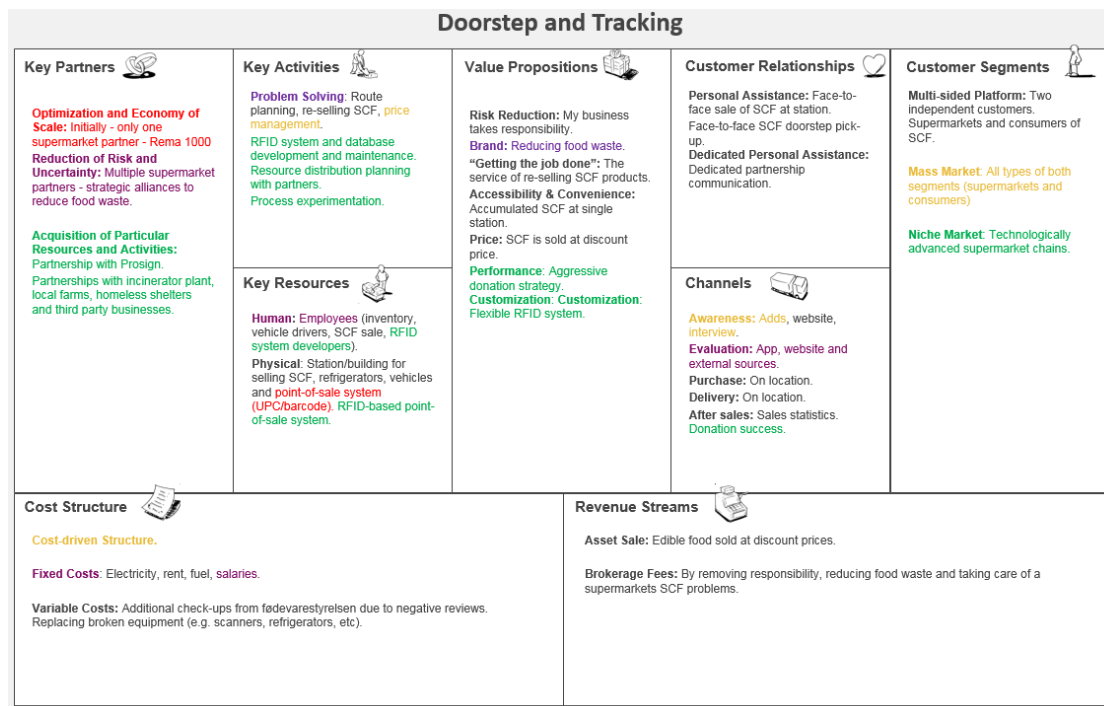
**Figure 5.12:** Result of applying blue ocean to the Browse and Remove Model.

The *Browse and Remove* prototype in Fig. 5.12 focuses on delivering customer services and similarly to Fig. 5.11, the model is also concerned with evolution and considers that no changes has been made to the supermarkets technologically. Because I have an employee browse through the supermarket and remove/collect their SCF, the name of the model is 'browse and remove'. Considering being a multi-sided platform with two customer segments, there are two potential targets to offer services to. This gave rise to two service-oriented value propositions. As mentioned in section 5.2.1.1, some employee spend upwards of 30 minutes browsing through, placing labels and moving SCF. This gave rise to a service concerned with how SCF is going to be collected at each supermarket. Instead of having workers from the supermarket locate and pack the SCF, another option is for my employees to do it for them. An employee from my business, could enter each of

the supplying supermarkets, browse through it and pick-up all the SCF. The process of locating SCF using classical barcode scanning would require spending additional time at each supermarket. The process of browsing through the SCF must be practiced, as quality is of utmost importance. If not done correctly, it may lead to losses on the suppliers end, which will hurt the reputation of both the supplier and us. Despite practice and a systematic approach in finding SCF, the circumstances for where the food is located may vary and routines may vary for each supplier. This prompts the BPM logic of mindful actors. In this context, I believe it is important for the employee to not just follow a strict procedure, but rather act intuitively to the situation at hand. E.g. if the general systematic approach is to first go through the supermarkets vegetables, then meat, then dairy and so fourth, depending on the situation, the employee must be able to improvise and do them in another order. Optimally, this service should be offered at night or around closing times, so that our inventory can be replenished and database updated by the next morning. This service also creates a niche market of smaller merchants. Compared to bigger competitors, stand-alone merchants have less manpower and therefore less employees to manage their SCF, likely making this service more beneficial to them. That is also why stand-alone merchants has been added to key partners.

The other services are performance based and focuses on consumers rather than suppliers. Through the analysis of competitors in Industry Forces 5.1.1.2 and consumer behavior in Regulatory Trends 5.1.1.3, I have come up with a list of possible services. These are: sales through online channels, home delivery and assisted pick-up. Sales through online channels was inspired by Motatos, TooGoodToGo and the "Mad Skal Spises" app. What further motivates the deployment of such services is also the increasing trend of ordering groceries from home seen during the Covid-19 pandemic, as stated in section 5.1.1.1. Despite the findings in Fig. 5.3 illustrates an increasing interest in smartphones, PC is still the most popular choice among all generations. Therefore I believe it is important to utilize self-service ordering on both platforms. Arguably, as noted in 5.1.1.1, due to the younger generations' higher WTP and sense of environmental responsibility, experiments that attempt to improve customer experience should be conducted on smartphones in particular. Once SCF has been purchased through either of the channels, consumers can choose to get the products delivered through a third party company or pick up the products themselves at the station. This process is entirely dependent on what type of SCF the consumer wants to buy. In similar fashion to Motatos, only food labeled as "best before" with a reasonable shelf life should be deliverable. Vegetables and fruit or refrigerated goods, such as meat or dairy should follow a pick-up-same-day principle, where the ordered SCF is picked up by the consumer who purchased it the same day it was ordered. This is to avoid the risk of food spoiling, which is particularly important in a business such as this. This leads to the last type of service which is related to personal assistance. This was inspired by BilkaToGo and mirrors the concept of a drive-in where employees pre-package the ordered goods and offers to place it in the consumers car. Applying further flexibility to the service, consumers should be able to decide whether they want their goods to only be pre-packaged or also want them placed in their car. Both the delivery service and pre-packaging services would be offered at the cost of a small fee, adding a usage fee to the revenue stream.

## 5.2.4.3 Doorstep and Tracking model



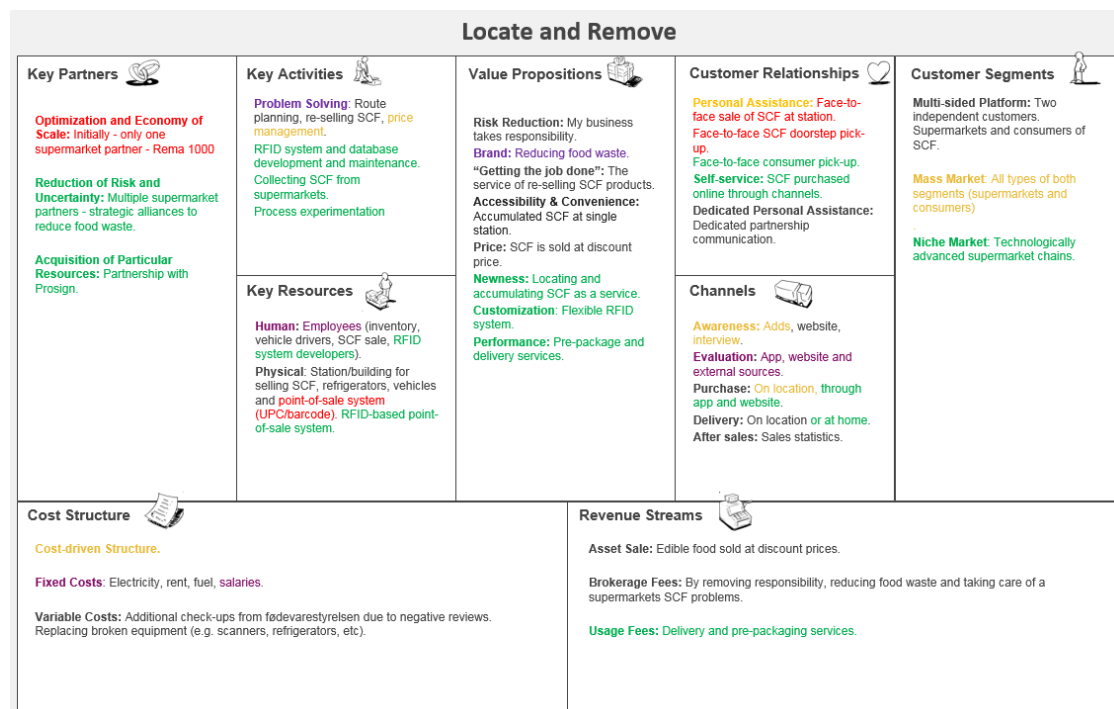
**Figure 5.13:** Result of applying blue ocean to the Doorstep and Tracking Model

The prototype depicted in Fig. 5.13 represents a future where supermarket chains have begun using RFID systems. The focus of this model is capitalizing on that fact and similarly to Fig. 5.11 improve the processes of how SCF is donated and in some cases discarded. Following the same general principles of donation presented in Fig. 5.11, the question here is how developing and maintaining a RFID system can benefit the business. One of these benefits is tracking, hence the name: Doorstep and Tracking. A key activity would in this model be to develop and maintain a RFID system compatible with multiple different suppliers. This activity would be the cause of a digital transformation of e.g. the database. After collecting SCF at each supermarket, all the products would be scanned using RFID technology, allowing me to update the database of the inventory in real time. Contrarily to Fig. 5.12, 5.11 and 5.5, this would require an overhaul of the database, as it would need customized compatibility to the needs of the donation strategies and suppliers. This could be considered a deep structural change, which is why infrastructural flexibility is such an important asset when in digital transformation. Changes to the database would have to be experimented with and be based on options such as who are our suppliers and partners and what sort of data do we have. One demographic that would be added to the database is traceability of specific products. This could, for instance, assist in informing suppliers of after sales - even if the SCF products are damaged. In a case, similar to "projekt hjemløs" 5.1.2, where products sometimes are donated due to sustaining damage



at the inventory level of a supermarket or earlier in the food supply chain, the ability to track each specific product would allow me to inform the supplier of exactly where the product ended up, almost no matter the sustained damage. Experimenting with examples such as these can help leverage future contingencies, as we may already have experimented with the means and constraints set by e.g. the environmental cause of the contingencies. Because of the work required to create, maintain and experiment with opportunities in a RFID system, I believe it is necessary to acquire a resource of expert knowledge. That is why I added Prosign as a key partner, as they are specialized in the deployment of RFID systems. Using co-creation, it would allow me to diminish uncertainties in the market as our internal knowledge of RFID systems would be stronger. In key resources, RFID system developers would be added as employees in order for the co-creation and maintenance to be successful. The old point-of-sale system using barcodes and UPC would be deleted and instead a RFID-based point-of-sale system would be added. There are also changes in the customer segments, as the business model no longer fits into the mass market of supermarket suppliers, as suppliers are now required to have a RFID system. This creates a niche market, which primarily involves bigger supermarket chains that are able to afford such system deployments. As a result, the mass market is reduced.

#### 5.2.4.4 Locate and Remove Model



**Figure 5.14:** Result of applying blue ocean to the Locate an Remove model

Finally there is the prototype: Locate and Remove, presented in Fig. 5.14, which



incorporates the same services introduced in Fig. 5.12 but in an environment where my company and its supermarket suppliers are using RFID systems. It is now possible to locate SCF rather than browse for it in the supermarkets, hence the name of the model. The service of collecting SCF from the different supermarkets rather than having their own employees is in this prototype optimised. As stated in section 5.1.1.3, using RFID systems it is possible to achieve a 78% reduction in time spent manually checking merchandise. This accounts for SCF as well, taking into consideration the possibilities of having scanners only display scanned food that has a shelf time left of e.g. 48 hours, as explained by Prosign in section 5.1.1.3. Experimenting with adjustments to what type of SCF the scanner should display may result in better user experiences and services offered. Depending on the type of SCF it may prove useful to only look at food with a shelf time left of 48 hours while in other cases 120 hours. For vegetables and fruit it may be optimal to only collect it, when its shelf time is less than 30 hours and for refrigerated goods it might be optimal to collect it when it has less than 50 hours left. For certain products, like e.g. canned food, beverages and chocolate, it may be fine having it set to 200 hours. This is in fact an example of another digital transformation that could be made to the database. Through co-creation with the supermarket suppliers and Prosign, each SCF product could be experimented with to either display itself on the scanner screen or not, based not only on its shelf time left but also its type. E.g. a particular vegetable would not appear on the scanner screen when scanned, if its shelf time left is greater than just 30 hours, but a dairy product with 45 hours left would display itself. It would require experimentation because each type of product should be updated cyclically using *light touches* until an optimal display point has been found. New product entries would also need to be categorised and experimented with, if necessary, as soon as they enter the market. Using RFID scanners would speed up the trip at each supermarket tremendously, allowing the accumulation of SCF each night to be much faster. Because, as stated in 5.1.1.3, it is possible to update data in real time when using RFID tags, it would also be possible to deliver a better service for the consumers. Product information could be updated in real time through the channels, meaning consumers would know exactly what is left of each type of product. Depending on the SCF product inventory, consumers would know if they had to buy it now through an online channel, or if they could simply pick it up at the station later.



## 6 Discussion

Due to the rising trend of digitized grocery shopping, which especially grew during the Covid-19 pandemic, and food-related problems caused by the war in Ukraine I believe that digital solutions in the context of food supply chains is more important than ever. This sudden demand of digital solutions combined with the already growing environmental responsibility in consumers, which is likely to strengthen even more due to the war, are factors I believe will cause digital transformations throughout the food supply chains in an attempt to meet consumer demands. Despite how serious both of these situations are, I believe they will result in an important wake-up call which over the years will benefit sustainability as a whole. I further believe this makes it all the more important to practice strategies similar to the new BPM logics, as they will help ease the adaptation of new technologies and digital solutions. As stated, there exist a multitude of drivers such as competitiveness, brand improvement, environmental responsibilities, and improvements to sales that digital solutions can help with. I believe the new BPM logics can be used as a step towards reducing the risks associated with answering the moral question of: "When is sustainability and the environment important enough for companies to put themselves at risk?".

An interesting fact I came across in section 5.1.1.1, is that people tend to resist new technology. I find this interesting, as solutions such as the Amazon Dash Cart attempts to deploy new technology, not just in their own hands, but in the hands of their consumers as well. Based on my findings, this is a step in the wrong direction. I believe technological demands should be handed over, step by step, to consumers until they have fully adapted it. From the perspective of a supermarket that has begun using a RFID system, everything consumer-related could be done exactly as before they had a RFID system. This would allow the supermarket to control when and how much they want to expose their consumers to the new technology. This was also part of the reason why I decided to create an environment with and without RFID systems in my scenarios.

Despite a study in section 5.1.1.1 indicating that online grocery shopping reduces food waste, other empirical research [77] contrarily show that food waste likelihood in fact is higher, when groceries are purchased through online channels compared to in-store. The argument for this is based on the difference of how consumers perceive product-ownership when it is bought online vs. physically. If that is true, then more considerations and research must be made, as it would contradict the entire purpose of the business (to reduce food waste) by food waste increasing at the consumer level.

Because of the technological 5.3 and behavioral 5.1.1.1 trends among consumers tends to relate to their generation, I believe the same goes for their digital tendencies. I argue in Market Segments 5.1.1.1, that the primary consumers of this business is the younger generation and green consumers, despite not directly targeting them in my prototypes

and business model. If I knew the digital tendencies of the optimal target group, I believe better marketing strategies and sales could be achieved. Therefore, I would argue that a more in depth analysis of the tendencies displayed by relevant consumers could improve the overall business model, as it would create a niche market that could be better targeted within the mass market of consumers.

An interview, or preferably a focus-group meeting, with relevant experts from any of the companies suggested in section 5.1.2 would have proven very beneficial to the report. It would have been possible to do show-and-tell for each of the prototype scenario and get a discussion going that could lead to information about their work processes, opinions and knowledge about RFID systems. This would have helped expand the models further and following the process of effectuation, it would have fit well into the process of adding partners.

In response to the lack of interviews, I decided to conduct an empathy map on the Rema 1000 seen in key partners of the initial business model in Fig. 5.5. This led to some useful discoveries in how their SCF is either donated or discarded if not sold and how much time employees generally spend locating SCF. This inspired the remaining two environments for my scenarios model; the problem employees at supermarkets have finding SCF and the issue of some food being discarded.

Despite having no direct relation, I would argue that the principles of effectuation suggested by Sarasvathy share a surprising amount of similarities with new BPM logics. I believe that the new BPM logics is a supplement to Sarasvathy's work, that introduces a way to make effectual process logic practical in digital transformation settings. Light touch processes is closely related to the leveraging contingencies principle, as by having easily modifiable processes it allows them in a lot of cases to smoothly adapt to sudden contingencies. It was the lack of adaptability that the original process logic lacked in constantly changing environments that motivated the basis for the more dynamic light touch processes. This is especially tied to digital solutions, as they tend to require a lot of experimenting and thus a lot of process adaptability. Furthermore, the principle of affordable losses seems to fit well into the idea of constant experimentation. Infrastructural flexibility is also associated with leveraging contingencies, as it concerns how easy it is to reconfigure the infrastructure in accordance to shifting processes. Despite being difficult to achieve, this can help control and thereby leverage contingencies. Beyond the three logics being a supplement to effectuation in the sense that they can be used in practical settings for companies in digital transformation, I would also argue that mindful actors is entirely different from effectuation. Mindful actors does not seem to share similarities with the process of effectuation, but is rather an additional supplement, because it introduces a way for the individual employee in a company to act, that benefits the company as a whole.

## 7 Conclusion

This report investigated the market surrounding the second chance food business. I found that there exist competitive, environmental and sustainability-related drivers within the entire food supply chain (supermarkets included) to become more digital and to reduce food waste. I also found barriers that prove difficult to overcome as a company, when trying to digitally improve oneself within the business. Based on the findings, I then made an initial business model capitalizing on important concepts such as rising trends, supplier demand, technological possibilities and competitors. Certain findings were left out of this model, as they would be applied later in the design phase. I then investigated potential suppliers for the business and reached out to them based on the business model and demographic factors. Unfortunately, none of the potential suppliers had time to conduct a proper interview. Using the initial model as ground zero, I decided to investigate a single supermarket in an attempt to generate knowledge usable in an effectual setting. Following the process of effectuation I did online research, observations and questioned the employees of the supermarket. This helped generate new knowledge which in collaboration with the environment analysis laid the foundation for my scenarios. Each of the four business model prototypes generated in the scenarios were thus a result of an environmental analysis and effectual research. I then applied relevant theory discussing how reworking the classical business process management could prove useful when a company is performing changes digitally. This discussion then led to the surprising discovery that not only may the new business process management logics be a supplement to effectuation, but they may also help translate effectual processes to pragmatic uses when a company is changing digitally.



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