Tech in the food industry: How digital platforms are shaping the way we consume

exploratory case study

Master Thesis

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Abstract

The food industry is a rather complex network of different entities, most of which add value to the product while also creating conditions for resource waste. A quick fix has proven to be illusory and increasing the efficiency of the food system will require an extensive, collaborative effort by governments, businesses, and consumers alike.

The following case study provides insights into the dynamics that affect emerging platforms within the food sector. It assesses how their solutions are mitigating market inefficiencies and recognizes the push towards a more sustainable food industry. The paper redefines three categories from Aschemann-Witzel et al., (2017) on key characteristics of initiatives in the food industry, allowing for their application to emerging digital platforms. The adapted categories accommodate three types of initiatives: platforms that focus on actions that prevent food waste in the supply chain, platforms that tackle food waste across the supply chain via redistribution to consumers, and platforms that assist consumers in attaining more sustainable habits through skill development and knowledge sharing.

The findings reveal that the platforms are inducing changes, as they can pursue business opportunities that traditional actors have been unable to take. They are tackling the inefficiencies in three distinct ways: better matching between supply and demand, combining food waste avoidance with a moderately priced product, and altering consumer behavior through innovative and playful technology. However, we found that these platforms do not only impact traditional stakeholders in the food industry; they also create a broader social impact by looking for holistic solutions to reshape an inefficient food supply chain.

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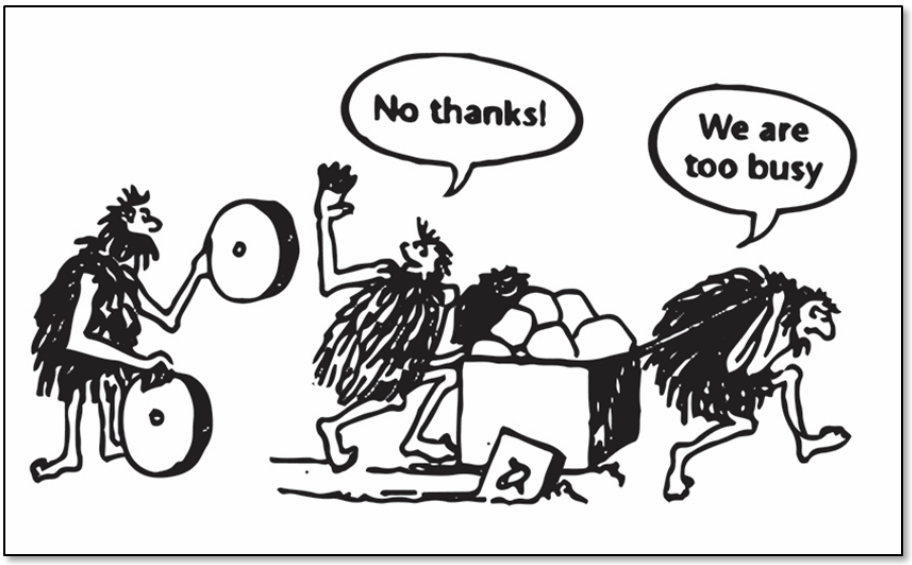


“There are few parts of the chain having a margin that is not bigger than two percent in the food chain. So no one has extra energy or capacity or capital to change things. They're just like sort of stuck in that system and trying to just survive under those terms. It's a bit like that old drawing just seen as like two guys who tried to carry or push a carriage that has square wheels and pushing really hard and then someone is coming with a round wheel and says he could use this and they're like sorry we're too busy. But that's the situation we're in.”

- CEO Plant Jammer

1. Introduction

The food industry is undergoing significant changes. Changes due to globalization, demographics, organizational structure, consumer preferences, environmental awareness, and new technologies. The food industry is a complex network of different entities, with many different stakeholders worldwide. At its core is a perishable product which adds to the complexity of the industry. While the network of stakeholders mostly adds value to the product, it is unable to reduce conditions for resource waste.

A quick fix of the system has proven to be illusory and increasing the efficiency of the food system will require an extensive, collaborative effort by governments, businesses, and consumers alike (Gunders, 2012). One reason this problem continues to persist in the food and agriculture sector is the leisurely speed at which stakeholders innovate and adopt new technologies. Moreover, there is a disparity between investment made in food system startups and investment in comparable industries such as healthcare. Investments in healthcare startups are ten times more than those made in food system startups (Nayyar, de Cleene & Dreier, 2018). This is a striking disparity considering the comparable size of the industries.

Technology has made many aspects of our lives more efficient, and it is reasonable to suggest that it can have the same effect in the food industry. A large part of the modern economy already operates within the digital market. In particular, digital platforms are the new core organizational form of business in the digital economy as they are more productive, profitable and valuable than conventional firms (Cusumano, Gawer & Yoffie, 2019; Kenney, Martin & Zysman, 2016; Kumar, Lahiri, & Dogan, 2018). Digital platforms change the way businesses operate and open new ways for economic activities as they derive value from the platform's participants (Parker, Van Alstyne, & Choudary, 2016). Due to technology development and new value creation, the growth of these innovative platforms is quickly making it the most influential organizational form. Currently, out of the 261 unicorns that have started up, nearly 20% are platform businesses (CB Insights, 2018).

We recognize that similar technology can be used to transform the food industry. An increasing amount of platform businesses are entering the sector, which can disrupt established players and alter the face of the industry. Thus we want to investigate how platforms are affecting the current state of the market, and the key characteristics that define them.

1.1 Research Question and Outline

The aim of this research is to uncover the way emerging platforms in Denmark have established themselves in the highly competitive food industry, and how they are contributing to an increasingly sustainable food sector by tackling food waste. Our theoretical focus is centered around platform businesses and the inherent dynamics they bring to the food sector and, more specifically, their potential to redefine the food supply chain. In order to answer how platforms are shaping the food industry, the following two topics will be explored. Firstly, we will examine the central characteristics of emerging platforms within the food industry, and the various success factors which influence their potential for inducing change. Secondly, we explore the actions taken by the platforms to alter the food supply chain. These considerations led us to the following research questions:

How are new emerging digital platforms changing the food industry?

- What are the key characteristics and success factors of the platforms?
- How are the platforms altering the food supply chain?

The first part of the paper outlines an introduction of the research topic by highlighting the current challenges of the food industry. The second chapter leans on a theoretical framework of platform theory, and will thus attempt to add to that knowledge by examining the platform phenomenon in the food industry. The third chapter contains the methodology where we examine and explain our research design and the data collection methods we have utilized. Within the fourth section we will give a brief outline of the chosen case companies and present and analyze the empirical data that was gathered. In the fifth section, we discuss the findings that present an answer to the research question. First, we explore the key characteristics of these platforms and their distinctions. Following the examination of these key characteristics, we will

elaborate on the methods new platforms are utilizing in changing the food supply chain. Finally, we state potential limitations, give suggestions for further research and conclude with a summary of this paper.

1.2 Research Context

In order to understand the significance of this research, we begin by introducing some context. Exploring relevant developments in the food industry, we found that there was a massive disparity between investment in the food industry and other comparable industries. According to a World Economic Forum report in 2018, $14 billion was invested in just under 1,000 food systems focused startups over the last few years. Compared to $145 billion that was invested in approximately 18,000 healthcare-related startups over the same period (Nayyar, de Cleene & Dreier, 2018).

The relatively low level of investment is striking, especially considering the obvious inefficiencies that exist in the industry. Although there are many inefficiencies in the food sector, the most recognizable and perhaps most destructive outcome of these is food waste. Food waste largely exemplifies the inefficiencies within the food industry. Thus, we decided to research initiatives that specifically aim to tackle the food waste challenge. However, tackling food waste also solve other inefficiencies that will be explored in the following chapters. The European Union has made combating inefficiencies in the food supply chain, in the form of food waste, as one of their top priorities on the agenda for 2020 (European Commission, 2016). Furthermore, combating food waste is also part of the 17 sustainable development goals presented by the UN in 2018.

Food waste refers to food appropriate for human consumption being discarded. This often comes down to food being spoiled as it is kept beyond its expiry date, but it is also related to other reasons such as oversupply due to market surplus, or the populations' consumption habits. Food waste is generated in massive amounts across the entire food supply chain with adverse effects on severe environmental, social, and economic issues. Considering the fact that one third of the produced food in the world is wasted, it should be evident that we are dealing with a system that allows for a staggering amount of squandered resources (Stefan et al., 2013; Williams, Wikström, 2011). In Denmark alone, 700.000 tons of edible food is wasted yearly, while 260,000

tons come from the households (Miljøministeriet, 2015). Globally, one third of all the food that is produced is wasted, while fifty percent of the food waste occurs in households (Parfitt, Barthel, & Macnaughton, 2010).

Waste is due to operational inefficiencies in the supply chain, but it also arises due to consumer demands (Aschemann-Witzel et al., 2015). The demand for constant availability of fresh and diverse goods is one of the market conventions in western countries that lay a foundation for waste. Household waste is not inevitable, nor has it always been common. The level of wasteful behaviors differ based on cultural and economic factors (De Laurentiis, Corrado & Sala, 2018). There are also differences in the amount of household waste with regards to age groups and nationality. The average American consumer, for example, waste ten times as much as the average Southeast Asian consumer. Moreover, people over the age of 70 waste half as much food as other age groups (Gunders, 2012).

The food supply chain is also partly to blame as it has traditionally been a push chain, and therefore, has contributed to the consumption habits that are costing us today. The food industry is a notoriously competitive market with low margins and a heavy emphasis on price competition. Most actors in the industry are either unable or unwilling to break with this dynamic, which is one of the reasons why we are not seeing more coordination across the supply chain (Göbel et al., 2015). The food value chain is still to a large degree made up of separate entities with different processes. The product is produced within a global network, where every single company has incentives to optimize their own processes, but at the same time accept that their actions might lead to an accumulation of waste in other parts of the supply chain (Göbel et al., 2015).

2. Literature Review of Platform Theory

Considering the research question, an understanding of platform theory is necessary in order to understand the intricacies of digital platforms and their potential for disruption. We anchor our study on research drawn from Cusumano, Gawer & Yoffie (2019) and Parker Van Alstyne & Choudary (2016). However, we enhance these insights with a thorough review of further prominent research within this field.

In the next chapter, we will introduce a review of existing literature and relevant theoretical concepts for our particular area of study. We have divided the review into three parts. First, we explore and review the relevant literature about platforms, and the fundamental drivers that shape platform markets. Second, we examine more company-specific factors, and what the literature contend is the key success factors when building a platform. Finally, we end the literature review by introducing a relevant theory detailing how conventional firms operate in the food industry, and contrast this research by highlighting the differences between platforms and more traditional companies.

2.1 The Age of Digital Platform

The rapid adoption of information technology by companies has for an extended time fundamentally changed the value chain in the industry they are operating in (Porter & Millar, 1985). These structural changes have altered the traditional vertical relationships of companies. In that the roles and capabilities of the value chain participants start to overlap, but also by new players from different sectors becoming a competitive threat. In particular, the phenomena of disintermediation have become more prevalent, which directly affect more intermediary positions in the chain. However, It does affect each industry differently, with the informational intensity of products and services, or the reduction of search costs being factors that contribute to disintermediation (Delmond et al., 2017). Information technology can also initiate the phenomena of cooperative effort in product and service co-creation, like real-time interfaces or network effects. Which implies that companies need to assume control over resources that are beyond the scope of conventional organizational boundaries. Moreover, the value proposition

of a company inevitably has to interact with the market environment to withstand this dynamic corporate environment (Andal-Ancion, Cartwright & Yip, 2003).

The advancement in information technology has also helped create new business models, which for better or for worse are reshaping the previous economy. Chief among these new organizational designs is the digital platform. Although digital platforms are diverse in function and structure, they are often distinct from the traditional pipeline business in that they do not buy, produce or sell goods. Instead, they facilitate trade between two or more different groups by providing a digital framework where they shape the rules for how participants can interact with each other (Kenney & Zysman, 2016).

Moreover, a vital feature of the platform business is that this digital framework can support an array of different interactions, which inevitably contribute to a blurring of market boundaries. Platform market boundaries can stretch over several industries, as the goods sold through a platform are not limited to any specific sector (Cennamo, 2019). Consequently, through technological progression and increased internet access across the globe, these platform businesses are expanding globally at such a rapid pace that no business or industry can be considered safe from their 'creative destruction' (Evans & Schmalensee, 2016).

Platform Defined

Platforms have been a topic of intense research and are omnipresent in information system as well as management literature (Constantinides, Henfridsson & Parker, 2018, De Reuver, Sørensen & Basole, 2017; Thomas, Autio & Gann, 2014). As a consequence, many definitions can be found, and thus we will devote our attention to a few central interpretations.

Platforms can be architected in many ways and can serve several different purposes. However, there are two basic types of platforms: innovation platforms (also called industry platforms and software platforms, Gawer (2014), Evans, Hagiu & Schmalensee (2006)) and transaction platforms (also called matchmakers by Evans & Schmalensee (2016b)). Innovation platforms "consist of common building blocks that the owner and ecosystem partners can share in order to create new complementary

products and services" (Cusumano, Gawer & Yoffie, 2019), which will not be part of this research paper. Transaction platform owners are intermediaries or online marketplaces that facilitate value-creating interactions between various users like external producers and consumers. These platforms provide an open, participative infrastructure for these interactions and set governance conditions for them. The platform's overarching purpose is "to consummate matches among users and facilitate the exchange of goods, services, or social currency, thereby enabling value creation for all participants" (Parker, Van Alstyne & Choudary, 2016). Inspired by economic theory, transaction platforms are often characterized as a multi-sided market (Rochet & Tirole, 2003). Many notable platforms fall into this category, such as for example; Amazon, Uber, AirBnB, and eBay.

A multi-sided market typically include an assortment of functionalities that reduce search costs, transaction costs or product development costs (Haigu, 2014). Subsequently, many multi-sided platforms rise to occupy prominent positions in their respective industries. On a fundamental level, two cardinal features distinguish a multi-sided market from related but distinct business models. First, the platform facilitate direct interaction between the participants of each side. Second, all sides have to be affiliated with the platform. By 'affiliation', it is suggested that users have to make a platform-specific investment in terms of a fixed access fee, expenditure of resources such as time or even just an opportunity cost, in order to directly interact with the other participants (Haigu & Wright, 2015). Engendering 'affiliation' is considered to be necessary for a platform to create indirect network effects, which is regarded as another critical component of the multi-sided market model.

2.2 Fundamental Drivers of Platform Markets

2.2.1 Network Effects and Critical Mass

Network effects refer to the interdependence of the amount of users on a service and the value the service brings. In other words, when the value of a service to one user is predicated on how many other users there are, it is said that this service exhibits network effects (Shapiro & Varian, 1999). Network effects are also called network externalities or cross-group externalities. However, they all symbolize a largely similar point; all other things being equal, it is better to be connected to a bigger network than

a smaller one (Shapiro & Varian, 1999). A platform's goal is thus to generate a valuable network so that the value grow when the number of participants increase.

There are direct and indirect network effects which can either be positive or negative (Shapiro & Varian, 1999). Parker, Van Alstyne & Choudary (2016) separate network effects into four types: positive same-side, negative same-side, positive cross-side, and negative cross-side network effects that all need to be managed in order to generate value for platform participants. Platforms often stimulate network effects between the supply and demand side by bringing together multiple market sides. These kinds of network effects are frequently labeled as indirect network effects or cross-side effects, and they display the impact that participants from one side have on participants from the other side of the market. At Uber, for example, riders are discouraged from using the service if there are not enough drivers as waiting times will be longer. If there are many drivers on the platform, the waiting times will be shorter, which will encourage more riders to use the service. The subsequent increase in riders will attract more drivers, and thus create a positive feedback loop which is very difficult for competitors to compete with (Cusumano, Gawer & Yoffie, 2019). Closely related are the direct network effects. Direct network effects refer to the impact that users make on other users on the same side. The telephone is an example of direct network effects, where if more people have a telephone, the more value it holds for other people with a telephone. In general, network effects are positive when a user benefit from the maturation of the user base, but are negative when the user growth is accelerating competition or clutters the platform.

Network effects represent an economic phenomenon known as demand-side economies of scale (Shapiro & Varian, 1999). In contrast to supply-side economies of scale, which gave rise to giant monopolies during the industrial era, demand-side economies of scale take advantage of technological progression to gather value from the demand side (Shapiro & Varian, 1999). Propelled by increased efficiencies in social networks, demand aggregation, and app development, platforms can produce a bigger network that holds more value for the users (Van Alstyne, Parker & Choudary 2016b, Parker, Van Alstyne & Choudary, 2016). Moreover, in many information technology industries, the platforms can engender both supply-side economies of scale and demand-side economies of scale. The consequence is that growth on the

demand side simultaneously bring down cost on the supply side and creates an even more appealing product for the other users, which increases the growth in demand even more (Shapiro & Varian, 1999). Consequently, it can provide the largest platforms in a market with a competitive advantage that is exceedingly difficult for other competitors to overtake (Parker, Van Alstyne & Choudary, 2016). Thus, in the information economy, the market 'winner' will be situated to reap the majority of the revenue (Shapiro & Varian, 1999).

To cultivate network effects, a critical mass of users has to be attained. Ultimately, if the user base is large enough, the market will build itself (Shapiro & Varian, 1999). But a problem arises when a participant will only enroll when they see value in accessing the other participants (Evans & Schmalensee, 2016). The critical mass constraint might be an effortless or rather severe bottleneck to navigate depending on consumer taste, the market dynamics, and the type of network effects (Evans & Schmalensee, 2009). The level of participation affects the quality of the product and consequently, if the quality is below standard the participation will decline and go beyond the critical mass which is a downward spiral towards depreciating quality and zero engagement (Evans & Schmalensee, 2009). Thus, every platform needs to make a strategy to find a way of reaching the critical mass frontier in order to perform and compete (Evans & Schmalensee, 2016). As these dynamics directly influence company performance, devising the right strategic framework for engendering network effects is one of the cardinal challenges that platforms have to overcome. Navigating changes that could either subvert or strengthen network effects, such as; changes in market dynamics, technology, and new government regulations, is therefore of immense importance (Cusumano, Gawer & Yoffie, 2019).

2.2.2 Multi-homing and Switching Costs

Wherever network effects are present, the focus of organizational attention should be more directed towards factors that influence a platform's ability to engender network effects (Parker, Van Alstyne & Choudary, 2016). For instance, in contrast to traditional businesses, most platform businesses do not charge users directly, and this is one reason why users participate in more than one platform, which is called multi-homing (Eisenmann, Parker & Van Alstyne, 2006). Network effects are understood to be weakened by multi-homing, which substantially lowers the attractiveness for the other

market side, which also indirectly impacts the revenue and profit of a platform (Cusumano, Gawer & Yoffie, 2019). To prevent multi-homing, platforms usually attempt to introduce mechanisms that make it more 'costly' for participants to be affiliated with more than one platform, these costs are generally called multi-homing costs. If multi-homing costs are high, a participant will be more unlikely to join other platforms, and if multi-homing costs are low, users are more inclined to participate in other services. Multi-homing costs, as a concept, encompasses all expenses that a network user has due to being affiliated to a platform (Eisenmann, 2008). These expenses can be anything from access fees to opportunity costs.

Multi-homing, in general, occurs due to participants' aspiration to gain the effects of network externalities in an ecosystem of non-interconnected platforms (Rochet & Tirole, 2006). In other words, when platforms are incompatible or not interconnected, it is necessary for one of the market sides to multi-home in order for trade to be beneficial (Rochet & Tirole, 2006). As there are at least two market sides, three cases of homing need to be deliberated: both sides can single-home which entail that they both only use one platform; one group can single-home while the other multi-homes or both sides multi-home (Armstrong, 2006). There are various strategies that a platform can pursue to reduce multi-homing, such as price competition, loyalty programs, or by offering superior products and services (Cusumano & Gawer, 2002). Nevertheless, competitors may still find ways to reduce the costs of switching by relying on interoperability, data conversions, and information synchronization (Edelmann, 2015). At large, although multi-homing moderately weakens network, the primary concern for most platforms is to ensure participation in their service by creating a superior service for their target segment.

2.2.3 Differentiation, Niche Markets and entry barriers

In May 2019, Uber made its public offering at $45 per share, valuing the company at around $82.4 billion (Merced & Conger, 2019). This is the type of astounding value that many people are beginning to affiliate with platforms and multi-sided markets. All the same, these “unicorns” of the digital economy are far and few between, and most platforms will not reach the heights of Uber. Successful multi-sided markets are the

exception rather than the norm, consequently, platforms must identify other ways to compete (Gawer & Cusumano, 2008).

As not everyone can be a platform leader, platforms often have to establish themselves in a niche segment of the market or create a differentiated service. Platforms can achieve differentiation by emphasizing a few attributes highly valued by target customers while de-emphasizing other attributes less critical to them. In general, platforms often do so by offering superior quality or niche products (Cusumano & Gawer, 2002). First-movers generally also start their early lead within a niche, often the most attractive one as they still have the freedom of choice (Lieberman & Montgomery, 1988). Thus, a source of competitive advantage for platforms is identifying what drives demand in the future and targeting that demand (Suarez & Kirtley, 2012). Many successful platform 'dethroners' have managed to achieve differentiation successfully and outperform platform leaders by emphasizing what they believe will drive demand in the future (Suarez & Kirtley, 2012). However, this is not possible in all markets as not every market has a significant demand for differentiated services. For instance, Google has around 92% of the market share for search engines worldwide, with the closest competitor being Bing at around 2% (Desjardins, 2018). This is due to the minimal need that users of search engines have for specialised features (Eisenmann, Parker & Van Alstyne, 2006).

The profitability of a market is questionable when the market has low entry barriers and low switching costs. On the other hand, when the entry barriers and switching costs are high, there will be a concentration of players and the probability of a winner-take-all market is intensified (Eisenmann, Parker & Van Alstyne, 2011). There are three entry barriers that only occur in platform markets; network effects create barriers through existing platform complements, platform ecosystems are difficult to replicate due to the numerous complementors, and the network itself creates complex switching costs, in particular when the platforms' value depends on the number of participants (Cusumano, Gawer & Yoffie, 2019). Additionally, learning effects such as personalized recommendations can also increase the entry barriers for other platforms (Zhu & Iansiti, 2019). Nonetheless, even when strong network effects protect a platform, traditional entry barriers can still be low which enables new entrants to enter from the supply

side, fragment the user base and prevent the market from tipping to a winner-take-all market (Cusumano, Gawer & Yoffie, 2019).

All the same, dealing with product-market segments as distinct markets, is arguably overlooking a fundamental point of digital markets (Cennamo, 2019). The implicit assumption that is present in more conventional markets that competition is a zero-sum game is far less applicable in the platform economy. Platforms often manipulate network effects to change markets, and often grow the market through innovation (Parker, Van Alstyne & Choudary, 2016). It can, therefore, be asserted that platform competition is mainly between markets, rather than the product itself (Rochet & Tirole, 2003).

2.2.4 Blurring Boundaries and Network Clusters

The rise of platforms does not merely blur market boundaries, it also causes organizational boundaries to blur, which makes the outward focus for a business vital (Parker, Van Alstyne & Choudary, 2016). Due to an interdependent business ecosystem, a platform's performance is increasingly dependent on the firm utilizing assets outside its direct control. Therefore, it is crucial to possess external resources foster the collective health of the network. The integration of resources is a key form of innovation. Moreover, understanding the impact of various actions on the environment is central to operate in this networked environment (Iansiti & Levien, 2004). By accessing resources outside of its direct control, a platform can operate significantly more cost-efficient than traditional businesses. According to a new study of Cusumano, Gawer & Yoffie (2019) platform companies with comparable revenue to conventional firms in an industry have higher operating profits and market value even though they have significantly less employees. As a result, they can spend considerably more on research and development in comparison to other expenses, thus increasing revenue and market value. Moreover, by fostering an ecosystem where they gain access to external resources, highly digitized organizations also have the advantage of potentially growing faster globally than their more traditional competitors (Yonatany, 2017).

When growing internationally, platforms can either grow globally or multinationally. Many platforms with a geographically wide-ranging network, often have a more modularised network which divides into smaller local clusters. These network clusters arise when a buyer gathers more value from a provider in closer geographical proximity to him than one that is located further away (Zhu et al., 2018). For example, if the platform has a distinct site for each market, where one or more market sides are geographically dependent, and each country needs to be established independently in terms of user-seller connection, it is called a multinational platform. A global platform is serving all markets globally as the provided service comes from a central operation. Also, all market sides interact globally, which means that there are global network effects, the investment is lower, and therefore the speed of growing the global platform is faster than with a multinational platform (Kotha, Rindova & Rothaermel 2001; Yonatany, 2017). According to Zhu & Iansiti (2019), the structure of the network does not only impact the speed at which a platform can gain scale, but it also influences the organization's ability to sustain that scale. They suggest that the more a network is fragmented into local clusters, and the more isolated those clusters are from one another, the more vulnerable a business is to challenges (Zhu & Iansitit, 2019). In general, it is stated that network properties are one of the cardinal features of the platform economy, and the most accurate determiner for a platform's success or failure (Zhu & Iansitit, 2019). Under certain conditions, these network properties can even drive competition between platforms to a winner-take-all scenario (Eisenmann, Parker & Van Alstyne 2006).

2.2.5 The Competitive Forces in Platform Markets

On occasion, a few particular platform providers manage to attain a dominant position in a market for an extended period. They achieve what is often referred to as a sustained competitive advantage (Eisenmann, Parker & Van Alstyne, 2006). When a platform gains this prominent position, it is frequently due to the underlying dynamics of a winner-take-all market (Parker, Van Alstyne & Choudary, 2016). In those particular markets, it is possible to find platforms with upwards of 90% market share (Desjardins, 2018). Due to network effects and switching costs new entrants have to present some revolutionary functionality to win substantial market share. The likelihood of a winner-take-all market is dependent on several conditions such as; strength of network

effects, the difficulty of multi-homing, lack of opportunities for competitor differentiation or niche competition and the strength of entry barriers (Eisenmann, 2008). If a platform wants to compete in this environment, at least a cost or differentiation advantage is needed. Being a first-mover in a winner-take-all market can be significant, but it is not always decisive. Late movers might have some advantages, and especially if the market evolves slowly. The late movers may, for example, be in a position to reverse engineer the first-mover's product and beat them on cost, they can incorporate the latest technology into better designs, and they might spot and avoid the pioneers positioning errors (Eisenmann, Parker & Van Alstyne, 2006).

Platform leaders in a winner-take-all market are ostensibly secure from most competitive maneuvers from other platforms in the same market. Nevertheless, as market boundaries are less fixed in the platform economy, there is always a risk of an attack by platforms from neighboring markets. This is known as platform envelopment, where the 'attacking' platform is in an adjacent market where it can harness the network effects that previously had protected the incumbent (Eisenmann, Parker, Van Alstyne, 2011). In order to envelop, the attacking platform needs to bundle its functionality with the functionalities of its target platform into a multi-platform bundle that leverages shared user relationships. Nevertheless, carrying out an envelopment attack is only possible if the attacked platform is a complement, substitute, or functionally unrelated. (Eisenmann, Parker & Van Alstyne, 2011). Platform envelopment should not only be considered as a strategic move that a platform can engage in, but it should also be understood as a powerful force that is in itself shaping platform evolution.

In addition to envelopment, Parker, Van Alstyne & Choudary (2016) has found five other ways for platforms to compete: limiting platform access to prevent multi-homing; fostering innovation and capturing its value; leveraging the value of data; redefining mergers and acquisitions; and enhancing platform design. It is worth noting that in comparison to more conventional firms, platform businesses are generally superior at responding quickly to competitive maneuvers. Thus, the platform winners usually are those platforms that can consistently create the highest value for its users (Parker, Van Alstyne & Choudary, 2016). We will, therefore, continue by exploring the key features of

building a platform and the various mechanisms that have to be in place for value creation.

2.3 Building a Platform

Researchers have accentuated different success factors and outline different obstacles for a platform to succeed. First, Hagiu (2014) found that there are three main obstacles for why platforms struggle; deciding on which market side to onboard first, potential key constituents showing resistance and reservations to a new powerful platform, and the complexity of the business due to the different sometimes conflicting interests of the participant groups. Later, Van Alstyne, Parker & Choudary (2016a) highlighted six reasons for why platforms do not succeed, which are failures: to optimize openness, to engage developers, share the surplus, launch the right side, putting critical mass ahead of money, and having the right imagination. Lastly, according to Yoffie's, Gawer's & Cusumano's newest research (2019), there are four common mistakes for platform failure: mispricing on one side of the market, failure to develop trust with users and partners, prematurely dismissing the competition and entering the market too late.

In a broad sense, these findings can be condensed into four steps that should be followed when building a platform. These are: choosing the market sides of the platform, picking a launch strategy, establishing ecosystem rules, and designing a business model with a particular emphasis on pricing structures (Cusumano, Gawer & Yoffie 2019; Hagiu 2014).

2.3.1 Market Sides

Platforms have to choose a market side, yet they also have to choose how many sides and when they should onboard new sides. (Cusumano, Gawer & Yoffie, 2019). To overcome the initial chicken-egg problem, it is usually beneficial to start with fewer sides and then vertically integrate into additional sides. Adding more than two sides will potentially enlarge cross-side network effects and might create new revenue streams. However, it creates the risk of high complexity, conflicts between multiple sides, and the need to satisfy different platform sides limit the innovation abilities (Hagiu, 2014).

Therefore, it is crucial to devise a strategy about which market sides to pick and when and how to integrate these market sides before launching.

2.3.2 Launch

In order to launch successfully, it is essential to have a strategy that considers the critical mass, a fitting business model design, and how to deal with competitors. But that also tries to solve the chicken-egg problem. Parker, Van Alstyne & Choudary (2016) propose eight ways to launch a platform successfully:

Way 1: *follow-the-rabbit-strategy* uses companies' traditional business success to attract both sides and convert when reaching the critical user base.
Way 2: *piggyback strategy* connects with other platforms' existing user base and creates value units to recruit those in its platform at a later stage.
Way 3: *seeding strategy* produces, borrows, or simulates value units by itself.
Way 4: *marquee strategy* attracts key users onto the platform by providing incentives
Way 5: *single-side strategy* attracts one set of users by creating a business model that they benefit from and later attract the other set of users to engage with the first set and convert into a platform.
Way 6: *producer evangelism strategy* attracts through its platform design producers that can persuade their customers onto the platform.
Way 7: *big bang adoption strategy* uses traditional push marketing to draw attention to the platform
Way 8: *micromarket strategy* targets a small market of members already engaging in interactions, which gives the platform proof of concept for the broader market by showing compelling matchmaking features.

Other authors like Hagiu & Eisenman (2007) also discussed launching strategies, but not as thorough as Parker, Van Alstyne & Choudary (2016), which we will follow in this paper. However, next to deciding on a launch strategy, finding a fitting business model design and a pricing strategy is essential in order to give the platform a chance of survival.

2.3.3 Business Model Design and Pricing

The critical success factor for a platform is arguably the choice of the business model (Rochet & Tirole, 2003). It is crucial not to be stuck in an infinitive launching loop as is the case with Uber, but instead, become a profitable business. Therefore, platforms need to design their business models in a way that they can extract value at least from one market side and turn them into growing profits by fueling network effects. The transaction platforms' business model generates value by charging fees that vary in terms of who and what gets charged and which services are subsidized or even free. They generate profit and offer value to their market sides by matchmaking, reducing friction in a transaction, advertising, having complementary services or technology sales (Cusumano, Gawer & Yoffie, 2019). Which functionalities to include is dependent on a cost-benefit analysis. Certain features might be valuable for one side but bring negative value to the other sides which creates a strategic trade-off. The trade-off should be solved in favor of the most important market side for the platform's long-term success and not what brings the most immediate revenue (Hagiu, 2014).

Platforms need to be aware of the presence of particular network externalities in order to determine the optimal prices for different groups, by aligning them with the demand among the participating groups (Evans, 2003). Typically, there is a money-side and a subsidiary-side which should generate cross-side network effects; thus, the right pricing is vital for platform success. The less price-sensitive side, or the side that benefit more from access to the other, should be charged if the critical mass is reached (Eisenmann, Parker & Van Alstyne, 2006; Hagiu, 2014). Charging the more price-sensitive side can support multi-homing and weaken cross-side network effects which affect the volume of transactions (Cusumano, Gawer & Yoffie, 2019; Rochet & Tirole, 2006).

Usually, there are two common ways of charging users: through a transaction fee or a subscription model. The difference between these two ways of charging is how they affect cross-group externalities. A per transaction charge will weaken the cross-group externalities as a fraction of the benefit gained by the transaction will erode by the extra cost incurred (Armstrong, 2006). A platform's subscription or fixed charge will not impact the users' willingness to trade, but it will condition the end-user´s presence on

the platform in the first place (Rochet & Tirole, 2006). Nonetheless, competitive prices on one side, depends on the other sides' extent of multi-homing (Rochet & Tirole, 2003).

2.3.4 Platform Ecosystem

In order to ensure value for the platform participants and other stakeholders in the platform ecosystem, the enterprises engage in platform governance. Governance can be regulating access by having rules about who is allowed to join, rules regulating interactions, and rules to minimize low-quality transaction, for example, through reviews or evaluations. (Hagiu, 2014; Parker & Van Alstyne, 2018). The set of rules that drive an ecosystem need to be understood in order to facilitate good governance (Tiwana, 2014). Good governance helps to diminish or even prevent market failures that are mostly caused by information asymmetry, externalities, monopoly power, and risk. Strong curation encourages desirable behavior while dissuading unwanted conduct. Consequently, quality curation is viewed as a mechanism for minimizing negative network effects (Parker, Van Alstyne & Choudary, 2016). Based on Lessing (2009), there are four basic governance tools: laws, norms, architecture, markets. According to Parker, Van Alstyne & Choudary (2016), they can also be used in platform businesses in the following way: *Laws* are explicit rules that are supposed to moderate the behavior of users, but also on an ecosystem level. *Norms* can be constructed by applying intelligent behavior design in order to foster crowd curation. The platform *architecture* should be a self-improving program code encouraging and rewarding good behavior, but also for preventing or correcting market failures. *Markets* can govern behavior by using various incentives and design mechanism.

2.4 From Pipeline to Platform

In the most basic way, the difference between traditional businesses and modern platforms is the addition of digital technology. However, due to the enormous increases in speed, convenience, reach, and efficiency that digital technology can bring, the internet and its related technologies give platform businesses an ability to transform industries in ways that traditional companies can not (Kenney & Zyman, 2016; Parker, Van Alstyne & Choudary, 2016). Nonetheless, many traditional industries are yet to

experience a large scale technological transformation. As a result, many industries still experience inefficiencies that might have been reduced by the introduction of platform businesses (de Reuver, Sørensen & Basole, 2018). One such industry is the food sector, which is an industry that allows for substantial amounts of waste along its supply chain (Göbel et al., 2015).

Prior research has focused on how conventional initiatives are able to reduce food waste and other negative externalities in the food sector (Aschemann-Witzel et al., 2017; Cicatiello et al.,2016). By focusing on key characteristics and success factors of consumer-related food waste initiatives, Aschemann-Witzel et al., (2017) identified three general types of initiatives that aimed at tackling waste. First, retail and supply chain alteration initiatives, that focus on actions that prevent or avoid food waste within the supply chain, compared to other categories the business opportunity factor is especially characteristic for this group. Second, redistribution initiatives such as food banks and non-profit organizations, that tackle food waste across the supply chain by redistributing the food to consumers. It is characterized by having multiple aims by both reducing food waste and providing social aid. Lastly, information and capacity building initiatives such as consumer organizations that target consumers directly reduce waste. They provide information to consumers in order to build their capacity to reduce wasteful habits. Their 'positive focus' distinguishes information and capacity building initiatives from the other categories (Aschemann-Witzel et al., 2017). All of these initiatives enable people to consume otherwise wasted food, and they collectively try to raise awareness of supply-chain deficiencies. Although these vary between the various categories, it was observed that timing, competencies, large scale, and collaboration are essential for all of them (Aschemann-Witzel et al., 2017). Timing, competencies, and large scale can also be found as success factors within platform theory. However, collaboration is not in particular discussed in the platform literature, which should be further investigated.

However, the factors that impact conventional firms are not necessarily the same as those which impact platforms. As discussed, platform businesses can increasingly take advantage of boundary fluidity which allows them to utilize resources without owning them (Constantiou, Marton & Tuunainen, 2017). This entails that platforms can access essential industry resources without incurring the costs, which allows them to

operate more cost-efficient than traditional businesses (Cusumano, Gawer & Yoffie, 2019). As platforms generally create value by facilitating interaction, they are not burdened by production costs. It gives platforms a considerable advantage as building, and scaling platforms is thus much simpler and much less costly compared to traditional pipeline businesses (Van Alstyne, Parker & Choudary, 2016). Lastly, while conventional companies generally focus on growing value by creating better and cheaper products, platforms are more concerned with increasing the value of its network. It is, therefore, reasonable to suggest that the observations made by Aschemann-Witzel (2017), on the key characteristics and success factors of traditional initiatives, might not be attributable to platform businesses.

Concluding remarks

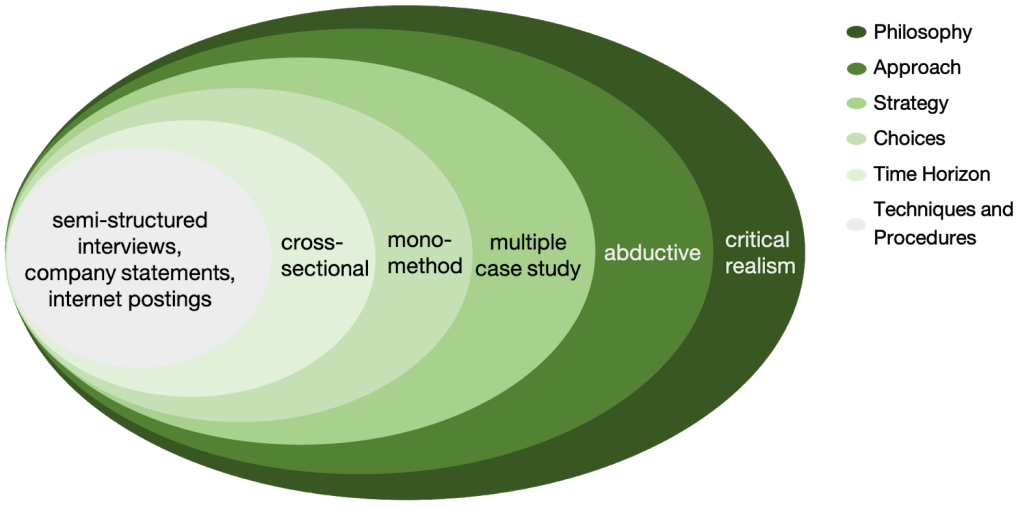
Platform theory is a growing research field, and thus it has been necessary to assess the relevance of the various research and include only that which is considered to be at the forefront of the academic field, or else relevant to our particular research. We consider the included theories sufficient for the reader to gain a full and coherent understanding of the most topical and prominent theories that exist within the platform literature. Moreover, we will use these theories as a conceptual framework for the remainder of this study.

Prior research on initiatives tackling food waste in the food industry is solely focused on conventional firms, and as we have seen, the nature of platforms is very different from the traditional pipeline businesses. As a consequence, it is necessary to add to this research by examining comparable platform businesses within the industry.

3. Methodology

In order to reach satisfactory and useful results when investigating the research question, some methodological decisions have been made to ensure the robustness of our study. We use the guiding framework 'research onion' by Saunders, Lewis, and Thornhill (2009) for method development that will also be a structural guideline for this chapter: This section clarifies the design of the research design and how it evolved throughout the data collection process and analysis. The following section presents the study's methodology and explain the reasoning behind those decisions, starting with the outer layer of the research onion and moving to the inner parts: research philosophy, approach to theory development, research design with its methodological strategies, methodological choices and time horizon, and its last layer: techniques and procedures. The research onion adapted from Saunders, Lewis, and Thornhill (2009) visualizes the methodological choices for this research (*Figure 1*).

Figure 1: Authors' Research Onion



Source: Authors adapted from Saunders, Lewis, and Thornhill (2009)

3.1 Research Philosophy

In research, we have to make certain assumptions about what constitutes reality and how to best develop knowledge. That is important for two reasons: firstly, it is necessary to have these assumptions in order to guide and inform how to design the

research. The point of any research should be to gather knowledge and increase our understanding of reality. Thus, to conduct research in a meaningful way is essential. Secondly, it is crucial to be aware of the fact that different researchers naturally will have different assumptions about the nature of truth and knowledge, and its acquisition (Cohen, Manion & Morrisson, 2002). Understanding how researchers developed knowledge and how they view reality is equally or even more essential than to understand the knowledge in isolation. As different research philosophies will have contradicting claims to what is the most appropriate way to conduct research, it is up to each researcher's discretion to choose the appropriate research philosophy for their particular study. To justify the choices made in this study, we will explain how we consider the nature of reality and the nature of knowledge. As mentioned above, this has further informed our research design and which techniques and procedures we have favored when conducting the research.

Theories about the nature of social reality are frequently reduced to two opposed, mutually exclusive categories: *idealist* and *realist*. In short, the *idealist* approach contends that what we regard as the external world is just appearances that we contribute meaning to, and that it has no independent existence apart from our thoughts. In stark contrast is the *realist* approach, which suggests that both natural and social phenomena should be assumed to have an existence that is independent of the human observer (Blaikie, 2007). The differences between these theories appear self-evident. The idealist theory, suggests that nothing is independently real in social reality, as it is merely an idea that has taken on the impression of being real. In other words, activities of humans, or by 'creative subjects' as Blaikie (2007) defined it, construct reality. The realist theory, on the contrary, rejects this notion and treats social reality similar to that of the natural world, in which we assume that the makeup of the social world is built on certain hidden structures and mechanisms that exist independently of our knowledge of them. Although both theories are logically robust in their way, we hold to a *critical realism* approach in our study, which ontologically is based on the same principles as realism.

Although we now have explained how we view reality as something that exists independently, our *thinking of reality* can still be communicatively constructed and socially conditioned. One of the most critical tenets of critical realism is that ontology is

not reducible to epistemology (Archer et al., 1998). In our case, this means that it is essential to distinguish between a reality independent of what we think of it, and our thinking about it, which naturally will be constrained by human cognitive ability. We recognize the objective reality of the natural world, but at the same time, we also recognize the events and discourses of the social world and how they are always relative to a particular frame of reference. We, therefore, prescribe to a relativist epistemology, as we share the view that our knowledge of the world is subject to the innate structure of our minds (Blaikie, 2007). We are thus in this study looking to identify those structures that generate the events and discourses of the social world, which in turn might inform our understanding of an independent reality (Baskhar, 1989). It is important to note that critical realism does´not see human knowledge as being able to capture more than a small part of a much broader and more profound reality. We intend to develop knowledge that brings us closer to that reality. As such, it should be considered not as reality instead as a contribution to our collective knowledge about the subject at hand.

3.2 Research Approach

Our research was grounded in an abductive approach. In simple terms, abduction within research is to move from a conception of something to a different, possibly more developed or more profound conception of it (Richardson & Kramer, 2006). As Dubois & Gadde (2002), we also consider that the main objective of any research is to confront theory with the empirical world. In our case, we estimated that in order to meet the objective more satisfactorily, the confrontation between theory and empiricism was continuous throughout the research process. We, therefore, aimed at moving 'back and forth' between theory and the empirical data throughout our study. Rather than trying to force the data to fit the preconceived theoretical categories, we aimed at continuously developing these categories from the data we collected (Dubois & Gadde, 2002).

Moreover, the new conceptual framework that emerged from this process guided the evolution of our case and influenced how we reshaped the boundaries of the case. This parallel development provided a payoff in terms of increased understanding of both theory and empirical phenomenon we researched. More importantly, it allowed for cross-fertilization between established theoretical models. Thus, new concepts derived

from the empirical data, which can lead to new combinations and ultimately to theory development (Dubois & Gadde, 2002).

3.3 Research Design

Following abductive cycles, the study has been redesigned and redefined during the research process. We started with an initial research area and formulated a working research question. The research focus, however, has been changed through an iterative process. Our initial interest came from looking into newly established initiatives or emerging initiatives that aimed to reduce food waste. There seemed to be a relatively rapid increase in such initiatives and spearheaded by the 'flagship' TooGoodToGo, they were beginning to capture the attention of the public. We were curious about how they aimed to reduce food waste, and particularly how technology enabled them to do so. We attended several public talks, Q&As about food supply chain challenges and their future direction for a better understanding of the landscape. We also gathered information about other food waste initiatives through their websites, news articles, and social media. One of our main observations from this process was that many of these initiatives are organized as platforms. Subsequently, we decided to investigate what kind of platform dynamics are prevalent and whether the food waste 'market' had any unique conditions that have not been discovered yet.

We reached out to several of the local initiatives, and were able to schedule several interviews. Our first couple of interviews provided us with multifarious insights, that made us realize that the problem of food waste requires a profound and more holistic examination. Moreover, we observed that in order to deal with food waste, one has to fix the system that allows for it. As a result, we decided that in addition to investigating platform dynamics and platforms' key characteristics, we should also examine how these platforms are shaping the food industry. This process of balancing the theory and the evolving data led us to a working definition of the problem and the final research question.

3.3.1 Methodological Strategy

According to Saunders, Lewis & Thornhill (2009), the exploratory approach is especially useful to clarify the understanding of a phenomena. Exploratory research can be conducted in two distinct ways. Either researchers take well-defined theories and apply them in their specific area of research, or they use it to develop their own theory from scratch. This study aims to take developed theories about platforms and examine them in a real-life setting in order to gain new insights, and is thus the first approach (Schvaneveldt & Adams, 1991). As the phenomena of digital platforms in the food industry is a relatively new occurrence, our shared understanding of the phenomena is arguably underdeveloped. As a consequence, we decided to follow an exploratory research approach as it is a useful means to discover new insights about the situation (Robson, 2002). Additionally, exploratory research also holds the advantage of being highly adaptable and provide a high degree of flexibility (Schvaneveldt & Adams, 1991).

Our goal is to provide a rich understanding of platforms in the food industry and explore the impact of platform dynamics. Therefore, we used a case study strategy, due to its particular usefulness when attempting to attain a more advanced knowledge of the context of the research and the various processes that are in place (Morris & Wood, 1991). Yin (2003) further corroborates this view, as he explains that one of the main advantages of the case study is derived when attempting to investigate a current phenomenon within its real-life context. We designed the research as a multiple case study, where we are collecting data on several different enterprises. The rationale behind our decision to conduct a multiple case study arises from wanting to uncover more general findings. As explained above, we want to investigate how the platform model and its supposedly inherent dynamics manifest themselves in the food industry. We stress that this is not a case study of our sample cases in general, but rather a study of the occurrence of a comparable phenomenon in which they all tie in.

A common critique of the case study approach is that it lacks generalizability beyond the specific context of the research. We would argue, however, that it is dependant on how carefully one chooses the cases, as well as the amount of cases that are included (Flyvbjerg, 2004). Nevertheless, valuable knowledge is never independent of its

context, and generalizability in itself should not define the value of a case study (Flyvbjerg, 2004). Moreover, the case study is a useful method for theory elaboration due to the constant "*juxtaposition of contradictory or paradoxical evidence*" (Eisenhardt, 1989), which can lead to creative and often novel theory.

As a comparative case study, it has involved analyzing the similarities, differences, and patterns across our cases. We see the abductive approach as outlined above as giving certain flexibility that carries a significant advantage in regards to this type of research. The number of cases and the emerging data has required us to move back and forth between the cases and the data continuously during the research project. This iterative-parallel research which is inherent in an abductive study has provided the backbone of our investigation into the platform phenomenon.

3.3.2 Methodological Choices

Two terms are widely used to differentiate between data collection and data analysis techniques; quantitative and qualitative methods. In order to answer the research question and in line with the choices previously presented within this chapter, we conducted qualitative research through interviews and online secondary data collection. Through qualitative research, we can better understand and interpret, for example, social phenomena as the method allows for a more in-depth study (Lichtmann, 2014). The use of qualitative methods has allowed us to compare and contrast how the different cases are shaped by platform dynamics. By supplementing this data with interviews and insight from more established actors in the food supply chain we were able to conceptualize how these initiatives are influencing the food industry. This represents the main theoretical focus throughout the study. We used a mono-method qualitative study as we see the interviews as the primary source of our research; the secondary data is used to triangulate our findings from the primary data (Bryman & Bell, 2015).

3.3.3 Time Horizon

According to Saunders, Lewis, and Thornhill (2009), the time horizon is essential for the research design, which the 'research onion' also illustrate. There can be either a longitudinal or a cross-sectional time horizon. Longitudinal studies focus mainly on

development and change over time, whereas cross-sectional studies depict a snapshot of the current situation. As this research is time-constrained, we decided to follow a cross-sectional research design. In other words, our study explores how emerging digital platforms are shaping the food industry at this specific point in time, and is not an analysis of how the construction have developed over an extended period.

3.4 Techniques and Procedures

Techniques and procedures are the innermost layer of the research onion that deal with the data collection and analysis process which are discussed in the following section (Saunders, Lewis, and Thornhill, 2009).

3.4.1 Data Collection: Purposive Sampling

We used a purposive sampling method, where our sampling criteria was derived from various research interactions, as well as an extensive literature review. The sampling was heavily influenced by Achemann-Witzel et al. (2017), and the categories they presented in their paper. Their research resulted in three distinct categories that we attempted to emulate in our sampling process; initiatives that targeted consumers directly with '*information and capacity building*', initiatives that sought out new consumers to food and products that would otherwise go to waste ('*redistribution'),* and finally initiatives that aimed at changing the supply chain in ways that made it easier for consumers to help prevent waste ('*retail and supply chain alteration*'). We used these categories as the basis for our sampling of initiatives in Denmark but added an additional criterion that our samples had to be organized as a platform, or an emerging platform. Moreover, to measure the current and potential impact of these initiatives, we decided to include a sample of more established actors in the supply chain in order to get a better understanding of the market environment.

3.4.2 Primary and Secondary Data

To better understand the challenges of the food industry and how the stakeholders are currently tackling food waste, we attended various events, panel discussions and tours. These research interactions helped us to refine our research area, form the fundamental constitution of the interview guide, and more competently interpret the findings. *Table 1* presents an overview of other research interaction which we considered as valuable to understand the food industry.

Table 1: Interaction Research Log

Position	Company	Interaction	Date Time and Location
Supply Chain Manager	Arla	Tour of the Production Facility	07/02/19 10.30 - 12.30 in Christiansfeld Arla factory
Head Chef	Amass	Informal meeting with other students	20/02/19 18 - 21 at AMASS
Company representatives	TooGoodToGo, Føedvare-banken, Nestle	Panel Discussion on Sustainability and CSR	20/02/19 17-18 at CBS
Customer Engagement Manager	TooGoodToGo	Informal meeting with other students	01/03/19 09 - 11 at TooGoodToGo store
Business and Product Development Assistant	YourLocal	Informal meeting	08/03/19 8.30 - 11 at CBS
Founder / CEO	DelDinMad	Informal meeting	15/03/19 16 - 17.30 at CBS
Customer Engagement Manager	Plantjammer	User testing	17/03/19 13.30 - 17.30 at coffee shop
Representatives of companies	TooGoodToGo, Whywaste, GRIM, Plantjammer	Panel discussion on “Future of Food”	06/04/19 14 - 15 at Refesehaløen
Customer Engagement Manager	Plantjammer	User testing	20/04/19 at Plant Jammer office
CEO & CMO (Founders)	GRIM	Volunteering at case company	14/05/19 10.30 - 16.00 at GRIM office
Farmer	Farm Seidenfaden Maribo	Tour of farm	28/05/19 10 - 16 at Marbio farm

Source: Authors

Interviews

The rationale behind interviews as a data collection technique lies in targeting the expert knowledge and in-depth information that can be found when interviewing experts or incumbents in a particular area of study. It is known as a resource-intensive research method, as planning, scheduling, and executing the interviews is reasonably time-consuming. Nevertheless, interviews hold the advantage of gaining thoroughly detailed and responsive answers to the questions asked. Furthermore, it allows follow-up questions which enables a more in depth exploration of the topic of inquiry .

In total, we executed 12 interviews over three months. The interview lengths were on average 50 minutes per interviewee which totals around 10 hours of interview recordings. Most interviews were conducted face-to-face, while a third was carried out over the phone or via Skype video call. Although phone interviews have some drawbacks such as a lack of non-verbal communication, we found that both the personal and the phone interviews provided the analysis with rich qualitative data and broadened our understanding of the topic.

We acknowledge that there is a certain power asymmetry that is prevalent in interviews. The interviewer controls the interview due to the scientific competence of the researcher as well as dictating the agenda that rules the conversation (Kvale, 2006). As a result, the researcher holds a monopoly over the interpretation of the interviewees' responses and will inevitably frame it according to his or her design. It is important to recognize that interviews are in actuality an influential form of conversation with control over the produced knowledge; contrary to the belief that interviews are an open dialogue. The goal of a perfect and balanced relationship between interviewers and interviewees in a research interview seems unrealistic. Nevertheless, we have aimed to be aware of this power asymmetry and attempted to diminish its impact on the data.

In order to document all relevant data, the interviews were recorded and transcribed with the purpose of further analysis. *Table 2* provides an overview of all the conducted interviews.

Table 2: Interview Log

Position	Company	Date Time and Location
Founder / CEO	Plantjammer	16/04/19 from 14.00 -15.00 at Plant Jammer office
Customer Engagement Manager	TooGoodToGo	03/05/19 10-11.30 at TooGoodToGo store
Front End Developer	Plantjammer	22/05/19 9.15 - 10.15 at Plant Jammer office
Marketing Manager	TooGoodToGo	22/05/19 - 13 - 14 via Skype
Founder / CEO	DelDinMad	24/05/19 16.30 - 17.30 at CBS
Founder / CEO	Grim	08/06/19 - 13 - 15 at Grim office
Customer Engagement Manager	PlantJammer	27/05/19 9.30 - 11.30 at Plant Jammer office
Head of R&D	Amass	29/05/19 10-12 at AMASS
Founder / CTO	WhyWaste	05/06/19 14-15 via Skype
Farmer	Farm Seidenfaden Maribo	12/07/19 11 - 12 via Phone
Supply Chain Manager	Coop	24/07/19 at Coop HQ
Founder / CFO	Fresh.land	30/07/19 via Phone

Source: Authors

We worked with an interview guide that had a somewhat rigorous set of questions. Around ten percent of the interview guide to adapt to the new insights gained from our interviewees (see general interview guide in *Appendix 1*). The interviews were semi-structured, leaving possibilities open for following new ideas and discoveries.

Secondary sources

We also gathered secondary data in order to enrich our research further (Bryman & Bell, 2015). Saunders, Lewis & Thornhill (2009), have developed three sub-categories of secondary data; survey-based data, documentary data and those data compiled from multiple sources, which are often an amalgam of the previous categories. We gathered a large amount of documentary data, such as written documents in the form of journals, newspapers, organizations' websites, blog posts, and social media posts.

We also gathered multiple source data, in order to access more industry-specific data in the form of industry rapports both from Denmark and the EU as a whole.

One of the main advantages of secondary data is that it is much less time-consuming to gather the data. As a consequence, the researchers have more time to analyze the potentially much larger data sets, and have more time to ponder theoretical aims (Saunders, Lewis & Thornhill, 2009). Moreover, it can be valuable to measure and assess the primary data with the secondary data by placing the findings in a broader, more general context.

As it is sometimes difficult to assess the quality of secondary data, we have carefully evaluated the data sources. We required that the secondary sources were published by the case companies, in total, we collected 77 cases' related sources.[1] Moreover, we collected various reports published by trustworthy sources such as industry reports by the European Commission which gave us a better understanding of the current state of the food supply chain, its developments, and its current challenges. The purpose of collecting these types of secondary sources of data was twofold. First, the secondary sources were used, when possible, to validate and strengthen specific findings in the primary data. Second, the data was used to gain a more comprehensive understanding of the context and the environment in which these initiatives operate.

3.4.3 Data Processing

In order to organize the data for analysis, the interviews were recorded, transcribed, and categorized. Ensuring a more reliable and accurate recollection of the data for future researchers as well as for the current study. For the coding and analysis process, we used a coding software called Nvivo, which assisted us in organizing and grouping the interviews into categories. Existing theory has been used to formulate the research objectives, and thus these theoretical propositions were also used to devise a framework for directing our data analysis (Yin, 2003). We decided on using the qualitative reasoning called template analysis, which suits our abductive approach. A template analysis allows an abductive approach to qualitative analysis as predetermined codes can be adjusted or added to the data collection and analysis

[1] The secondary sources can be accessed through this link: *www.shorturl.at/klTX6*

process. Template analysis offers a more flexible way of analyzing the research than, for example, grounded theory as that is more prescriptive (King, 2004).

Our data went through three rounds of coding. In the first round, we followed the template we made based on our interview guide. We used the interview guide topics as higher-order codes, and we formulated the interview questions into lower-order codes (the initial template is located in *Appendix 2.1*). Therefore, we defined a set of nodes based on our template before independently processing the data to find relevant and informative quotes. We still left the possibility open to find new emerging themes. Researchers interpret data differently and might derive different codes from the same data (Dey, 1993). Thus we wanted to process the data independently through the first couple of rounds, to derive a more diverse set of subcategories. The first stage of coding, yielded 322 nodes from one of the researchers, while the other collected 262 nodes. The researchers then compared and contrasted the codes to find similarities and differences. This discussion resulted in rearranging some lower-order codes, and we also established new higher-order codes for the second round of coding, the second round template can be found in *Appendix 2.2.* It was a highly iterative process in which we adapted the nodes and therefore, the higher- and lower-order codes throughout the three stages of the coding. As the relationships between the categories emerged, we organized them in a hierarchical structure, with emerging subcategories.

We then discussed and validated the results from the third and final round of coding, and decided upon 5 concluding higher-order codes and 15 lower-order codes. A detailed listing of all higher-and lower-order codes can be seen in *Appendix 2.3.* Finally, we created a sample coding table that displays the key findings for each category, and that shows a correlation between the individual interviews (see *Appendix 2.4* for an excerpt, the full coding table can be found on USB stick).

4. Analysis

This chapter presents the findings from our interviews and secondary data. The findings are divided into two separate sections. The first section presents the findings that illustrate the similarities and differences between the companies as they relate to platform dynamics, their organizational structure and their strategy. The second section introduces the findings which illustrate how the initiatives are shaping the value chain in terms of its market environment, how they influence consumers and how the supply chain is impacted.

We first introduce the case companies and other relevant background information. Moreover, our analysis will be based around three categories which have been adapted from the categories presented by Achemann-Witzel (2017). We will therefore shortly explain how we have adapted these categories, and based on a business model analysis we determined which initiatives are the best fitting for each of these categories.

4.1 Introduction of the Cases

In the following we will introduce our case companies. All of these cases are emerging platforms or already settled platform businesses located in Denmark.

Fresh.Land

Fresh.Land was founded February 2015 and their mission is "*to change the food industry and bring access to fresh and natural products from farmers - bring the "farmers markets" to the supermarkets."* Fresh.Land sources fresh high quality produce from producers and delivers it directly to buyers. It effectively shortens the supply chain by cutting out middlemen while also cutting food waste and chemicals through reduced transport logistics. For further details see Business Model Canvas in *Appendix 3.1.*

GRIM

GRIM was founded July 2018 and their mission is "*to create a new quality standard of what is edible. So we decided to proclaim fuck beauty standards as our go-to strategy*

in literally everything and made it our mission to show people how beautiful and tasty ugly can be." GRIM deals with produce, primarily fruits and vegetables that do not suit the industry standards based on sensory appearance. Therefore, retailers do not buy the produce due to its unappealing appearance and subsequently those items are not consumed. They provide consumers and other buyers a chance to buy this produce through a one-off purchase or through a subscription service. For further details see Business Model Canvas in *Appendix 3.2*.

TooGoodToGo

TooGoodToGo was founded September 2015 and their mission is: "*to reduce food waste worldwide, and our vision is to create a world where food produced is food consumed.*" TooGoodToGo is a digital platform offering restaurants and bakeries a way to sell surplus food to consumers at discounted prices instead of the establishment disposing the food as waste. For further details see Business Model Canvas in *Appendix 3.3.*

DelDinMad

DelDinMad was founded July 2017 and their mission is "t*o raise awareness among Danes about sharing our common resources*", "*A burning desire to create sustainable and innovative solutions that benefits society*", "*Achieving a significant reduction of food waste in danish society*". Deldinmad is a not-for-profit platform that opens channels between consumers to share their surplus food. It enables direct contact between consumers, where users can see different types of food being posted on the platform for pickup. At their own discretion, they may choose with whom to trade with. For further details see Business Model Canvas in Appendix 3.4.

Plant Jammer

Plant Jammer was founded August 2016 and their mission is *"to reduce greenhouse gas emissions and fight climate change through sustainable cooking and plant based food."* Plant Jammer allows consumers to cook and eat more flexibly, meaning that each individual can be empowered to reduce waste in their home by using ingredients that would normally be wasted due to the household not knowing how to use them in their daily meals. Additionally, they connect consumers' to discounts and

soon-to-expire products in retail stores. For further details see Business Model Canvas in *Appendix 3.5.*

4.2 Introducing the Categories

We have decided to group the cases based on the categories of traditional food waste initiatives that were identified by Aschemann-Witzel et al. (2017). These three categories contain: retail and supermarket alteration initiatives, redistribution initiatives and information and capability building initiatives are primarily based on where they interact in the supply chain. While the first two categories represent an upstream approach of the supply chain, the latter approach the supply chain downstream. However, as previously explained, there are inherent differences between platform businesses and more traditional organizations. We have, therefore, adapted the categories to fit our selection of platform initiatives.

Retail and supply chain alteration initiatives focus on actions within the food supply chain that prevents food waste → we call this category the Alterationists: digital platforms that focus on actions that prevent food waste in the supply chain.

The redistribution initiatives redistribute food across supply chains and consumers to tackle food waste → we call this category Redistributors: digital platforms that tackle food waste by redistributing food to consumers.

Information and capacity building initiatives provide information to consumers in order to assist them in reducing wasteful habits → we call this category the Capability Builder: Digital platforms that assist consumers in attaining more sustainable habits through skill development and knowledge sharing.

Business Model Analysis

In order to classify the cases into the relevant categories, we examined their respective business models based on Osterwalder and Pigneur (2010) business model canvas . Although there are differences and similarities between all of the cases, we could identify certain core elements to form the basis for the categorization. In order to create a framework for our analysis, we have focused on a few central elements of the

business model. These include their value proposition, key activities, key revenue stream, and the transaction type. By involving these four elements we cover the value creation dimension, value delivery dimension and the value capture dimension of the business model (Täuscher & Laudien, 2018).

Table 3: Business Model Elements Case Companies

Case	Value proposition	Key activities	Key revenue stream	Transaction type
Fresh.land	Delivering fresh produce directly from farmers	▪ Accumulating demand & matching it with suppliers + logistics	Transaction fees	Physical product
Grim	Preventing food waste by delivering suboptimal but fresh produce directly from farmers	▪ Accumulating demand & matching it with suppliers + logistics ▪ Educating consumers about food waste	Subscription fee Shop	Physical product
TooGoodToGo	Preventing food waste by facilitating trade of surplus food between businesses and consumers at a low price	▪ Reducing friction in trade ▪ Balancing supply & demand ▪ Building a community ▪ Educating consumers about food waste	Transaction fees	Offline services
DelDinMad	Preventing food waste by facilitating the redistribution of surplus food between consumers (for free)	▪ Reducing friction in trade ▪ Educating consumers about food waste	Non-profit	Offline services
Plant Jammer	Enabling healthy and sustainable habits through technology	▪ Support & develop the technology ▪ Establishing partnerships with complementary services	Subscription fee Technology sales	Digital product

Source: Authors

4.2.1 The Alterationists

We classified Fresh.Land and GRIM in the Alterationists category. They have a similar value proposition which enables consumers to buy fresh produce directly from farms. They are both accumulating demand, actively matching suppliers with buyers and ensuring the logistics necessary for moving the produce from supplier to buyer. The two main differences between the two cases are their key revenue stream and their

focus on sustainability. Firstly, Fresh.Land is charging a transaction fee and GRIM is charging a subscription fee for their food boxes. Secondly, although both can be viewed as operating sustainably, GRIM is more actively engaged in promoting sustainable solutions and raising awareness among consumers.

4.2.2 The Redistributors

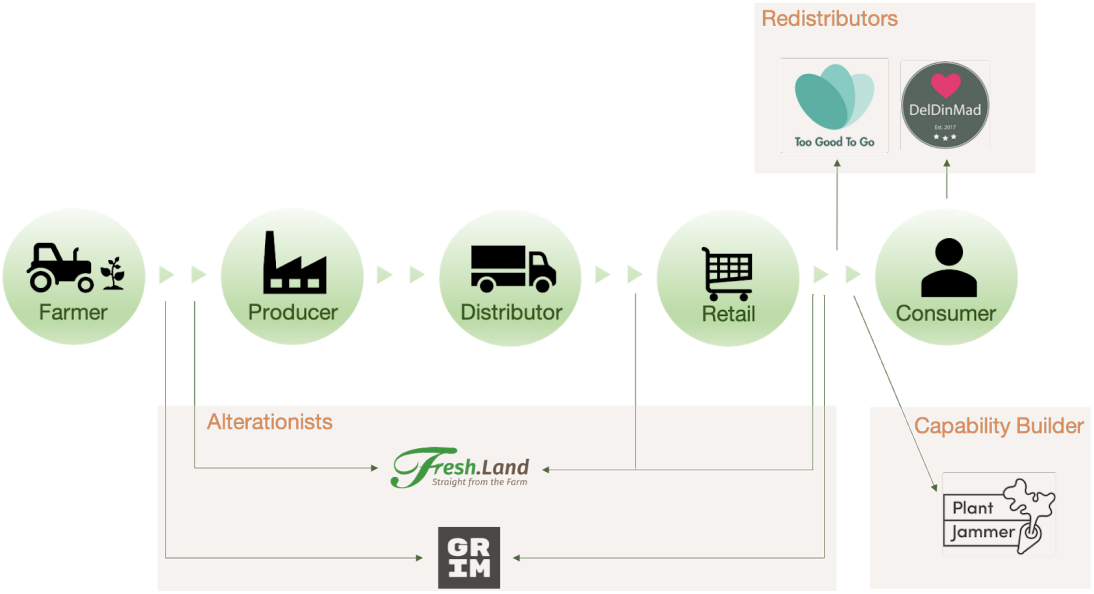
TooGoodToGo and DelDinMad belong to the Redistributors category. The two cases are different in that DelDinMad is a non-profit facilitating trade between consumers and TooGoodToGo is a commercial enterprise which facilitates business-to-consumer transactions. Nevertheless, their main value proposition is similar, both are facilitate the redistribution of surplus food through an offline service where the participants are providing the physical resources. Moreover, they are both actively educating users and raising awareness about food waste.

4.2.3 The Capability Builder

The final category contains only one initiative. This is partly due to the uniqueness of the service, which utilizes machine learning to provide users with tailored recipes based on their personal input. The main value proposition is to enable users to establish healthy and sustainable consumption habits through the use of convenient technology. It is the only one of the cases that has a digital product at its core, and also the only one that is profiting directly from its technology.

To show in which part of the supply chain these case companies interact, we illustrated *Figure* 2 for a better overview.

Figure 2: Case Overview within the Supply Chain



Source: Authors' own illustration

4.3 Platform Dynamics

In the upcoming section the categories will be analysed based on the concepts presented in the literature review. The findings are divided into three subsections. Firstly, the findings related to the fundamental drivers of platform businesses are presented. Secondly, we introduce the different ways these initiatives have built and are maintaining their platform. Finally, we introduce some emerging findings related to how the initiatives utilize technology and data.

4.3.1 Fundamental Drivers

As previously mentioned, companies and markets in the digital economy are subject to different forces than those in more traditional markets. We will therefore first present our findings on how these forces affect the initiatives and how they are managing these forces.

Network effects

Network effects are one of the inherent advantages of organising as a platform, and strong network effects have shown to be a prevalent condition and a major focus for all our cases.

The network effects are significant for the Alterationists in the way it reduces operational costs by increasing supply on the platform. The founder of Fresh.Land explained that growing the user base and enhancing network effects was critical for them in attracting farmers to their platform. Moreover, gaining scale enables them to act as the sole distributor of the producers *“So it's important to gain scale and be protected by network effects. If we have strong network effects there's no reason why a farmer should go anywhere else. He can sell 100% of his products through us.”* This sentiment was echoed by the founder of GRIM, who also implied that stronger network effects would make them more cost efficient and help them operate more cost efficiently. *“now we have kind of reached some sort of critical mass because we can go to bigger farms, that's an important factor. How many customers we have determines how big of a farm we can go. (...) it's not going to be such a hassle of sorting out orders cause I can order a pallet of this product and then another one of this. So it's actually what has the biggest effect on which also affects prize of course of the produce.”*

The Redistributors similarly reveals strong **cross-side network effects** on their platforms and accentuate the importance of managing these effects. As revealed by the Marketing Manager of TooGoodToGo, they are continuously trying to shape these dynamics by balancing both sides of their market. “*So it's critical for us to keep on finding new users because the more users we have, the more stores want to join. But it's at the same time if we have a lot of users and very little stores, it's a bad user experience because then there's no food for you. So it is that continuous balance that we're trying to, there's .... we don't experience that we just say now it's perfect. Now we sit back and relax because it's our overall growth is this demand going up and up and up and supply going up and up and up, they have to follow each other”.*

In addition to being aware of potential negative network effects if they are not managed correctly, the Redistributors also recognise the importance of turning this network into a **valuable community.** The Customer Engagement Manager of TooGoodToGo says this is an important aim for the company, and have been positively surprised by the current state of this community *“also there's a Facebook group called “experiences with TooGoodToGo” and it's in the thousands of people who use this.*

every day there are posts of people sharing experiences: "I got this bag from there (...) and so many comments."

The Capability Builder also stresses the importance of managing the network effects and creating a valuable network on the platform. In contrast to the others, the CEO of Plant Jammer explains that the more pertinent type of network effects for them currently, is direct network effects. "*there will be network effects meaning that when someone new comes in that gets value for everyone is exactly by having just like they've done with in Endomondo and running and my fitness pal and exercise and headspace and meditation where you have buddies that you're either competing or helping along the way".*

He reflects on the need to strengthen these and the various ways in which they are attempting to do so. "*what we're investing in most for this reason is also the health part because that's an area where you can easily see you know point systems, competitions, these kind of things regarding how do you eat the healthiest. (...) So if you have a group of like - if I have a group of my 14 guys on my football team that we're up to season start well focusing on weight control to get ready for the season, then it would be beneficial for everyone to have one more person in"*

Multi-Homing and Switching Costs

As discussed, the strength of the network effects can be determined by examining other factors, such as for example multi-homing costs. We observed that multi-homing by consumers is happening between a number of the case initiatives. The CEO of Plant Jammer has, for example, witnessed several of his users utilizing other platforms in conjunction with Plant Jammer. *"already now we see a lot of our users use ToGoodToGo to find ingredients and then they're putting it into Plant Jammer and cooking with that."* It suggests that the platforms have a similar customer segment and an overlapping user base.

Multi-homing does not seem to be a current concern however, instead these platforms consider their effectiveness in reducing food waste as a joint effort. As stated by the Customer Engagement Manager at TooGoodToGo, food waste and other climate change challenges has to be tackled as a collective. *"Food waste and most of all the*

problems that we're dealing with right now in terms of climate change are something where people need to work as a community and we want to create that community and all we want is to put a label on fighting food waste and not just earning money on food waste that's being saved".

This opinion is mirrored by the founder of Plant Jammer who explains that there is a clear sense of fellowship between the initiatives and that they will happily promote each other as an act of solidarity. *"we point people their way and they point people our way but just out of friendship and because we believe in each other's vision"*.

Niche and Differentiation

Although the Alterationists are tackling similar issues and are situated in the same part of the supply chain, they differ slightly in their core value proposition. We observe that Fresh.Land has an overarching focus on delivering fresh and quality produce which is the main motivation for why users are utilizing their service as their founder confirms. "*So customers are getting products that has a better quality, they come fresher, they look nice and smell good, they taste good and things they can not find elsewhere*.''

GRIM has a similar focus on providing quality produce, but their main objective and motivation is to fight established market convention about beauty standards in food. *"it's a food concept that fights food industry beauty standards by sending ugly surplus fruits and vegetables"*. Their founder says that their users are often motivated by the convenience of home delivery, but that the fundamental driver for most people is the sustainability aspect. *"definitely the sustainability is the most important driver, so people who want to live and eat more sustainably"*

The Redistributors are also emphasising sustainability as part of their value proposition, but they also have a low-cost position. As the Marketing Manager of TooGoodToGo admits, there are a lot of people using the service due to concerns about the environment, but there are also clearly those that are enticed by the low price. *"Of course we would like everyone to just do it because they think that food waste is bad and they want to help save it because of the environment and all of those issues, but the truth is that a lot of people do it to get a cheap meal as well".* The founder of DelDinMad also emphasizes that they want people to use the service for altruistic and

environmental reasons. As a nonprofit platform, they don't want money to be an issue. They are optimistic that people will share their surplus food as a way to help others. *“Oh no, it's free. And we have excluded the financial thing from the beginning. And that has been my main thing to do. We don't want people to get involved with money in this one. It's not the reason why we build this.”*

The Capability Builder is still experimenting with their service, attempting to find what their customers value most. At the heart of their service is their focus on gastronomy and helping users reduce their food waste by cooking with the items they have available *“It is taking you from ingredients up to recipes and then cooking with it which means you're building your own recipes and you're learning about the basics of gastronomy along the way which gives you this superpower of being able to cook with anything”*. The founder of Plant Jammer explains that they are still learning what different users value, and are adding new features to gage what brings the most value to broader user segments. *“Right now we're making a little bit of a change into focusing also on health. And with that we're opening off another segment. So it's very clear that once we move there we have a quite different target group that suddenly is becoming relevant to us”*

Blurring of Organizational boundaries and Network Clusters

A hallmark of digital platforms is their ability to orchestrate and make use of external resources without having to bear the cost of those resources. We observed although all of the platforms are accessing external resources, the degree to which they internalise the costs and the operational burden differs.

The Alterationists are making use of distribution companies and other logistics partners in order to move the produce from seller to buyer. As revealed by the founder of Fresh.Land, this requires some work when entering into new regions: *“we still need to open the routes for new delivery. (...) The platform can accommodate them but we always need to create it with established routes first. So there is a bit of upfront work when we open up in a new region”*. Similarly, dealing with suboptimal produce GRIM are currently screening the produce themselves in order to determine which are suitable for the consumers. As the founder explains, this is done in their own warehouse before it gets delivered to the buyer through their distribution partners.

"*they always come directly from the farm to us by the transport, by trucks. And then we handle it here in our warehouse. And then we deliver with our delivery partner directly to people's doors or then they pick up"*

For the Redistributors, the users provide the necessary resources that enables trade between suppliers and buyers. The Customer Engagement Manager of TooGoodToGo notes that all the interactions happens on or through the app, and that there is no need for TooGoodToGo to be involved physically in the trade. *"In the app it says what time and where they should go to pick up the food. So once that time comes and they show up with their phone, to let's say the supermarket and then store swipes the receipt and then they get the magic bag"* Similarly, DelDinMad relies on its users handling the actual trade. As the founder explains, the participants put in what they want to share on the platform, then other users can pick it up. *" You enter your address also. So people can see where it is to be picked up".*

The Capability Builder are also building a service where they don't need to internalise costs or own any additional resources through providing a physical infrastructure. The app is being used by people across the globe (in 12 markets), as the CEO of Plant Jammer highlights that the service is digitally offered. *"we're trying to build the world's best cooking assistant and being digitally offered".* Moreover, they are actively enhancing their service by accessing external resources through various partnerships, but without taking direct control over them. This is illustrated by their partnerships with supermarkets and retailers. The CEO of Plant Jammer explains further how the shops can give users of Plant Jammer personalised offers, without Plant Jammer having to assert control over the interaction. *"They will click a button that will go into the Plant Jammer app in the marketplace and then any user around (the supermarket in) Værløse, when they open up the marketplace will see these discounts and we'll be able to quickly find things that are fitting their needs that will stop food waste in a local area."*

Competitive Forces in Platform Markets

We observe that most of the initiatives expect that a clear market leader will emerge, but that there might be space in the market for more differentiated services. The founder of Fresh.Land considers that positioning themselves with a focus on quality

means that they are better able to withstand these competitive forces. *“I think there is always a little bit of winner take all. But there could still be space for some platforms with slightly different models to go into and focusing on different themes and different dishes. So I think there will be space for a couple and not just one. So probably there will be a platform that is going to sell there's going to dominate the space without the short supply chain and without all the policies duration that we do. It's just an open marketplace where you do deal and uh, it's easy to do deals, but we are totally integrated (...) we will always be at that drop to get 10 or 20% addressable market because not everyone goes for quality. (...) So it's different taste different models. Our model is for quality”*.

Similarly, the Redistributors believe that there will be room for more players in the beginning, but that it is simply a matter of time before one platform gains center stage. The Customer Engagement Manager of TooGoodToGo says that *“I would say that there is space for both. And that's because it's such a new market. (...) So up until there is a final solution there will probably be more competitors fighting to to become that solution”.*

The Capability Builder also envisions a platform leader in the market. As explained by the founder of Plant Jammer, there are some inherent dynamics in the market that advance the possibility of a winner-take-all market. *“I think there's some dynamic to both logistics and tech that calls for scale. (...) so likely there will be an Amazon or a similar one who will be running this space and they will have great incentives. To make sure there's no food waste around. I think there's gonna be one player who's gonna be not dictating but is going to be having the finger on the pulse in terms of integrating the food chain in a way that we don't have this wasteful system”.*

4.3.2 Building a ‘Competitive’ Platform

We have observed differences and similarities in how the platforms have established themselves in the market. In the following we provide a table to give an overview of some of the key characteristics of our cases (*Table 4*).

Table 4: Platform Building Characteristics

Category of platform	*Alterationists*		*Redistributors*		*Capability Builder*
Platform	Fresh.Land	GRIM	TooGoodToGo	DeldinMad	Plant Jammer
Status	Emerged	Emerging	Emerged	Emerged	Emerging
Market Sides	End consumers				
	Farmers		Restaurants	End consumers	Retail
	Wholesale	Restaurants	Manufacturer		
Planned market sides			Farmers	Retail	Farmers
Launch Strategy	Micromarket	Follow-the-rabbit strategy	Producer evangelism strategy	Micro-market strategy	Single-side strategy
Business Model Design	Differentiation		Cost		Differentiation
Pricing Strategy	Charging consumers through transaction	Charging consumers through transaction	Charging consumers through transaction	Free service	Freemium subscription model
Ecosystem Governance	Own curation		Ratings by users		Own curation

Source: Authors

Market Sides

In building the platforms, the cases had to choose which markets sides to integrate in the platform and what market side to onboard first. *Table 4* shows that all the platforms are consumer facing, but that they differ slightly on the other market side(s).

The Alterationists have similar market sides, as both are connected to farmers, wholesale buyers and individual consumers. *“So we have three types of users. We have suppliers, we have buyers, wholesale buyers like supermarkets and catering companies, and then we have end consumers”* (Founder Fresh.Land).

The Redistributors differ slightly in market sides, in that one is customer to customer (C2C) whilst the other is business to consumer (B2C). This is likely to change in the future, as the founder of DelDinMad states that they are planning to add retailers to the platform. However, It is currently a C2C platform. *“its a peer to peer, person to person a sharing platform of surplus food. So it's household food. (...) We've been to several retail stores and we know about the, they have a huge bunch of food they need to throw out every day. (...) And this one can be an alternative for getting the food”.* TooGoodToGo on the other hand has already experienced huge growth, and through their growth have boarded various types of suppliers. The Marketing Manager explains that anyone that has a surplus perishable product are prospective suppliers for their platform. *“it's a mix of bakeries, supermarkets, flower shops, hotels with their buffet restaurants. (...) basically everyone who has surplus food or flowers, they can be potential partners”.* When deciding which market side to onboard first, the Marketing Manager of TooGoodToGo noted that their focus is to assist suppliers to a larger degree than consumers. “*So on new markets it's the shops that we reach out to first and that's also because shops need sales tactics. While as users you can just make a Facebook post something like this you know, especially with a brand being this big you can quite easily enter new market in terms of users. It's not the same for the shops because they don't have the same channel of information as users have”.*

In contrast, the Capability Builder has decided to **onboard the end-consumer side first.** The rationale as explained by their CEO, is that they need to fully understand their core user group before opening up for a second market side. He describes how this approach have already prompted retailers to request access to the platform *“We see right now that we're working with retailers who are interested in having their products available in our platform. (...) The core sort of lesson and take is generally that you know you need to sort of hold the customer and be close to them to really understand*

and that's why we're starting in the home kitchen rather than starting from the supply side".

Nevertheless, all the case companies are planning or already in the process of adding further user groups. They consider it a necessary step to take when reaching a certain level of users, as exemplified by this statement from the consumer engagement manager at TooGoodToGo. *"So basically what we do when we have a market that's starting to... It's not declining but we're like in a passive state in Denmark by now. It's difficult to scale and make it grow. So we're trying to innovate another aspect. So the shop is like this is one way of doing that - so that's the first time we're dealing with the actual manufacturers or the warehouses and wholesalers and everybody who imports food and so forth. (...) And now we are trying to collaborate with farms as well."*

Launch

It does not seem to be one way of launching the platform. The initiatives have deployed different launch strategies in order to solve the chicken-and-egg problem and to drive users onto their platform. As seen above, the Capability Builder has prioritized to onboard the consumer side before opening the platform to an additional side. This launch strategy is called a single-side strategy. Further, classification of the cases' launch strategies can be found in *Table 4.*

Business Model Design and Pricing

Although, all the platforms are similar in their efforts to reduce food waste, the initiatives are deploying different models and proposing various ways to deal with it. As the founder of Fresh.Land describes, there are various models out there and not many copying each other yet: *"Right now we are not seeing too much copycats, you know, like Escooter where VOi is the same as Lime or the same as all the other providing exactly the same thing. Here we are seeing some tonalities and different ways of doing business"*

The Alterationists are integrating three main elements in order to make buying and selling the produce on their platform a frictionless and more valuable experience. As explained by the founder of Fresh.Land, they are attempting to automate the processes to make it less labor intensive, thus increasing their operational efficiency.

“The way it works is we have a platform and that platform takes care of, getting products, matching products from a supplier to a consumer and it handles all the logistics involved in that. So the platform combines three things. It combines the e-commerce component where the deals are made, contracts are made, suppliers and buyers are allocated. It combines the second thing, which is logistics, where we actually control the delivery via last mile or long haul. And thirdly, there's the finance that also goes through the system. So, we do all the payments, all the invoicing, all the credit notes etc, and all the insurance.”

However, the initiatives differ in their revenue model. While Fresh.Land is primarily charging transaction fees, the founder of GRIM says that they utilize a subscription model as its main revenue stream. *“So we then tackle this problem by creating a food box concept where it's a subscription. So you can get a big or a small box delivered to your doorstep or to a pick up point near you.”*

With regards to the Redistributors, one of the initiatives is a non-profit company and are thus not charging for entry nor trade on the platform. The founder of DelDinMad believes that retailers have an incentive to share the food regardless of payments being made. *“They have a huge bunch of food they need to throw out every day. And of course they waste food on it, but they also pay for it to be thrown away. So actually there is also a business case there for them”*. TooGoodTogo on the other hand are charging a transaction fee where they get one-third of the price of the produce, while the remaining two-thirds goes to the supplier. In encouraging the suppliers to board the platform, all of the initiatives are providing good and competitive conditions for their suppliers. They have a clear strategy of not charging them for entrance to the platform. As explained by the Marketing Manager at TooGoodToGo: *“There is like a super small admin fee that you (the store) pay yearly. But other than that you don't pay anything, then you just get money from us”*

The Capability Builder offers free entry to their platform, but also offers a paid subscription for access to additional features. As revealed by the CEO of Plant Jammer, this is one of three platform revenue streams:. “*people are paying for Prime which is the subscription part of the app we're getting the whole nutritional understanding with it. We can set a target for your health and your realizing which*

ingredients are helping you along that pathway and can notch it that direction". They are also has a feature which enables users to find discounted products at local retailers. This feature might provide a second revenue stream in the form of transaction fees. "*The second part is that we are now adding marketplace feature which is moving us upstream towards a retailer. So now we're working in a few pilot with retailers where they are putting food waste products on sale on the marketplace and then users can find the products and actually cook with them."*

In addition to the subscription and transaction fees, the platform is also using its technology to create a separate revenue stream. According to the CEO of Plant Jammer, other companies are interested in using their core machine learning technology to improve their products and services, and thus plant jammer have been able to engender a third source of revenue. *"In the process of building this. We've taken some pretty heavy technologies in use. Insert an assistant kind of artificial intelligence where you're learning from patterns of existing recipes but putting learnings from chefs on top and that kind of methodology combining structural learning with machine Learning is super powerful and something that we're then applying to other fields with partners (...) It's sort of the third component of how we're making it into black numbers."*

Platform Governance

One of the differences between the categories is how they are engaged in curation within the platform by facilitating rules that minimize low quality outcomes. The Alterationists are to a more significant degree coordinating the trade by leveraging their market knowledge through matchmaking. As explained by the founder of Fresh.Land, there is no need for direct interaction between supply and demand *"So it depends on the customer and that's where our matching comes into play. So we make sure that everything the farm is declaring and is producing. We can allocate it to the best possible buyer."* As the Alterationist deal with delivering the produce directly from the producers, they show a much higher level of control when it comes to who are allowed to sell on their platform. The founder of Fresh.Land describes how the suppliers need to fill certain criteria before they are allowed to trade on the platform. *"They have few things they will supply us including some documentation about certifications and etc, for compliance. Then there's a period where we do the validation*

of that documentation. And if the documentation is valid, it means that they can put product online. (...) It's not anyone that can go there and publish a product at the moment."

The Redistributors facilitate direct contact between the supply side and the demand side, meaning that buyers actively choose which supplier they want to engage with. The Customer Engagement Manager at TooGoodToGo expressed how the consumers choose which suppliers they want to interact with through the app interface. The transaction is then completed without any extra input from TooGoodToGo. *"You can see (on the app) it has green dots on the map when something is available and so forth. (...) you get a picture and a description saying that, you get whatever they might have and you know it doesn't say exactly what you get but it can say you get a mix of some of the things that this shop have during the day.*

Thus the Redistributors have decided on a more user-generated form of curation through a rating system. However there is a difference between the two cases, in that one displays the ratings on the platform, while the other use it predominantly to coach and support its suppliers. As described by the Marketing Manager of TooGoodToGo, if a shop has a low rating, TooGoodToGo often consult the supplier in ways they can improve. *"And it's also something that our customer care team can use because if they see that a supplier has a rating of one, which is super bad, then they can call them and they can ask: is there anything you can do to improve the service? Why do you think customers have a bad experience with you?"*.

The data does not reveal curation in place for the Capability Builder at this given time.

4.3.3 Platform Strategy

The following section will firstly examine how technology and data are utilized differently among the three categories. Secondly, we introduce how identity and managing consumer perception is considered as an important strategy for the initiatives.

Technology

We observe that the case companies use different degrees of technology in their business model. For some it is a core part of their business others only need it to be able to bring the market sides together.

The Alterationists use their technology to aggregate better matches. The founder of Fresh.Land explains that the technology is mainly developed for operational purposes. "*We developed our own platform, our own system. So that's our core technology, it's the system that when buyer buys into our platform is then allocating it to different farmers different suppliers, and managing the whole process so that we can deliver on time and high quality."*

The Redistributors have created an online marketplace, which primarily is used to facilitate direct interaction between supplier and consumer. The founder of DelDinMad express that technology is primarily a tool for sustaining the marketplace and providing a link between the market sides. *"Well it's (technology) the connection between the user/people sharing with each other. So it's kind of the link"*

For the Capability Builder technology is at the core of its business. As explained by the Frontend Developer at Plant Jammer, their advanced technology enables users to cook in a more flexible way as they can rely on the capabilities of the platforms algorithm to make recipe suggestions. *"it's an app that utilizes a bit of technology to what you would call machine learning or artificial intelligence, so we can tell ingredient by ingredient what goes well together."* He goes on to describe how the service can help users develop their cooking skills as well as their mindset about what to eat. *"And on top of that, we also try to teach people about gastronomy in a relatively easy way so that they will know what actually goes into what you usually perceive as a good dish. Because they have some gastronomic components."*

However, as he explains, the technology has become more than a utility for consumers. The technology can also be leveraged into an additional revenue stream, making it an even more integral part of their business model: "*we have a technology that existing food companies like all the food companies think are interesting. And I*

think that can boost their business model which is maybe losing a bit of momentum due to other options that are also fighting with convenience."

Leveraging data

Our findings suggest that the data gathered by the initiatives is currently used for business analytics and subsequently to improve their business performance.

The Customer Engagement Manager of TooGoodToGo describes how this type of data provides the basis for a host of strategic decisions, for example, in marketing. *"We work with two numbers and that's meals saved. So how many meals do we save in total and how many meals should we saved within a month and so forth. And then we have the saved-ratio is how we manage or make strategic decisions especially in terms of marketing. (...) we use this is in terms of geography and next week we're launching a TV ad campaign and that campaign is focused on the markets in Denmark with the lowest safe-ratio".*

The initiatives current priorities vary and thus the use of data naturally varies. For instance, the founder of Fresh.Land explains that the data is primarily being used to improve their matching capabilities: "*So the most important use of data is to match orders to suppliers. which taking into account you're waiting on the farmer take into account the availability. They can show cars? Costs and transportation costs of the products many different types. So that's the most important use"*.

Common for all the platforms is that they currently don't leverage the user data in any specific way. Given that the primary focus for all of these initiatives is still to acquire users, it seems that the question of whether or not to leverage user data is something that might be revisited in the future. As exemplified by this statement from the founder of Fresh.Land *"No, not at the moment. No. That's up in between, of course there's possibilities to use data in many different ways that people monetize data. But that's not something you're doing right now. So right now we use data to do our business better".*

Given the initiatives sustainable outlook and proposed fight against food waste, they have incentives to help stakeholders operate more sustainably by sharing some of their

data. The founder of Fresh.Land expresses how some farmers are already using data from Fresh.Land to gain a better understanding of what and how much to produce. *“So we have some farmers that are especially vegetable farmers and ask what should I plant the next season? Should I plant aubergine, should i plant peppers, should I plant... So some of them they plant whatever they want. And we do So we do analytics like that. so ok so how much did we sell and how much anticipate?(...) we do some forecasting, some analysis including telling the farmers what products do you see as the most interesting based on prices, based on the timing, based on what you saw”*

Not every platform has started using the data in that sense as some are unable due to lack of sufficient data. Others have seemingly made a decision to not share this data, but rather assist in other ways. As explained by the Marketing Manager of TooGoodToGo, they do not have sufficient data to make predictions, and thus would rather consult their partners about other ways to reduce waste. *“Just the save ratio and meal saved because predictive data when we are so young still and our business looks so different when you compare just a year back that it's difficult to estimate and to say anything about what's going to happen. (...)Yeah and then of course we have conversations along the way with them, especially with big partners on how they can do and what else they can do to reduce food waste. But it's not something that we send in those reports. That's only a performance data.”*

Creating an Identity

Our findings suggest that some of the platforms are attempting to establish a unique identity in the market. The Customer Engagement Manager at TooGoodToGo explains that some have started to view their brand as somewhat synonymous with the idea of saving food waste. *“A few days later we got a text message from one of the parents who said “oh my my kid is now demanding that we're eating leftover food and also that we're calling the leftovers TooGoodToGo.” So then now one day every week they have like a TooGoodToGo day. And that's not saving something from my shop is just using up their own leftovers that they call TooGoodToGo”* We also see that the other platforms are aiming to convince consumers that they are the future of the market. This is illustrated by how the founder of Fresh.Land compares themselves to a highly recognizable and successful platform in another market by saying “*We are the AirnBnB*

of food" (Kongsgaard, 2017). Thus making readers associate their brand with something impressive and successful.
The above findings represents some of the key characteristics and success factors as they relate to platform dynamics, their business model and strategy, and their use of technology and data. These characteristics and success factors will be further examined in the discussion.

In the succeeding section we present the various ways that the initiatives are interacting with the food supply chain. We compare and contrast the initiatives with regards to how they influence consumers and how they are impacting the supply chain as a whole.

4.2 Reshaping the Supply Chain

To examine how the platforms are able to change the value chain, we need to understand the current market environment in the food industry. Interviews with three established industry actors have been added to enrich the data. The head of R&D at AMASS restaurant, a large scale danish farmer and the supply chain director at Coop.

4.2.1 Market Environment

According to the supply chain director at Coop, the market environment is locked up within the food industry. The competition is high and being profitable is a difficult task *"In general it is a tough one. That's a very little margin in the, in general it's only us selling group who's actually making a profit*".

Moreover, reports and interviews reveal that there is a concentration of market power in the food industry. Although there are still a large number of farmers, retailers are increasingly increasing their bargaining power through consolidation. As the supply chain director at Coop describes, they can switch suppliers frequently due to their strong negotiation position. *"Of course we have a pretty good bargaining power, because we are the second largest in Denmark (...) we are moving a lot around, especially with the farmers and so on that we are changing from farm to farm every day. So, so we are pretty agile there, and, and not that dependent on the single supplier"* This can force smaller producers out of the market, which can lead to a

concentration of the farmers within the agricultural sector. Alternatives are seemingly difficult to find due to the large scale of some of these farms. As one large-scale farmer from Maribo describes, due to large scale farming and lack of experience with other channels, he is still somewhat dependent on their traditional channels. *“it's relatively large quantities, and it has to be handled right. (...) I don’t have apprenticeships for it. So that is being moved directly to the company and then they harvest it. And then we have an agreement on price etc. So it’s not so easy to sell to the individual consumer*.”

There are also **inefficiencies in collaboration** among the traditional supply chain actors. Changes are somewhat complicated because retailers have such high volumes. Moreover, the retail market has low margins and is considered to be highly competitive, which make knowledge and data sharing undesirable. As explained by the Supply Chain Director, there are numerous ways of how to predict the customer needs, but no single end-to-end forecasting system along the supply chain exist. *“That's a lot of inefficiencies (...) primary is the collaboration between the suppliers and the retailers that's a lot of inefficiencies. And still this sharing of a forecast is relatively low, especially on leaflets, and what we are moving on different offers because the retailers are really keeping the prices so close to them because of the competitive area in the marketplace.”* The CEO of Plant Jammer describes how the lack of collaboration and the lack of knowledge about concrete demand contribute to **resource waste**, and in particular food waste. He explains how the system is currently supply driven, as the lack of collaboration across the chain makes precise demand hard to determine. *“they try to push products to us by discounts and light colors on marketing pamphlets. And that's just by definition is gonna create food waste when you are a push model.”*

Waste also arises due to inefficiencies in terms of **overproduction.** To meet market needs, production levels are often determined by utilizing a forecasting system. As the founder of Fresh.land points out, this sometimes leave producers with surplus food, but without any channel to reach prospective buyers. ”*sometimes we have situations where a farmer is not able to sell their products, they have to throw them out because they don't have a buyer at the moment where they need to harvest. They don't have a buyer. It doesn't mean that the buyer doesn't exist. It just means that it's not on the*

radar." Thus a lot of the produced goods, don't make it into the market. This is also a result of some of the produce being deemed to be suboptimal.

Some of the traditional players are actively searching for new ways to repurpose the suboptimal goods so that they do not go to waste. As explained by the supply chain director at Coop, they are now giving it away to feed the animals in the zoo. *"We are also delivering a lot of products when we are declining the products, based upon sending for example, where the quality isn't good enough, for us and then we are moving them to the zoo actually for animals to eat instead of us just throwing it out."*

4.2.2 Consumer as a Driver

According to the head of R&D at AMAS, consumers expect flawless-looking goods in perfect quality, high differentiation of products and full supermarket shelves. He says that big industry is very efficient and that it is actually the consumers that primarily foster to the food waste problem. "*we as a species have that problem where no one would buy the last banana on a bench. (...) Again, 'cause they are big industry, they don't want food waste. So they try really well not to have it. But at the same time they're where they need to have full shelves, otherwise people won't buy the last thing that's there.*". The perception is that consumers have a significant influence on the food supply chain. They are the main driver for change and are strongly influencing what is being produced and how much. As a large-scale farmer ascertains *"it's the consumers that decide what we produce. If they then decide in the way that we produce what they want. That's why I started producing organic, because it was more consumers that wanted organic produce. We try to make the consumers happy."*

The interviewees mentioned that they see customers become increasingly driven to act in an environmentally-friendly manner. The marketing manager at TooGoodToGo observe how this result in consumers demanding more sustainable solutions and also want companies to operate in a more sustainable manner: *"it's becoming kind of like public demand that you as a store always a brand, do something sustainable and TooGoodToGo is an easy way for the store to show that here we don't waste food here, we care about the environment. So some of them use it as well as like branding purposes*."

4.2.3 Rise of Alternatives

Enabled by e-commerce platform businesses are on the rise, even though it still accounts for a small percentage of commerce within the food industry. The founder of Fresh.land describes how the platform businesses are providing an alternative to the traditional way food is sourced, and how this can provide better quality produce, as well as be more rewarding for farmers. *“the motivation is to provide an alternative for the food supply chain. An alternative that is better for consumers. You have the products quicker, faster, fresher and alternative that rewards the farmers to also grow their business.”*

Creating social impact

The researched platforms are all focused on creating positive social change through waste and C02 reduction. While most of them are leveraging a commercial business model in order to increase their impact on the value chain, they differ in the type of impact they are creating.

The Alterationists cut out intermediaries which saves time and transport emissions. But they also engage in matchmaking to make sure that the suboptimal goods are not waste. The CEO of GRIM explains how they tackle social challenges. “*one fourth of everything that's grown actually never gets from farm to market because they don't look perfect. And this is obviously a huge burden for the environment but then also it's a huge loss of resources of farmers' time, their land, their water, their passion that they put in growing it and then they can’t sell it. And then at the same time, consumers and also food businesses, they want to source and buy more sustainable fruits and vegetables. But sometimes they just don't know what the right thing is to do. So we then tackle this problem.”*

The Redistributors give an opportunity for platform participants to dispose of surplus food that would otherwise go to waste. They achieve this by offering it to another market side that can repurpose the ‘food waste’ and therefore also ‘save’ CO2. The customer engagement manager at TooGoodToGo explains how they are also trying to raise awareness about the topic. *“Because we need to have everybody being aware*

about the fact that when you throw something out you're wasting food like you're wasting resources, that is a part of our climate change that's going on right now."

The Capability Builder enables its users to create more sustainable habits through its machine learning technology. Moreover, through their marketplace, they show consumers discounted products that are soon to expire and which would otherwise go to waste. As explained by the founder of Plantjammer, their mission is to have 1 billion people eating plant based once a day to decrease C02 emissions. Therefore, their recipe algorithm is solely based on plant-based ingredients. *"50 percent of food waste today is happening in people's kitchens so it's already huge there. I think we could reduce that dramatically if people knew how to cook varied and If they didn't also could actually help the earlier part of the chain capturing stuff before it goes to waste and actually cooking out of it. (...) So that's why we're trying to use technology to invest in flexibility in people's homes (...) you're building your own recipes and you're learning about the basics of gastronomy along the way which gives you this superpower of being able to cook with anything. And once you get that flexibility out there - people are empowered. People get to actually cook what they know they should be eating more of and we get this flexibility that enables the whole food chain to be more efficient and better. That's the idea. So we want to start in people's kitchens rather than anywhere else. That doesn't mean that we stop there, that's where we start."*

Facilitating consumer engagement

As seen above, the data shows that the case platforms consider the customers to be the driver of the food supply chain. Consequently, they have implemented that as a core part of their business in various ways.

Through social media posts, events, and public talks the platform cases are more engaged with their customer base than traditional players. The supply chain director of Coop admits: *"We have really little direct dialogue to the end customer. Our main focus on the end customer that is through the data and forecasting and analytics."* In comparison, most of the platforms have high community engagement. Either through communication on the platform, through social media or even with volunteers helping out in various parts of their processes: "*people are so committed because they are*

part of something bigger, you know, they are part of changing the food system and they are a part of the GRIM crew, you know, it's more than just buying your vegetables so it, you'll really like, you want to be a part of it and you see that." (CEO GRIM).

Educating Consumers

As the platform cases consider the consumer as the main driver for structural change, most of the platforms see **educating consumers as an important objective**. All of them are raising awareness about the environment and in particular food waste.

The Alterationists provide transparency, they educate the consumers about the origin and quality of the products through for example social media posts or informative leaflets delivered together with their products: "*we've kind of ensured that it isn't just sustainable choice and we are really trying to be transparent about our choices. You know, we tell which farms it comes from, we tell why is it GRIM like actually here is a leaflet. You know, you get that, you know exactly what you're eating so you can trust us on that."* (CEO GRIM).

The Redistributors collaborate closely with food waste organisation and non-profits and speak about the importance of creating a movement as the Customer Engagement Manager of TooGoodToGo emphasises *"We have been doing so much work on that which we call the movement, that is just in terms of politics, businesses, educational and families. Trying to do some behavior changing and help the community and so forth."*

The Capability Builder can be seen to help households reduce food waste by offering tailored recipes enabled by their artificial intelligence technology. They also only use ingredients that are plant based and raise awareness about how much CO2 emissions come from the meat production. The Customer Engagement Manager Plant Jammer explains: "*Plant Jammer is really trying to educate the people how to cook, but also know how to cook healthy, sustainable, and quick and really use the things would you have rather than needing to go to a restaurant or like buying premade things, (...) it doesn't take a lot. It's not expensive. It's not time consuming. It's not a pain. It's really just the simple, quick and easy way to, to learn how to cook."*

Also, the platforms teach consumers about products' 'shelf-life', give them a new way of preparing food or simply better taste or alter the common food beauty standards through design elements. Through their community engagement and being very close to the customer, they are **able to change consumer perception**: *"it's a food concept that fights food industry beauty standards by sending ugly surplus fruits and vegetables (...) we want to do (that) with the design element for example. You know, our intention and motivation was always to make things look nice and fresh."* (CEO GRIM). Moreover, through their operations they are trying to facilitate habit changes in consumers, as the CEO of GRIM said: *it's really important in the brand and the communications, in actually telling people about the problem itself and getting visibility and creating awareness and changing private consumers' consumption habits."*

Partnerships for greater influence

The platform cases engage in strong partnerships and collaboration. Most of our case companies either have or previously had **collaborations with each other** by offering each other through their platforms or simply by promoting each other: *"There's companies like GRIM (...) And we are including that in our marketplace special (...) And then the other part is more informal, so TooGoodToGo are good friends and we point people their way and they point people our way but just out of friendship and because we believe in each other's vision."* (CEO Plant Jammer).

The Alterationists additionally use partners' resources as an essential part of their business model which the CEO of GRIM underlines: *"So it's really about having a strong relationship. So they are definitely considered as partners and then Mover is our partner, the delivery company and also like - it was such a big part of the like the customer experience that we also have to have it like very tight."*

The Redistributors have more informal partnerships, where they create awareness using each other for marketing in order to attract more customers: *"it's more in terms of collaborating in terms of trends and making sure that we're not fighting each other but fighting the problem of fighting the food waste."* (Customer Engagement Manager TooGoodToGo).

Whereas the Capability Builder has informal partnerships but also uses partnerships to extend their business model and enhance their capabilities further into a more integrated solution: *"(with)* whywaste we're just about to do this pilot and believes that *we can do something cool together because they have access to the retailers and we have access to the users and customers and there's a great link there.*" (CEO Plant Jammer).

To investigate partnerships more in-depth, we also interviewed one of the Capability Builder's complementors whywaste. Whywaste is a start-up that has created a tool which help grocery stores work more efficiently with their own data. By utilizing machine learning they aid retailers to automate labor intensive processes. They also give supermarkets actionable insights to adjust its purchase volume more effectively. The CTO of Whywaste explained that due to the partnership, Plant Jammer is able to get better insights on soon-to-expire products and other discounted product which they then can include in their marketplace: "*It's like providing stuff that's on sale and new ways of selling them. So Plant Jammer has this great consumer facing app with all the recipes and then the dynamic recipes with the aided by machine learning. So, and also they want to provide offerings through their platform. So we tried to source offerings to them from our end.*"

Plant Jammer is centered around the consumer whereas whywaste has a heavy operational information system to improve retail processes. Through this collaboration a more holistic integrated solution can be built that diminishes inefficiencies caused by the missing interconnectedness of actors: "*closer collaborations with companies like Plant Jammer and with charities to really make a big impact on the food waste."* (CTO whywaste).

4.2.4 Impact on Food Supply Chain

In order to create a more end-to-end solution, the case companies need to fully understand the consumers and their needs. The CEO of Plant jammer explains that it has been a conscious choice to start with the consumers. "*you need to sort of hold the customer and be close to them to really understand and that's why we're starting in the home kitchen rather than starting from the supply side. But I do believe that you*

know we that's what tech can do - have these fully integrated solutions from end to end. We still are 95 percent focusing on the homes and the kitchens and that experience is not only when we get that right we have a mandate to move upstream." (CEO Plant Jammer).

As seen in their strategy all of the platforms are planning or have already moved upstream as this might create a more holistic solution due to the added insights they gain from other market actors: *"we are getting so many user insights now and also dealing with the manufacturers and (...) the shops that we are gaining so many insights right now that at some point we will be able to combine it all and say "OK guys here's the problem this is what you're doing wrong from now this is what we've been kind of missing from this point and I would say at that point we will have to resources to offer a solution that will help fight this food waste. (...) So the solution will be a world with less food waste."* (TooGoodToGo Customer Engagement Manager).

This end solution might be a pull driven supply chain, as the CEO of Plant Jammer envisions: "*We believe in a model that's much more pull driven so that you will have much more understanding of your user and rather than just saying a supply over here and in less demand over here and first to supply and then realize how to push it through people. We'd much rather see as one that's demand driven. So basically where you'll have much more transparency to us to what people eat when they eat and when they need it. And then based on that you're making supply decisions."* Plant Jammer is trying to set up this pull driven model by being the default way of cooking: "*So it's that connection that we believe we can make if we are present in the homes and we have visibility and notch ability on people's cooking habits. Telling people why right now red cabbage is in surplus and we recommend you to do a jam with red cabbage. Then we are being able to push it that way in a much more gastronomy based way would make so much more sense. So we see a food chain that's much more connected and we think technology can do that make visibility and transparency and communication across the food chain much more than one way.*"

Technology is viewed as a main element that drives change in the food supply chain. The CEO of Plant Jammer explains how the technology will impact the way we cook and how the Plant Jammer application will help: *"I see a world where technology is*

making it easier for you to think about your food. In another way where you're using what you have and you're having fun doing it and it's easy. So ways that that will happen is with sensors in the kitchen that will help you remember things that you don't remember whether you have carrots or tomatoes left, that's something that the sensors take care of. (...) So essentially it's me driving home from work and asking Alexa what should I cook and it says make risotto and do it with this particular carrot. And I say yes and it's on my doorstep. Now, all I have to do when I arrive home is to follow the wording and smell and taste the food as I'm doing it along the way" (CEO Plant Jammer).

However, the CEO of Plant Jammer thinks that the technology should not only be about convenience. Rather it should enable people to have a more enjoyable experience when preparing and eating the food. *"many technologies are trying to build like a highway - we don't have to make the decisions, you just flow through. We try to make a little bit more of a wooden path where there are certain parts that should be a highway. But the parts of actually cooking and eating I think should be a wooden path where you are actually aware of feeling the roots on the ground and you're aware in the presence and putting that at the center stage of the cooking experience rather than all the planning and the difficult part." (CEO Plant Jammer)*

The founder of Fresh.Land envisions a future where the market contains two extreme form of suppliers; large scale suppliers and small scale suppliers. Large scale suppliers will always exist within industrialized and commoditized products as he explains that *"There will always be space for massive buyers for chemical stuff just because of the sheer quantity that you you need to feed so many mouths."*

Smaller suppliers struggle to live on the better quality alone and are more interested in reaching out to consumers directly: "*They will want to reach directly to the customers, but they don't have the scale to do so by their own brand or have their own distribution channel. That's what we do for them." as the founder of Fresh.Land states and goes on: "So there is a very clear quality difference when you are on a short supply chain or when you are on the longer one and it's more massived. So the people that come to us is because that higher experience, that better quality".* Fresh.Land business model focuses on small-scale farmers which are struggling with the changing

market environment, and the increasing power asymmetry in the middle of the supply chain due to its consolidation.

The **landscape of physical stores** is predicted to change as the Coop Supply Chain Director mentioned: "*we will see a lot of fewer stores in Denmark in general, both from our side and then probably competitors and more direct delivery to the end customer.*" The founder of Fresh.Land adjoins: *"It's not efficient to have food standing in the supermarket for days. Everyone's seeing it and touching it and all that It just doesn't make sense. So have the food lying there in the store. It makes much more sense to distribute this food directly to people or to restaurants.*" Moreover, he believes that the big supermarkets will disappear : *"big supermarkets where you go and you buy for an entire week, I don't think that is going to survive. I think you'll just be delivered.*" Rather small speciality supermarkets will survive where people go to get inspiration, recommendation or knowledge: "*products that you need and then go and shop yourself for the more exclusive ones and if you want an experience when you do that because no one likes to be standing in line and queuing (...) but if you can get knowledge about the product, perhaps even meet people that is maybe a nice experience you want"* (Founder Fresh.Land).

5. Discussion

In the previous chapter, we presented our empirical findings about the categories. The findings were split into two sections where one was a direct comparison of the platforms' key characteristics within the three categories, and the other section presented findings on the market environment and platforms impact on the value chain. The discussion follows the same structure: The first part discusses the key characteristics and success factors of the cases. The second part discusses the impact the initiatives, and the various categories have on the food value chain. The third part contrasts our findings on the key characteristics and success factors of our cases with the previously mentioned categories from Aschemann-Witzel et al. (2017). The last part provides an outlook of the food industry.

In the following chapter we intent to answer the research questions that guided this study:

How are new emerging digital platforms changing the food industry?

- What are the key characteristics and success factors of these platforms?
- How are the platforms altering the food supply chain?

5.1 Platform Dynamics

Developments in the food industry, in conjunction with technological advancement, has provided business opportunities in segments of the food industry that has not previously existed. Moreover, the market competitiveness, which has left the established players needing to optimize under existing conditions, has left room for new entrants to pursue those gaps. In the following section we will discuss the conditions that are present in digital markets and whether they point to a winner-take all or most market.

5.1.1 Winner-take-all Dynamics

These new initiatives are addressing narrowly different market segments and thus, are not yet in direct competition, in the conventional sense. Nevertheless, as platforms in adjacent markets, we submit that they are in competition, or at the very least, will find

themselves as competitors in the future. As goods that are produced on or sold through platforms are not limited to any specific sector, platform market boundaries can stretch over several industries. Platform competition is, therefore, between markets rather than the product itself (Rochet & Tirole, 2003). Increased interconnectedness and interdependence spanning numerous products across several markets and sectors means that one can establish a multi-product bundle for the final consumer (Eisenmann, 2011). Thus, dealing with each of these product-market segments as distinct markets would be overlooking a fundamental point of digital markets (Cennamo, 2019). The competitiveness of the market and the possible elements of winner-take-all dynamics will have a direct influence over their strategy and subsequently, over the position they will be in to impact the food industry. The likelihood of the market being a winner-take-all market depends on three elements; network effects, demand for differentiated services and high multi-homing costs for at least one user side (Eisenmann, Parker & Van Alstyne, 2006). Therefore, we will discuss how the different categories are affected by these dynamics and whether their experiences points to a winner-take-all market.

Network effects

Growing the user base and being protected by network effects is a vital part of surviving as a platform. All the initiatives are actively engaged in engendering and managing these effects. However, they cite different strategic reasons for why effectuating positive network effects on their platform is essential.

We observed that the Alterationists need to create stronger network effects as a means for cutting costs and convincing suppliers to single-home on their service. Although they are primarily competing on a differentiation strategy, by increasing the user base and subsequently strengthening the network effects, they can experience efficiency gains on the supply side and become more cost-efficient. Moreover, achieving supply-side economies of scale reduces the price for the buyers. Thus, more buyers are likely to participate in the platform, which in turn can engender demand economies of scale. In other words, the demand on the consumer side, reduces the cost on the supply side which in turn accelerates the growth of users on the demand side (Shapiro & Varian, 1999). This efficiency double, is a hallmark of

businesses driven by information technology, and is one of the main reasons the Alterationists are actively seeking to strengthen the network effects.

These reasons were not as pertinent for the Redistributors, as they simply facilitate transactions between suppliers and customers instead of taking possession of or full responsibility for products or services. As a consequence, they have a very low cost structure (Hagiu & Rothman, 2016). Managing the cross-side network effects is a necessity for creating a good user experience, by making sure that there is a balance between supply and demand at all times. A result of efficiently orchestrating these network effects has been increased user engagement and the creation of a community. The importance of creating a community, is partly because customer experiences are increasingly more social in its nature, and other customers are also influencing the experience (Lemon & Verhoef, 2016). As a consequence, the firms have much less direct control over the customer experience and the customer journey than before. Engendering a community around the platform is thus a great way to increase the likelihood of a good user experience. Moreover, the positive mentions helps to attract more suppliers to the platform and thus create an even stronger network of users.

In contrast to the other categories, the Capability Builder harnesses direct network effects. The Capability Builder is focused on increasing these effects by creating more valuable features on their platform and increasing user engagement with their service. Increased engagement by consumers will, in turn, make the service more attractive for other prospective market sides or partners, thus increasing the potential profitability of the company. In order to strengthen these effects, they are experimenting with concepts such as gamification to increase the value of interactions between same sided users.

Multi-Homing

Although the strategic focus behind managing the network effects manifested itself slightly differently, network effects are prevalent in all the cases. Nonetheless, it is difficult to establish how robust they are without examining other factors that might reveal their strength. One thing that can give us an indication of how strong network effects are is the degree of multi-homing that takes place on each of the market sides

(Cusumano, Gawer & Yoffie, 2019). The data reveals that several of these platforms are being utilized simultaneously by the consumer side. This proves that multi-homing is happening at least on one of the market sides. The data is less clear on the other market side, and making it difficult to state confidently whether they both multi-home or if only one side multi-homes (Armstrong, 2006).

It is nevertheless reasonable to suggest that due to the current, relatively small scale of most of the platforms, the producers are unable to sell all their produce through just one channel. As long as this is the case, the incentive to multi-home exists. Due to the similar customer segments and the overlapping user base, multi-homing costs for users are not very high, which may also indicate that switching costs are low. As long as the platform brings value and switching costs stay low, the consumer will continue to multi-home (Edelmann, 2015). Some might argue that the network effects are weakened by multi-homing and therefore, the impact and revenue decreases (Cusumano, Gawer & Yoffie, 2019). However, we argue that as long as the initiatives serve slightly different needs and as long as the market is not concentrated, multi-homing costs will not have a detrimental effect on the platforms.

Moreover, as they are collectively focused on tackling food waste, multi-homing by consumers does not appear to be a pressing concern for the initiatives. On the contrary, it is indicated that their success is dependent on each initiative converting more consumers to this alternative way of food consumption. The segment they are catering to is still relatively small, but this segment might grow as the public becomes more concerned about wasteful processes in society. Thus, they are all increasing their potential user base through cooperative efforts around awareness creation. We found that the initiatives are actively promoting each other, and some even encourage users to multi-home.

Niche and Differentiation

Another factor that can help reveal the competitiveness of the market is the demand for differentiated services. We found that two of the categories are following a differentiation strategy, while the other is pursuing a focus strategy.

Both the Alterationists and the Capability Builder can be viewed as pursuing a similar differentiation strategy, as the initiatives have two or more aims in their value proposition. They all offer tangible value to their users, such as quality and convenience, but users are also attracted to the platforms' sustainable focus. Similarly, the Redistributors also have multiple aims in their value proposition. One is to reduce food waste by forwarding food to consumers, which ostensibly attracts consumers due to its environmental connotations. Secondly, they are offering food to consumers at a very low price. This combination of a sustainable focus and cheap or free food can arguably be seen as both a cost leadership strategy and a differentiation strategy. It is therefore more accurately described as a focus strategy (Porter, 1980). The focus strategy closely resembles the differentiation strategy. It targets the needs of a well-defined market segment. In this focused market segment however, a company can achieve both a differentiated and low-cost position (Porter, 1980). We argue that the initiatives are differentiating themselves from the traditional players by having clear, multiple aims. Combining a sustainability element with quality product is an essential part of the success of these platforms. Thus, it is clear that there is demand for differentiated services in the food industry that targets niche markets.

Following the theory of winner-take-all dynamics as presented by Eisenmann, Parker & Van Alstyne (2006), there is no basis for concluding that this market is a winner-take-all market. Through our examination of network effects, the presence of multi-homing, and the demand for differentiated services, we conclude that the current forces suggest that there is room for several actors in the market. Nevertheless, the market segment these initiatives have identified is relatively new, and It is currently difficult to predict how the above factors will develop in the future. Our findings suggest that the market is gaining an increasing amount of actors that are establishing themselves in or adjacent to this market segment. It is, therefore, the possibility of this space becoming more concentrated, although it currently has room for more actors.

As there are specific dynamics in both logistics and technology that demand for scale, it is reasonable to suggest that the platforms will increasingly grow into even more intersecting spaces. Moreover, since the user bases are already overlapping, it is likely that a multi-service bundle will be preferable to a larger portion of their users (Eisenmann, Parker, Van Alstyne, 2011). Thus, the initiatives will have clear incentives

to copy each other's features in order to become this solution. We predict a market where there will be users either concentrated around a few platforms, or spread around many differentiated platforms. In either scenario, the barriers to entry will grow as there will either be increasingly strong network effects in a few of the platforms, or there will be little room for more differentiated services. Regardless, new entrants will find it increasingly difficult to penetrate the market.

Moreover, even though a winner-take-all market looks unlikely by examining the state of the current market forces, some actions taken by the initiatives might steer the market in that direction. As presented in the findings, most of the initiatives expect the emergence of a platform leader and compete to become that leader. We discovered that one of the ways initiatives are getting users to support them and utilize their service is by engaging in expectation management (Shapiro & Varian, 1999). The initiatives are attempting to gain a unique identity within their market segment by giving consumers the impression that they will become the standard within the market. We witnessed that TooGoodToGo is, in some instances already equated with the action of eating leftovers and buying food that is soon to expire. Similarly, Fresh.Land is stating in interviews that they should be seen as the Airbnb of food (Kongsgaard, 2017). The product or service that people expect to become the new standard in the market will often become that standard due to positive feedback and bandwagon effects (Shapiro & Varian, 1999). Through expectation management, the initiatives might, therefore, move the market closer to a winner-take-most market.

5.1.2 Managing Growth

Scaling is an important objective for all of the initiatives. Not only is this vital for continued growth and for maintaining their position in the market, but it is also the only way they can create a more significant change in the food industry. We have observed certain mechanisms that are likely to influence each platform's effectiveness in scaling. These mechanisms manifest differently over the three categories and create certain dynamics which impact the categories. These dynamics, in particular, will influence the type of network the initiatives can build, which subsequently will influence the strength of their network properties.

Curation

We observed that all of these platforms focus on sourcing out openings to move upstream, looking for prominent ways to increase its usefulness and attract more users by adding new features and interactions (Parker, Van Alstyne, Choudary 2016). Moving upstream might result in significant growth opportunities. However, the degree at which the initiatives engage in curation, might influence the relative rate of growth that they can experience. The initiatives with the least amount of curation will be better positioned for rapid growth due to participants having easier access to the platform (Evans, 2012). Nevertheless, this rapid growth comes at a cost, as the lack of curation can produce negative externalities on the platform. In contrast, the initiatives with stronger curation will experience a comparatively slower growth, but are more likely to avoid negative externalities on the platform.

The Redistributors facilitate direct contact between buyers and suppliers, meaning that buyers can actively choose which supplier they want to engage. In their model, an abundance of choices is vital, and the buyer takes more responsibility for sourcing out the right supplier. The Alterationists, however, are to a more substantial degree leveraging their knowledge of the market and their users to engage in matchmaking, that they naturally feel will result in higher value for the two sides. By doing so, they are also taking on the responsibility of delivering a satisfactory product, and thus stricter curation becomes more important. Currently, it is only the Redistributors and the Alterationists that engage in curation, which means that the Capability Builder is more likely to experience a sharp rise in users. Although curation can influence the growth potential of the initiatives over some time, it cannot be seen in isolation from other important factors.

Taking Advantage of Boundary Fluidity

One of the critical elements that differentiates the Alterationists and Redistributors from the Capability Builder is that the former deals with a physical product while the latter has a digital product at its core. This difference usually influences the amount of external resources a platform needs to assert control over in order to deliver the product from supplier to consumer. Moreover, due to the physical product being perishable, even stricter control needs to be asserted over the delivery process. Both the Alterationists and Redistributors are facilitating the trade of food, but their models

result in a very different delivery method. The difference lies in that Redistributors make use of resources controlled by the platform participants. Therefore, they generally do not need to invest in infrastructure or logistics in order to deliver the product from supplier to consumer. The Alterationists, on the other hand, are investing time and money in sourcing out logistics partners or by building routes for delivery themselves. In other words, the Redistributors are more actively taking advantage of the boundary fluidity of platforms which can be a factor that influences the rate at which a company can grow (Constantiou, Marton & Tuunainen, 2017).

It is essential to build a delivery system that guarantees that the product has a consistent quality. Dealing with perishable food, which is very delicate and often has a short lifespan, requires strict control over the delivery method. Being the guarantor and provider of this distribution system can, therefore, be relatively costly. Moreover, the possible solutions for cost-reduction through expansion and automation might negatively impact the ability to maintain quality and service (Cusumano, 2017). Therefore, it can be argued that economies of scale are relatively harder to reach, and have a more limited scope than with a digital product such as the one offered by the Capability Builder.

Network Properties

Network clusters is another concept which informs how these initiatives are going to grow into new regions (Zhu & Iansiti, 2019). Similar to other platforms that facilitate trade of physical products, the Alterationists and Redistributors are susceptible to network clusters. It means that a consumer in Copenhagen gains no additional value from the platform having a supplier in London as there is no mechanism in place for transporting the food within an acceptable timeframe or without risking a sharply reduced quality. The Capability Builder is not restricted by distance as the platform has a digital product at its core, rather than a physical one. Thus, the network growth increases value to users regardless of where in the world they are situated.

The result of these clusters is that the Alterationists and Redistributors cannot leverage existing user bases in new regions. Instead, they find themselves in a similar position to Uber, where they have to launch afresh in every new market they enter. Large brands and well-known businesses still have an advantage in new markets due to consumers'

familiarity with them. Thus initiatives such as TooGoodToGo will still find it easier to establish themselves in new markets than other less known brands. Nevertheless, the danger for the initiatives, as witnessed in the case of Uber, is if they end up in an infinite launching loop. Where gaining scale in a high number of markets simultaneously hinders the platform's ability to make profits (Parker, Van Alstyne & Choudary, 2016). In comparison, the network of the Capability Builder is not limited by geographical distance. Thus, they face no limitations to user growth due to network clusters. The result of this is that the Capability Builder can create a potentially global network that has much stronger network properties, than the multinational networks that the Alterationists and Redistributors can build (Yonatari, 2017). The way in which the other initiatives bridge this gap is by enhancing their network properties through a community. Through social interactions in the community, consumers strengthen their bond to other users on the service. The result is that they create another layer of direct network effects which stands to strengthen the indirect network effects which already take place through the marketplace.

5.1.3 Platform Ecosystem

One of the key facets of platforms businesses is its ability to engender a valuable ecosystem. The growth of the ecosystem and the value it holds for participants in the system is beholden to the platform value proposition for its key partners. It is thus essential to initiate, develop, and maintain a partner network. In that regard, strategy should be based upon the continuous management of the market ecosystem and the co-production of value within this same ecosystem (Andal-Ancion, Cartwright & Yip, 2003).

Creating Value for Partners

Our data reveals that consumer demands are one of the main drivers of the chain. The initiatives have recognized this and implemented it as a core component of their businesses in various ways. They are all consumer-facing and primarily focus on the demand side (Cusumano, Gawer & Yoffie, 2019). It is a common understanding that in the western world, market conventions and overconsumption by consumers are partly responsible for the overproduction leading to waste along the value chain. Getting consumers behind the service is essential for being in a position to change consumers' habits and directly influences how the initiatives can change the value chain. In order to

board and provide value for consumers, the initiatives are dependent on creating a valuable ecosystem for their partners and other business-related stakeholders which provides input that is critical to their product offering. Thus it is increasingly crucial for platforms to think about their value proposition with regards to key partners in the same way they create a value proposition for consumers.

For most of the platforms partners, there is a value of attaching themselves to an initiative that produces positive, sustainable change. All of the initiatives leverage this benefit for their partners, but this might not be enough in isolation. In difference, DelDinMad and traditional food banks that primarily can be used by retailers to promote a firm corporate social responsibility (CSR) policy, TooGoodToGo is also offering additional revenue for the surplus food which goes straight to the retailers' bottom line. This value offering is more attractive for the retailers, and most actors in the industry with surplus food will be more likely choose TooGoodToGo as an option. How favorable the conditions for the partners is subject to the operational efficiency of the initiates. With lower operational costs, the initiatives can increase its profitability as well as leverage better conditions for their partners.

GRIM is also providing their partners with favorable conditions in order to entice them to use the service. Farmers would have often sold most of the produce to biofuel companies for a much lower price; instead, GRIM is able to command a better price for their produce due to the operational efficiency of their service. So the farmer is now choosing a more sustainable option as they are better rewarded for it. One of the basic tenets of competitive advantage is to operate at a lower cost than rivals (Heppelmann & Porter, 2014). Due to operational efficiency through high levels of automation, Fresh.Land can offer better payments and conditions to farmers compared to more traditional supply chain actors. We have seen a concentration of market power in the middle of the supply chain, which is pushing more and more small scale farmers out of the market. By creating a closed-loop automated system that handles the e-commerce, logistics, and payments, they can reduce manual labor significantly, and therefore reduces costs. As a result, the farmers can command a higher price and, in general, are better rewarded than through the traditional chain.

One way in which the Capability Builder Plant Jammer is aiming to create value for its partners is by creating an integrated system that can increasingly benefit the ecosystem. We can see this as they leverage their machine learning technology into a joint partnership with whywaste and local supermarkets, which creates added value for all participants. Advanced technology like AI or machine learning has the potential to be a real disruptive driver and a factor for winning on the platform battleground (Cusumano, Gawer & Yoffie, 2019). Therefore, it is a precious asset that Plant Jammer can leverage to engender a valuable and robust ecosystem.

Another way platforms can provide value for their partners is by sharing the data they accumulate on their service. Information technology is generally recognized as a valuable instrument for creating, storing, and transferring information capital (Kim, Lee & Han, 2010). Moreover, nearly all products and services have a certain level of information content, but the informational intensity of a product or service varies dramatically (Andal-Ancion, Cartwright & Yip, 2003). While all of the initiatives can create and store large amounts of data, few are transferring this information to its partners.

Many retailers and food producers are looking to gather data on their consumers in order to optimize their value offering. For many retailers, the insights they get from data is relatively limited. The data they currently have access to, is not very dense as it is mostly based on sales data. Thus, a key component of the Capability Builder value to its partners within retail is the informational density of its service. Through partnerships with services like Plant Jammer, retailers can get more accurate data about consumers in their area, which further improves their decision making. Moreover, due to electronic deliverability of the service, they can easily facilitate partners by filling in missing competencies that the partners lack internally but are critical to their overall product offering (Andal-Ancion, Cartwright & Yip, 2003). For most of the other initiatives, the use of data is limited to mostly improving their business performance. Naturally, data can be used for internal purposes like improving business performance or user experience (UX), but as we have seen, it is also essential to find ways to leverage this data for the benefit of the ecosystem (Alaimo & Kallinikos, 2017). However, these companies are all within the start-up phase, limiting the data samples available to them. Therefore, for a lot of the initiatives, the data sample might be too low for

statistical relevance which may be a reason why our case companies have not implemented this method.

5.2 Impact on the Value Chain

This second part discusses the impact the initiatives, and the various categories generate on the food value chain. Specifically, we want to elaborate on how these platforms alter the food value chain. The nature of platform businesses show that platforms do not only compete with each other and their platform participants but also with the environment around them (Parker, Van Alstyne, & Choudary, 2016). However, competition also means creating impact. Therefore in this section, we discuss in what way the platforms create impact for their users, the market environment, but also for society.

5.2.1 Social Impact Creators

We call our case studies social platform businesses because they create social impact. We found that all of the researched platforms possess a social aspect in their business model and therefore act as social enterprises as they employ social entrepreneurship (Defourny & Nyssens, 2007). Our organizations operate within social entrepreneurship because the social mission and hence social value creation is a central priority, regardless of its nonprofit or for-profit business approach (Peredo & McLean, 2006; Austin, Stevenson & Wei-Skillern, 2006). Their mission highlights the social purpose of the venture. Promoting sustainable development in order to sustain the planet plays a central role in their business models. Additionally, they see market failures as a business opportunity by addressing the social needs that arise from these failures (Austin, Stevenson & Wei-Skillern, 2006). One example of creating a business opportunity from market failure can be observed through the platform cases' ways of turning waste streams into useful and valuable input. They make better use of under-utilized capacity and therefore fall in the sustainable business model category 'create value from waste' (Bocken et al., 2014). Another example of a sustainable business model is seen by some platforms that want to ensure long-term health and well-being and contribute towards creating a prosperous society and planet which is categorized as the 'adopt a stewardship role' archetype (Bocken et al., 2014). The 'stewardship role' is played out by our cases through community development.

Thereby, they proactively tackle consumers' health or engage in amended producers' welfare and sustainable harvesting practices. They choose a way to educate consumers by having high community engagement. This is highly effective because strong relationships with brand elements add trust (Habibi, Laroche & Richard, 2014). Most of our platform cases constructed a story that makes people relate or even convert to the companies' cause and motivates people to be in their platform community. Therefore, they have created a primal branding code (Hanlon, 2006). We argue that they are establishing a 'fighting food waste' cult. Through information-giving and education, they are trying to move consumers to actively choose more environmentally-friendly solutions.

5.2.2 Impact on Consumer

However, consumers make unintentional choices that might be harmful to the environment. As for example, consumers and supply chain actors see it as a fact that there are suboptimal goods (deviating from sensory perception standards or being close to expiry) and therefore these mostly go to waste. As of now, consumers make food choices based on sensory appeal (smell, taste, appearance), health, price and natural content which are the most important food choice factors based on various cross-cultural studies of Steptoe's, Pollard's & Wardle's (1995) Food Choice Questionnaire (Cunha et al., 2018). Choices such as distinguishing between suboptimal goods can lead to greater waste in the supply chain, increasing the harmful impact on the environment. Consumers might not actively choose this, but sometimes there are no better options provided due to the choice architecture that is in place (Sunstein & Reisch, 2014). Hence, consumers need to be motivated in order to trigger behavioral change towards sustainable choices.

It is an easy task for customers to choose a 'green' way when they simultaneously receive cost savings and protect the environment (Sunstein & Reisch, 2014). In particular, this is the case for the Redistributors. consumers pay a small fee (or no fee) to get leftover food that would otherwise go to waste. At the same time, the supplier side has an incentive to reduce their surplus food through the Redistributors' platforms by having a 'good feeling' or even increasing their brand image by using the platform for CSR activities. As seen In the case of TooGoodToGo, suppliers also receive an economic incentive. That might explain why the social business model of

TooGoodToGo has experienced rapid growth: within four years they have expanded to twelve countries, have almost 13 million users saving 18 million meals which equals to 45 thousand tons of CO2 emission (TooGoodToGo, 2019).

Admittedly, often the (economic and other) costs are higher when considering a solution that brings environmental benefits. However, in certain situations costs do not rise significantly higher than average, yet still bring significant environmental benefits. This is the case of the Alterationists who show environmental benefits by shortening the supply chain. The decreased transportation and food waste reduces CO2 while delivering food to the consumer much faster. However, they do not offer as significant cost savings as Redistributors. Similar to the Redistributors, the Capability Builder draws from a cost saving solution. They may also provide a solution that is not significantly higher in cost than average, similar to the Alterationist. The Capability Builder, on the one hand, gives an economic incentive through their discounted, soon-to-expire products in their marketplace. On the other hand, their platform has features without economic incentives. These features help consumers to cook with ingredients they possess or cook healthier.

Therefore, the Alterationists and the Capability Builder have to find another solution to trigger consumer behavior change as of architecting smart choices. Platforms can take steps to inform consumers so that they actively choose the environmentally-friendlier product. Similarly, platforms can make a cost-benefit analysis to select a default rule that nudges consumers in a more environmentally-friendly direction (Sunstein & Reisch, 2014).

Informing and Nudging

Informing and nudging is essential in order to motivate or even move consumers. The case study platforms inform and educate consumers about food waste and its effects through social media, their websites, television campaigns, leaflets, and within their mobile application. Informing and educating affects people's conscious reflection on the surrounding environment whereas nudging[2] affects the context within which people

[2] Thaler and Sunstein (2009) define a nudge*: "is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives"*

act which is anchored in the automatic processes of the brain and people only respond to the environment (Ölander & Thøgersen, 2014; Dolan et al., 2012).

As nudging only takes place in a choice architecture that does not forbid options or changes the economic incentive, it excludes the Redistributors (Thaler & Sunstein, 2009). Within the Alterationists, we did not observe nudging elements as they instead actively inform and educate the consumer about the inefficiencies in the supply chain and the effects it has on the environment. Whereas the Capability Builder (besides having the market place discounts) nudges users into choosing environmentally-friendlier options, reducing food waste, and selecting healthier options.

The Capability Builder nudges consumers to opt for environmentally-friendlier offerings by mostly proposing plant-based ingredients to choose between. However, consumers still have the freedom of choice, as they also offer dishes including meat or fish. Even so, these are deemphasized within the app. It nudges consumers into reducing food waste as the AI algorithm can replace the 'missing' ingredient with another similar one in terms of taste and texture. Moreover, users get nudged into choosing healthier options based on their health goal. This is done through marking ingredients in red that are bad for the user's health goal and a gamification element (see *Appendix 4* for screenshots). AI algorithms simplify the decision of how and what to cook, and through its convenience and ease of replacing ingredients, steers users into a more healthy and environmentally-friendly direction. In that way they allow consumers to still have the freedom of choice (Thaler & Sunstein, 2009; Sunstein, 2014). However, some other nudge elements are in place that are natural to mobile applications like notifications which act as reminders. As people tend to forget or procrastinate, most of our case platforms' send out a reminder (with right timing) that can nudge the users in a desired direction (Thaler & Sunstein, 2009; Sunstein, 2014).

Although the Redistributors' actions are not defined as nudging, TooGoodToGo still has strong social nudging elements. On TooGoodToGo's website, they inform that others are engaged in this environmentally-friendly behavior of saving food waste. They provide statistics of how many people have downloaded the app, how many meals were saved and how much CO2 has been reduced through the use of their product.

They claim to be the biggest “waste warrior community”, creating peer pressure on prospective consumers, which is another social influence nudge (Thaler & Sunstein, 2009). other platforms do not clearly state what impact they have created or the amount of users they have. In that sense, TooGoodToGo can be a good example of how to create a more significant impact through the “following the herd effect” of social nudging. Additionally, consistent, unwavering support from marquee users can also move groups in a desired direction. For example, TooGoodToGo uses ‘ambassadors’ that promote their cause. Individuals like Princess Marie of Denmark, who helped open the TooGoodToGo store provide social influence to nudge people. (LeeMiller, 2018).

Similarly, the case platforms’ collaborations with each other also enables the social norm nudge. By promoting each other and showing that other platform communities also are fighting against food waste increases the peer pressure as well as the likelihood of more people joining the movement (Thaler & Sunstein, 2009).

Nevertheless, the question arises whether informing users actively or nudging them into a ‘greener’ choice is more effective in integrating sustainable food choices into daily life and creating a more enduring change in consumer behavior. In the cases, we mostly see informing customers takes place over nudging. Multiple studies have shown only limited success at changing behavior by education and information. Education and information influences what people consciously think about, but does not cause behavioral changes. However, an essential task of nudging is to make the provided information more action-triggering (Ölander & Thøgersen, 2014; Dolan et al., 2012). Therefore, we argue that informing is essential in order to nudge consumers in a desired way.

The case platforms can facilitate digital nudging through their mobile application interfaces’ and improve the user experience (Mirsch, Lehrer & Jung, 2017; Weinmann, Schneider & vom Brocke, 2016). Notably, through new technologies and data collection methods like machine learning, more personalized user information can be used to nudge individual users into a particular behavior. Technology advancements can leverage the effectiveness of personalization (Benartzi, 2017). As studies have pointed out, personalization enhances consumer attention and enjoyability and is persuasive (Cordova & Lepper, 1996; Goldstein, Cialdini & Griskevicius, 2008). As

soon as attention is captured, it is easier to influence consumer behavior. Thus, we argue that through these technologies, it is possible to personalize the platform interface based on consumer needs which might increase not only the user experience but also the nudge effect for individuals.

5.2.3 Collaboration for Change

Nonetheless, it is not always possible to create change individually as changes in conscious behavior might not be enough to provide a sustainable change of consumption. Therefore, private or public correctives need to be in place (Sunstein & Reisch, 2014). one way the platform cases' try to solve this challenge is through partnerships and collaborations This is also one of the key success factors for food waste initiatives (Aschemann-Witzel et al., 2017).

Building a strong network while also facilitating weak ties is vital for growth, outreach, and social mission (Granovetter, 1973). As (social) value creation exists within and outside the organizational boundaries, social impact increases through collaboration as platforms can generate collective impact (Austin, Stevenson Wei-Skillern, 2006; Kania, & Kramer, 2011). As observed, a common vision, mutually reinforcing activities, continuous communication are part of the collective impact. However, to make collective impact truly effective, the initiatives would need an additional backbone organization that brings alignment and holds them together. While this is currently not in place,a new organization called IMPACTRS[3] was established. IMPACTRS tries to tackle this challenge by building a digital, connected ecosystem (Kania, & Kramer, 2011; Hanleybrown, Kania, & Kramer, 2012).

Our case companies are closely attuned to the context they operate in which shows a 'system thinking' that enables them to identify which internal and external resources need to be mobilized (Kirsch, Bildner & Walker, 2016; Austin, Stevenson Wei-Skillern, 2006). Actions are needed both upstream and downstream in the supply chain, whereas conscious behavior change only includes changing the supply chain downstream (Aschemann-Witzel et al., 2017). Therefore, a context that triggers sustainable behavior needs to be designed which includes actions upstream the

[3] See https://www.impactrs.global for further details

supply chain. One example is how TooGoodToGo cooperate with producers to implement a new expiration date label ‘bedst før ofte god efter’ (best before but often good after). It is a key example of how they are using system thinking and at the same time creating collective impact. The date label is correcting the consumer perception about when a product should go to waste and also reminds producers about the consumer food waste issue. Therefore, it is a collaborative corrective in place in order to create change nonetheless, this may not be enough. Their solution needs to be embedded into the larger system of the food supply chain. This can be done in various ways, such as, shortening the supply chain, redistributing waste or giving users new capabilities to reduce food waste.

The movement towards sustainability in Denmark is already quite advanced, and these platforms are planting the seeds for future change. Through the case companies' customer-centricity, they are able to move consumers which affects the food industry. We argue that (digital) nudging is how the platforms can shape the food supply chain. They are changing consumers' minds in a desired (environmentally-friendlier) direction, thus making consumers more aware of food waste and demand better solutions from suppliers. The industry can be considered to be undergoing a process known as 'chain reversal' meaning that the consumer is now dictating to producers what they want to eat (Aguilera, 2006). Therefore, consumers are the driver of how the supply chain might develop, and the platform cases have a strong influence through their customer (nudging) about the future of the supply chain.

5.2.4 Impact on Food Industry

The unwillingness or inability of supply chain actors to change triggers the rise of alternative solutions. The competitiveness within the food industry generated by low margins and consolidation explains why there is a lack of coordination and optimization along the food supply chain. Inefficiencies along the food supply chain arise in part because the supply chain actors lack an incentive to optimize processes outside their domain. Therefore, optimizing processes further along the supply chain is less likely to occur. The resistance to coordinate and optimize along the supply chain increases inefficiencies that create resource waste. The problem of food waste is further exacerbated by companies' lack of concepts for subsequent use and or

insufficiently utilized ways of disposal. In such a highly competitive market, the ability to rely on internal innovation is rare (Sarkar & Costa, 2008). Thus, food is often wasted even though potential buyers are procurable (Göbel et al., 2015). However, consumers have become more concerned about food industry practices and have started to demand sustainable solutions, which fosters the quick development of alternative solutions.

New entrants fill this space by identifying consumer needs that are not currently being met by the established players. In order to compete with these new entrants, innovation needs to play an essential role within traditional companies. With the help of innovative practices, product creation from established stakeholders should satisfy consumer demands, as well as create processes that consumers approve of (Omta & Folstar, 2005). Incumbents might align themselves with some of these initiatives to capture a number of changing demands. For example, Coop established a partnership with a local food initiative called Råhandel, which helps small, local suppliers get localized produce into Coop's stores (Coop, 2019). On the whole, however, the incumbents are trying to optimize under the existing market conditions and are therefore unable to redirect vast amounts of resources to address all of these changing needs.

Therefore, our platform cases provide business models that reach from quick fixes to sophisticated end-to-end solutions for the food supply chain. Through their digital component, they have a competitive advantage compared to incumbents. Digital businesses are proliferating by facilitating data, software, and platform strategy. We can expect that the growth of platform businesses is more rapid than the one in the traditional economy. Through the high technology environment, the next platform generation will innovate on a new level (Cusumano, Gawer & Yoffie, 2019).

Even though these platforms are relatively young and small, platform businesses do not need as large a workforce, as they are more impactful in terms of operating profits and market value than traditional firms (Cusumano, Gawer & Yoffie, 2019). The impact is already generated at that level, however, to be a credible threat for the larger supply chain actors, the initiatives have to scale up beyond their present size. The more they grow, the more they will significantly impact the supply chain. For now, we can see

three streams of how the platform cases impact the food supply chain: Redistribution, Alteration, and Capability Building.

Redistributing Waste

Suboptimal goods from retailers, as well as food waste from restaurants will diminish via redistribution. Some of the case platforms, the Redistributors in particular, can source demand for soon to expire food efficiently by concentrating it into their platform, conveniently connecting companies that would throw out food with buyers that are environmentally concerned or looking for discounted products. In the 'developed' world, the highest potential for reduction of food waste lies with retailers, food services, and consumers (Parfitt, Barthel & Macnaughton, 2010). These are the specific targets of Redistributor platforms. For most of the actors along the chain, this would be an overarchingly positive development, as this sharing economy model (excluding DelDinMad) creates profit opportunities and a secondary market for price-sensitive customers. It increases revenues when previously businesses had to pay for disposal of unused products. One side effect of this for-profit development might limit the development of models that promote social welfare. these platforms give actors the opportunity for additional profits instead of donating the surplus inventory to food banks or other NGOs (Michelini, Principato & Iasevoli, 2018).

However, it also disincentivizes increased cooperation between the supply chain actors, as the penalty to surplus inventory is not as big as it previously was. Further, one of the leading causes of food waste is a low valuation of food. The incentive to offer these goods at a lower price further weakens the consumer perception of the value of food (Aschemann-Witzel et al., 2015). However, it is questionable if offering goods at an even lower price will worsen customer behavior due to the already low valuation of food. Redistributors try to change consumer perception which might help to increase the perceived value of food through awareness campaigns. For example, TooGoodtoGo's date labeling campaign aims to increase consumer awareness about the value of food.

All in all, even though the incentive of redistributing food is powerful, it does not change consumer behavior or the supply chain. It is merely an add-on to a suboptimal supply chain in order to cope with existing conditions. Thus, the case platforms' plan is

to move upstream. For example, TooGoodToGo has already moved ‘up’ by cooperating with manufacturers to provide products that would normally go to waste. Similarly they are looking to enter the farming sector to provide a similar outlet for goods from producers. They are planning to find a solution for food waste, but do not have a clear vision of what it will be, so for now it remains a quick fix.

Shortening the Supply Chain

Inefficiencies collaborating, power asymmetries and therefore, resource waste will diminish. The new entrants are giving an alternative by removing intermediaries and effectively shortening the supply chain. Through the shortened supply chain, food waste is reduced. On the one hand,they shorten transportation which also results in less need for chemical usage and naturally produces quality increases. On the other hand, through better matchmaking they can eliminate overproduction and suboptimal goods. Additionally, smaller farmers have a chance to thrive due to better aggregation of their produce and more accommodating market forces.

Suboptimal foods have often fallen outside of the scope of the traditional supply chain, as retail beauty standards are high, and consumers have made purchase choices based on sensory appeal. It is necessary to challenge these market conventions as demand side driven supply chain standards are considered a massive cause of waste at early stages of the supply chain (Stuart, 2009) On the one hand, providing consumers with the opportunity to buy suboptimal goods like GRIM is doing, can help highlight and change the consumers trepidation towards second class produce and help reduce waste. On the other hand, being able to match second hand produce with buyers like food processors that do not care about sensory appeal is another way to solve the issue of handling suboptimal goods and overproduction like Fresh.Land is focusing on.

Overall, the Alterationists contribute to a more sustainable industry by providing access to more localized or second quality produce, which in turn provides better conditions for local producers and smaller cooperatives in a highly competitive market. Smallholders often find themselves in a weak negotiating position against food processors, traders, wholesalers, and large retail chains. In some cases, the “big players” provide the only access to the market for small-scale farmers, which results in

unfair trade practices (Euractiv, 2018). The Alterationists give smaller producers an alternative to the bigger actors in the industry. The findings illustrate that providing additional revenue streams for smaller farmers and smaller cooperatives, may increase local sales and strengthen the local market; ultimately providing better conditions for local producers which is also a concern point of customers. Nearly 90% of those surveyed are in favor of strengthening the farmers role in the food chain (Euractiv, 2018). Similarly, over 75% of Europeans consider regional and local aspects when making their purchase decisions (Euractiv, 2018). Therefore, this transition towards de-consolidating and more local producers is aligned with consumer demands.

Capability Building

Building on consumers' capabilities will diminish household waste. While platforms currently have the ability to nudge consumers into healthier and more sustainable choices, it is likely that in the future, the supply side can be guided based on which food decisions should be made. This can be done with the help of sensor technology that measures the flavour map of consumers while still nudging consumers into choices fitting their aroma profile for produce that is in season.[4] That means that the sensors gather data of the food preferences from each consumer, send it back to the supply chain and based on what produce is available, the consumer will get recommendations about what they could cook and eat.

Technology might be the connector to facilitate visibility, transparency, and communication across the food supply chain. The digitalization of the industry provides actors with new sets of data on consumers' food choices and consumption patterns. Through smart devices, more accurate data about consumers' preferences and habits can be produced. In what has traditionally been a push driven supply chain, the Capability Builder is gaining access to the types of data that can help establish a pull chain, which would result in more accurate production levels. By creating AI-driven cooking tools, they are gathering accurate information about consumers cooking and eating habits which they can share with retailers and potentially with food producers. Being present in consumers' kitchens is arguably the best way to recognize changing consumer preferences.

[4] for details see: https://vimeo.com/211100378

A new supply chain?

The approach of our case platforms to move upstream is a good strategy for discovering a better and more holistic solution. However, only when the traditional supply chain actors find a way to collaborate along the chain, inefficiencies can be eliminated that result in a more environmentally-friendly solution. There is a need for strong collaborations between different supply chain actors. But for now, there are data silos along the whole supply chain. As found, there is no collaboration between supply chain actors, therefore an end-to-end demand forecasting solution is not in place. Traditional players, especially retailers collect and work with a significant amount of data, but it is siloed, and they do not share it with their partners throughout the chain. This modularised forecasting system is one of the inefficiencies causing overproduction.

As a collaboration among all supply chain actors seems further down the line, the collaborations between the new initiatives should be fostered. Our platform cases also have a lot of data to leverage from as they gather data from at least two market sides. user data is especially valuable, as it has an enormous potential to predict demand more accurately. The data output can be used for external use like feeding data to the back of the supply chain. For now, the platforms have discovered ways to cope with overproduction on a rather small scale. However there strong community engagement has a positive impact on user-generated content involvement, which fosters the user data collection (Christodoulides, Jevons & Bonhomme, 2012). User data collection will help platforms cope with inefficiencies in the supply chain on a greater scale in the near future.

Platforms are better formatted to build a pull-driven supply chain that can more accurately match production levels with actual consumer demand through having demand-side economies of scale (Shapiro & Varian, 1999). The emerging platforms will not make the traditional supply chain disappear, rather it is more likely that an alternative supply chain will integrate products that are currently falling outside the scope of the traditional one. They are able to aggregate demand as well as supply from their platform market sides which results in better matching capabilities, better price, and willingness to take all the produce no matter the standard. Therefore, the

new supply chain will be a viable alternative for farmers and other producers. as large retail and processing companies are heavily concentrated and hold substantial bargaining power over their suppliers, the new platform evolution might be able to alleviate the power asymmetry and put farmers in a better position. Giving an alternative for the producers might convince some farmers to move from more industrialized farming methods with large quantities, standardized products, and long term contracts to a more fluid, demand-driven chain. If there is optimization along the entire supply chain, the greatest value can be produced more efficiently (Handfield & Nichols, 1999). Therefore, in order to create greater value along the entire food supply chain, organizations need to operate in a sub-optimal cost perspective, The platform cases are willing to do so, as they thrive on a social mission (Leenders & Blenkhorn, 1988). Their goal is to find solutions that will diminish inefficiencies along the entire supply chain and therefore food waste post-harvest will be fractional. At the same time household waste will also be significantly reduced due to platforms efforts to inform and nudge consumer behavior. Whether this, in turn, will put pressure on the traditional supply chain to better the conditions for the producers remains to be seen, but the possibility of that happening is undoubtedly present.

5.3 Revising the Three Categories

Our examination of the three categories that were adapted from Aschemann-Witzel et al. (2017) has yielded some exciting results which are summarized in table 4. The characteristics that we inherit from Aschemann-Witzel et al. (2017) are marked in green, the unmarked categories are additions that we made.

Table 5: Key Characteristics of Food Waste Platform Businesses

New Alterationist	New Redistributor	New Capability Builder
Collaboration		
Business opportunity		
Matchmaking	Multiple aims	Innovative and playful technology
Social impact creation		
Multinational network	Multinational network	Global network
Indirect network effects	Indirect network effects	Direct network effects
Inform consumers	Educate consumers	Nudge consumers
Shortening the supply chain	Quick fixes for supply chain	Potential of a holistic solution

Source: Authors

A few of the key success factors they identified within conventional food waste initiatives are also highly essential factors for the platform businesses. Factors such as achieving a large scale, timing, and competencies, are also impacting the platforms' ability to operate successfully and are therefore also highly relevant for our cases, but are not included in the table as they are part of the platform nature. Moreover, like the previous research, we also found that collaboration is a vital element of succeeding in this particular market segment.

Aschemann-Witzel et al. (2017), particularly pointed out one main characteristic for each category. For the retail and supply chain alteration initiatives, it was business opportunity. As most of our cases are commercial, business opportunities are, of course, significant to all the categories, and not necessarily a characteristic that provides a proper explanation about the differences between the categories. It does, however, imply a significant difference between the conventional businesses and the digital businesses. Which is that the digital platforms can identify and pursue business opportunities in areas where conventional businesses can not. Instead we observed

that their extensive ability in matchmaking is a more prominent characteristic for Alterationists.

For the redistribution initiatives, the main characteristic was that they had multiple aims. They were both redistributing surplus food waste and providing social aid. We similarly found that our cases were especially effective due to the presence of multiple aims. However, the multiple aim that makes the digital redistribution platforms successful is the combination of reducing food waste and providing a financial incentive to retailers, restaurants, and wholesalers.

For the information and capacity building initiatives, Aschemann-Witzel et al., (2017), identified that a positive focus was especially characteristic for the category. In context, this means that the initiatives that had a positive focus when attempting to create awareness among consumers were particularly effective. Although our findings do not suggest that a positive focus is unimportant for the Capability Builder, it was not the most prominent characteristic. Instead, we observed that their effectiveness is a result of playful and innovative technology. gamification elements nudge users into healthier and more environmentally-friendly behavior.

We were also able to identify additional factors that have not been mentioned by Aschemann-Witzel et al. (2017). First, we found that all the cases follow a social mission. In order to create a more social and sustainable solution, they are willing to optimize processes across its network, which might require specific companies to operate sub-optimally from a cost-perspective (Göbel et al., 2015). Secondly, we found that they are beholden to specific network properties due to how they have organized. For example, the Capability Builder is able to build a global network due to its digital product and its direct network effects, while the Alterationists and Redistributors create a multinational network due to indirect network effects and the physical nature of their product, thus being subjected to network clusters. Thirdly, we observed that the categories are impacting the value chain in different ways. With regards to the consumers, they either inform, educate, or nudge as a means to promote more sustainable behavior. While for the supply chain, their solutions range from rather temporary solutions to potential end-to-end solutions.

The previous table (4) showed the key characteristics and success factors of the food waste platforms, divided into the three categories. We recognize that these factors will need further validation by research on a larger sample size. Nevertheless, since the success factors have proven to be very strong in our sample, we submit that these factors will also be found in similar food waste platforms.

5.4 Prospects of the Food Industry

The future of the food supply chain is uncertain. Experts and trends point to an increase in home delivery and e-commerce, while physical shops will diminish. Certain specialty stores may remain, offering a variety of products and innovative solutions to keep the consumer in the store longer. Other more prominent market players like Amazon are getting ready to make their move into the food industry, with their acquisition of the upscale retail chain Whole Foods in 2017 being a clear sign of intent (Cusumano, 2017). Technology will make many processes easier, and everything might be automated, which will lead to more personalization and more convenience.

Thus, a question that concerns the interviewees is what kind of relationship consumers will have with food in the future. Is an urbanizing world becoming more and more disconnected from food and the production processes? Many have voiced their trepidation about the increasing consumption of processed, premade meals and the reduction in more nutritious home-cooked food. As was pointed out in the interviews, the question becomes if the food supply chain will be a completely automated highway so that there is no manual labor involved or will the highway stop and go into a wooden path where we value the act of cooking and thus value food itself? In the transportation industry, for example, the disruption by Uber and other car-sharing initiatives have reduced the need to drive oneself and to own a car. It is possible to envision similar advancements and disruption within the food industry, eliminating the need to cook. The difference is that while cars have mostly been a means of transport, food is deeply rooted in our culture. our health, and our well-being. However, consumers might still demand inefficient methods of food delivery such as going to a store to browse around or cooking. Even though these daily rituals are time consuming and may not have the highest nutrition efficiency, they might bring personal gratification to the consumers. Albeit automation will increase dramatically, technology evolves

faster than culture and consumers; cooking from scratch will continue long after automation has occurred. (Dunn, 2019; Pinder et al., 2017). We argue that the way consumers see food will always be more than just obtaining nutrition; they see it as a social aspect of their life. Food is culture. Food is a part of daily life. Therefore, the emerging platforms might be able to increase the value of food through their high community engagement that nudges consumer behavior. Through that, consumers are more likely to reduce food waste and put pressure on the supply chain actors to also reduce waste. At the same time, the platforms have an additional impact on the supply chain through innovative processes, further decreasing inefficiencies.

6. Limitation, Further Research and Conclusion

The goal of this section is to reflect the limitation of this research while also stating possibilities for future research. Finally, the paper will end with a conclusion.

6.1 Limitations and Future Research

Some potential limitations of this study should be highlighted. Firstly, the sampling of the initiatives was based on identifying platforms or emerging platforms that were suited for the three categories of Alterationists, Redistributors, and Capability Builder. Ideally, we would have preferred to have gathered data from more initiatives in each category, as a more significant number of cases improves the validity of the findings. However, due to some initiatives declining our interview requests and the difficulty of finding more local cases for the Capability Builder category, the result was the five case initiatives as presented combined with interviews from four other supply chain actors. We maintain that the inclusion of the Capability Builder category was beneficial and necessary, and we are confident the data gathered through the three interviews with the company, as well as user testing and various secondary sources, was sufficient for a qualified analysis. Nevertheless, for future research, we suggest that a larger sample size is included in each category in order to gain a stronger basis for comparison and analysis.

Moreover, we acknowledge that there are certain differences between the cases within the Alterationist category and Redistributor category. We aimed to find comparable cases where these differences were fewer, in order for a direct comparison between the categories to yield more generalizable results. Nevertheless, due to these types of initiatives being a relatively novel construct, there is a limited number of organizations for each of these categories in the Danish market. Thus, we had to choose those that appeared to have the most similar dynamics, and those we deemed to be the best fit for the categories. Furthermore, the initiatives have achieved hugely different numbers of users, and their current experiences reflect this. For example, one of the organizations is still developing their service and may not yet be confronted with many of the issues that the more developed initiatives have seen. We therefore, advise that future research aim to find more initiatives similar in size.

We observed specific consumer trends through our interviews with the cases, but due to time constraints, we did not collect data directly from consumers to validate or strengthen these findings. Thus, we propose that future research should be done to validate our findings by gathering data on consumers through questionnaires, surveys, or focus groups. Moreover, we argued that user data mined by machine learning or artificial intelligence for personalized nudges could create a more significant impact on customer behavior change. To further validate this statement, user tests need to be done to see how the impact increases with personalized nudges compared to regular nudges, but also compared to informing and educating customers.

As platforms and its dynamics are fast-paced, it is difficult to say what the future will hold. Thus our outlook shows only how the future might be based on our interviewees' beliefs and articles about future development. We believe that these insights might be of inspiration to researchers that want to study developments in the food industry. Finally, the case study is critiqued for not being a method that produces generalizability. It is our contention, however, that the method allows for a more in-depth look at the underlying dynamics of the phenomenon in question. Thus, this research paper should be considered as a snapshot of the current food industry and the impact of emerging local platforms.

6.2 Conclusion

This multiple case study has examined, through interviews, observation, and various secondary sources, how new emerging platforms are changing the food industry. Through an in-depth investigation into the context of the food supply chain, we were able to determine the source to inefficiencies causing food waste. Therefore, we focused our research on digital platforms tackling this issue. Throughout our study, we have used three distinct categories from prior research about food waste initiatives by Aschemann-Witzel et al., (2017). These categories were modified to be applicable for the various business models of the platforms. The platforms broke down into three general business models; the Alterationists, the Redistributors and the Capability Builder. Each of which provides a different model for combating food waste along the supply chain.

We observed that the platforms have been able to leverage information technology to create business opportunities that conventional companies have been unable to create. Moreover, we identified key characteristics and success factors which inform how they were able to do so. First, having a value proposition with multiple aims has shown itself to resonate with consumers. We consider it one of the cardinal reasons for why TooGoodToGo has experienced increasing success. Second, it is important to induce network effects and strengthen network properties. Managing the growth of the network increases value for users and increases profitability for platforms. The initiatives therefore are, actively engaged in orchestrating the network effects. Moreover, the network properties influences the strength of their networks. Thus, we see that the initiatives are actively engaged in creating communities, which will enhance their network properties. Third, we found that building and maintaining a platform ecosystem is very important for the initiatives. The ecosystem adds to the value of the network which also impacts the value for the users. Finally, we saw that all of the platforms were trying to engender more sustainable behavior in consumers. The consumer is considered the main driver of the supply chain. Therefore, in order to produce a substantial change, it is essential to induce changes in consumption habits.

Additionally, we identified how these platforms alter the food value chain. We found that these platforms impact supply chain actors and consumers, as well as society as a whole. All of the platforms studied create social impact and are searching for holistic solutions to fix the food waste challenge. Starting with consumers is a core part of their strategy. Through active community engagement, they are able to motivate and move consumers to more environmentally-friendly behaviour. In order to increase their impact, they collaborate with each other and other initiatives, increasing the impact on the food value chain. The impact they create on the food value chain varies. The Alterationists are shortening the supply chain by disintermediation, the Redistributors are redistributing surplus food to prevent it from being wasted, and the Capability Builder is inducing behavioural changes through innovative technology, as well as leveraging data to provide better insights on consumer demand.

Furthermore, they continually challenge consumers' perceptions about the value of food and increase awareness around food waste. However, actions along the entire supply chain are needed in order to create sustainable change, which means collaboration among all supply chain actors is critical for creating a sustained impact.

The food supply chain have a distance to go before achieving this. However, these pioneers are presenting a development that can spearhead new disruptive initiatives in industry, which ultimately might provide the holistic solution that is needed to eliminate food waste.

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Appendix

Table of Content

Appendix 1: Interview Guide

Introduction / Business Model	1.1 Could you shortly explain the business and the motivation starting the business? 1.2 Talk us through the user journey (what is happening/how does it work)
User/ Platform dynamics	2.1 Who are your users? - How many users do you have? - How do you segment them 2.2 What do you find is their motivation for using the service? - What is the main motivation? 2.3 What kind of user interaction do you have? - What is the most valuable? 2.4 What do you consider as the main ('core') interaction on the service/platform? 2.5 what is the pricing strategy? - Subsidy side? 2.6 How do you ensure that the different users gets the most value from interacting on your platform?
Market Environment	3.1 How would you place yourself in the supply chain? 3.2 How do you view the competitive landscape of food waste platform initiatives? 3.3 - Could you talk about network effects and the need to effects on the customer base?
Data and Technology	4.1 Could you talk briefly about any technology you are using?

	4.2 What sorts of data do you collect? 4.3 What do you do with the data? 4.4 What do you do with the users? 4.5 What kind of information do you collect from the actions user take on the platform? - How does that information help form the service and the platform?
Impact	5.1 What kind of partnership do you have? - Key partners? 5.2 How do you view your platform position in the larger food industry? - Due to your presence, how do you think the food industry will change in the future? 5.3. How do you see your service helping to diminish food waste? - Do you use the data you gather to inform retailers and/or producers more about demand so that they can adjust the quantity they are producing/offering? 5.4 What do you observe that users say is the main motivation for changing current consumption habits 5.5 in what way do you and enable users to do something they couldn't do before? - in what way is technology involved in this process? 5.6 Talk us through the ideal future for this company?

Appendix 2: Coding Process

Appendix 2.1: Initial Template for Coding

Higher-Order Codes	Lower-Order Codes
Business Model	Motivation
	User Journey
User	Segment
	Motivation
Platform Dynamics	User Interaction
	Pricing
	Value Generation
	Network Effects
Ecosystem	Position in Supply Chain
	Competition
Data & Technology	Usage of Technology
	Data Collection & Usage
Impact	Partnerships
	Role in Supply Chain
	Coping with Ineffiencies
	Future of Venture

Appendix 2.2: Second round of Coding

Higher-Order Code	First Lower- Order Code	Second Lower-Order Code
Value Chain	Consumer as a Driver	User Motivation
		Food waste
	Current Market	Inefficiencies
		Power asymmetries
	Future Market	Changes
		Technology Enabler
		Trends
Platform	Business Model	Pricing
		Market Sides
	Network Effects	Direct
		Indirect
	Strategy	Upstream
		Collaboration
		Partnerships
		Technology
	Competition	Competitive Environment
		Competitive Advantage
	Challenges	Launch
		Critical Mass
Data	Sorts of Data	Self-reporting
		User Data
	Utilization of Data	Product development
		Marketing & Advertising
		Personalization
		Prediction
		Info to Supplier

Appendix 2.3: Final Round of Coding

Higher-Order Code	First Lower- Order Code	Second Lower-Order Code
Consumer as a Driver	Motivation	Sustainable Solution
		Influences Upstream
	Household waste	Awareness
		Value of Food
Market Environment	Inefficiencies	Collaboration
		Suboptimal Goods
		Overproduction
		Resource Waste
	Power Asymmetries	Consolidation
		Locked up Market
Rise of Alternatives	Social Impact	Social Mission
		Not Profit-centered
	Consumer	Educating Consumer
		Community Engagement
	Supply Chain	Collaboration
		Redistribution
		Alteration
		Capability Building
	Future	Technology Enabled
		Going into Extremes
		Loss of Supply chain actors
Platform dynamics	Network Effects	Direct - Indirect
		Supply & Demand - Side Economies of Scale
		Building a Community
		Managing the Effects
	Multi-Homing	Fellowship
		Between the Cases
	Niche and Differentiation	Differentiation strategy
		Focus strategy
		Sustainability
		Multiple aims
	Blurring of Boundaries	Physical infrastructure
		Network cluster
		Logistics
		Digital product
Building a platform	Market Sides	Onboard first
		Single sided
	Business Model & Pricing	Automation
		Subscription
		Transaction
		Technology Sales
	Platform Governance	Access control
		User generated

Appendix 2.4: Excerpt of Coding Book for the Analysis

	Fundamental drivers		
	Network effects	multi-homing & Switching costs	Niche and differentiation
Fresh.Land Founder	Yeah. So there's a strong network effect because of course the more farmers we have, the more attractive we are to a buyer. That he buys a bigger share of his needs and are satisfied by us. And if we have more buyers, we can take more and more of these, of the production that a farmer has. Even if it's production, that it would normally be hard to sell because it's very niche or because it's very off the normal standards. So its important to gain scale and be protected by network effects. If we have strong network effects there's no reason why a farmer should go anywhere else. He can sell 100% of his products through us.	"So it's important to gain scale and be protected by network effects. If we have strong network effects there's no reason why a farmer should go anywhere else. He can sell 100% of his products through us." - Founder Fresh.Land	"Right now we are not seeing too much copy cats, you know, like Escooter where vine is the same as Lime or the same as all the other providing exactly the same thing. Here we are seeing some tonalities and different ways of doing business" - Founder Fresh.Land
GRIM CEO	"Like now we have kind of reached some sort of critical mass because we can go to bigger farms. Like that was, that's like an important factor. Like how many customers we have determines how big of a farm we can go. (...) it's not going to be such a hassle of sorting out orders cause I can order a pallet of this product and then another one of this. So it's actually, that's what it has the biggest effect on which also affects prize of course of the produce." - CEO GRIM		Yeah, they are, it's really this crowd of people who either are like very sustainably motivated and already do a lot of, you know, they always buy or always or almost always buy organic. And that's a really big part of it as well. Um, and definitely the sustainability is the most important driver, so people who want to live and eat more sustainably" - CEO GRIM
DelDinMad CEO	Uh, well it's the connection between the user/people sharing with each other. So it's kind of link, you could argue that it can be at this connections at some point where they may start their own local society for this one, if there are enough in the community. But i've also thought about making some kind of group functionality, where you can invite people, so you've got a private, some kind of a group, especially for the eat together thing. Because if you are going to a place and eat with people and you feel nice and you have a good conversation and so on, it may be bringing some friendship, right? So we want to group people together that actually also, uh like to be with each other.		So it's household food, or we can say we haven't limited it to anything, so it can be used for different kinds of food. You know, we also have tried to make some exhibitions where they handle the food to people, and so we try to promote that via the platform. But the first thing, the main thing is to share food in between people. So that's the main, that's the main goal to achieve. And, of course reduce food waste. That's the main thing, right?
TooGoodToGo Marketing Manager	*So it's critical for us to keep on finding new uses because the more users we have, the more stores want to join. But it's at the same time if we have a lot of users and very little stores, it's a bad user experience because then there's no food for you. So it is that continuous balance that we're trying to, there's .... we don't experience that we just say now it's perfect. Now we sit back and relax because it's our overall growth is this demand going up and up and up and supply going up and up and up, they have to follow each other."*		
TooGoodToGo Customer Enagement Manager	*I would say that users are most important because users also create the public demand for their shops. So we are starting to experience that shops contact us and say: 'oh our customers are asking us to use TooGoodToGo can you help us to use it. And within five minutes they are users of too good to go.*	"Food waste and most of all the problems that we're dealing with right now in terms of climate change are something where people need to work as a community and we want to create that community and all we want is to put a label on fighting food waste and not just earning money on food waste that's being saved". - Customer Engagement Manager TooGoodToGo	"Of course we would like everyone to just do it because they think that food waste is bad and they want to help save it because of the environment and all of those issues. but the truth is that a lot of people do it to get a cheap meal as well"
Plant Jammer CEO	And the way that then this will become - there will be network effects meaning that when someone new comes in that gets value for everyone is exactly by having just like they've done with in Endomondo and running and my fitness pal and exercise and headspace and meditation where you have buddies that you're either competing or helping along the way. So if you have a group of like - if I have a group of my 14 guys on my football team that we're up to season start well focusing on weight control - I'm at that age now - weight control to get ready for the season then it would be beneficial for everyone to have one more person in and that's the kind of network effects I see the most of.	"already now we see a lot of our users use ToGoodToGo to find ingredients and then they're putting it into Plant Jammer and cooking with that kind of thing." - CEO Plant Jammer	"That's been at least the first lesson when we focused on food waste and we focused on gastronomy. That's very clear on what goes on. Right now we're make a little bit of a change into focusing also on health. And with that we're opening off another segment. So it's very clear that once we move there we have a quite different target group that suddenly is becoming relevant to us"
Plant Jammer Front End Developer			Well there's obviously a huge amount of food apps, recipe apps, and like cooking apps, food waste apps. But I feel like that plant jammer kind of is quite unique as we incorporate this food waste within the cooking

Plant Jammer Customer Engagement Manager			But I would say plant jammer is more like taking part of this really this home cooking. Like how can you reduce it at home and how can you really learn to use everything you have. So I would say there's obviously a huge variety of competitors, but not exactly for Plant Jammer because Plant Jammer is a combination of different things rather than just being a recipe app or cooking app or reducing food waste APP.

	Building a platform		
	Market sides	Desing and pricing	Governance
Fresh.Land Founder	*"So we have three types of users. We have suppliers, we have buyers, wholesale buyers like supermarkets and catering companies, and then we have end consumers"*	"The way it works is we have a platform and that platform takes care of, getting products, matching products from a supplier to a consumer and it handles all the logistics involved in that. So the platform combines three things. it combines the e-commerce component where the deals are made, contracts are made, suppliers and buyers are allocated. It combines the second thing, which is logistics, where we actually control the delivery via last mile or long haul. And thirdly, there's the finance that also goes through the system. So, we do all the payments, all the invoicing, all the credit notes etc, and all the insurance, so, it's.. the way we do it is with a platform that combine these three elements	"They have few things they will supply us including some documentation about certifications and etc, for compliance. Then there's a period where we do the validation of that documentation. And if the documentation is valid, it means that they can put product online. (...) It's not anyone that can go there and publish a product at the moment." - Founder Fresh.Land.
GRIM CEO		Yeah, so there is basically, I mean this particular price or particular costs that each thing that the box can cost to us so that we create a margin that at this point makes sense to us. Of course. So from each box we have to create a profit and we do. And then, what I weekly deal with is the, is the cost of the produce, so the food and fruit and vegetables.	
DelDinMad CEO	"its a peer to peer, person to person a sharing platform of surplus food. So it's household food. (...) We've been to several retail stores and we know about the, they have a huge bunch of food they need to throw out every day. (...) And this one can be an alternative for getting the food"	Yeah. Still free! But there's a business case for retail stores to give it away.	And of course we also have the transactions made so we can, if somebody says that someone has seen stupid things or you know, not using the proper language, then we can go and find out, okay, what did they actually write?
TooGoodToGo Marketing Manager	*it's a mix of bakeries, supermarkets, flower shops, hotels with their buffet restaurants. (...) basically everyone who has surplus food or flowers, they can be potential partners*	There is like a super small admin fee that you (the store) pay yearly. But other than that you don't pay anything, then you just get money from us" - TooGoodToGo (Nicoline).	
TooGoodToGo Customer Engagement Manager	"So on new markets it's the shops that we reach out to first and that's also because shops need sales tactics. While as users you can just make a Facebook post something like this you know, especially with a brand being this big you can quite easily enter new market in terms of users. It's not the same for the shops because they don't have the same channel of information as users have".		"And it's also something that our customer care team can use because if they see that a supplier has a rating of one, which is super bad, then they can call them and they can ask: is there anything you can do to improve the service? Why do you think customers have a bad experience with you? " - Customer Engagement Manager TooGoodToGo.
Plant Jammer CEO	"We see right now that we're working with retailers who are interested in having their products available in our platform. (...) The core sort of lesson and take is generally that you know you need to sort of hold the customer and be close to them to really understand and that's why we're starting in the home kitchen rather than starting from the supply side"	"people are paying for Prime which is the subscription part of the app we're getting the whole nutritional understanding with it. We can set a target for your health and your realizing which ingredients are helping you along that pathway and can notch it that direction" "The second part is that we are now adding marketplace feature which is moving us upstream towards a retailer. So now we're working in a few pilot with retailers where they are putting food waste products on sale on the marketplace and then users can find the products and actually cook with them."In the process of building this. We've taken some pretty heavy technologies in use. Insert an assistant kind of artificial intelligence where you're learning from patterns of existing recipes but putting learnings from chefs on top and that kind of methodology combining structural learning with machine Learning is super powerful and something that we're then applying to other fields with partners (...)It's sort of the third component of how we're making it into black numbers."	

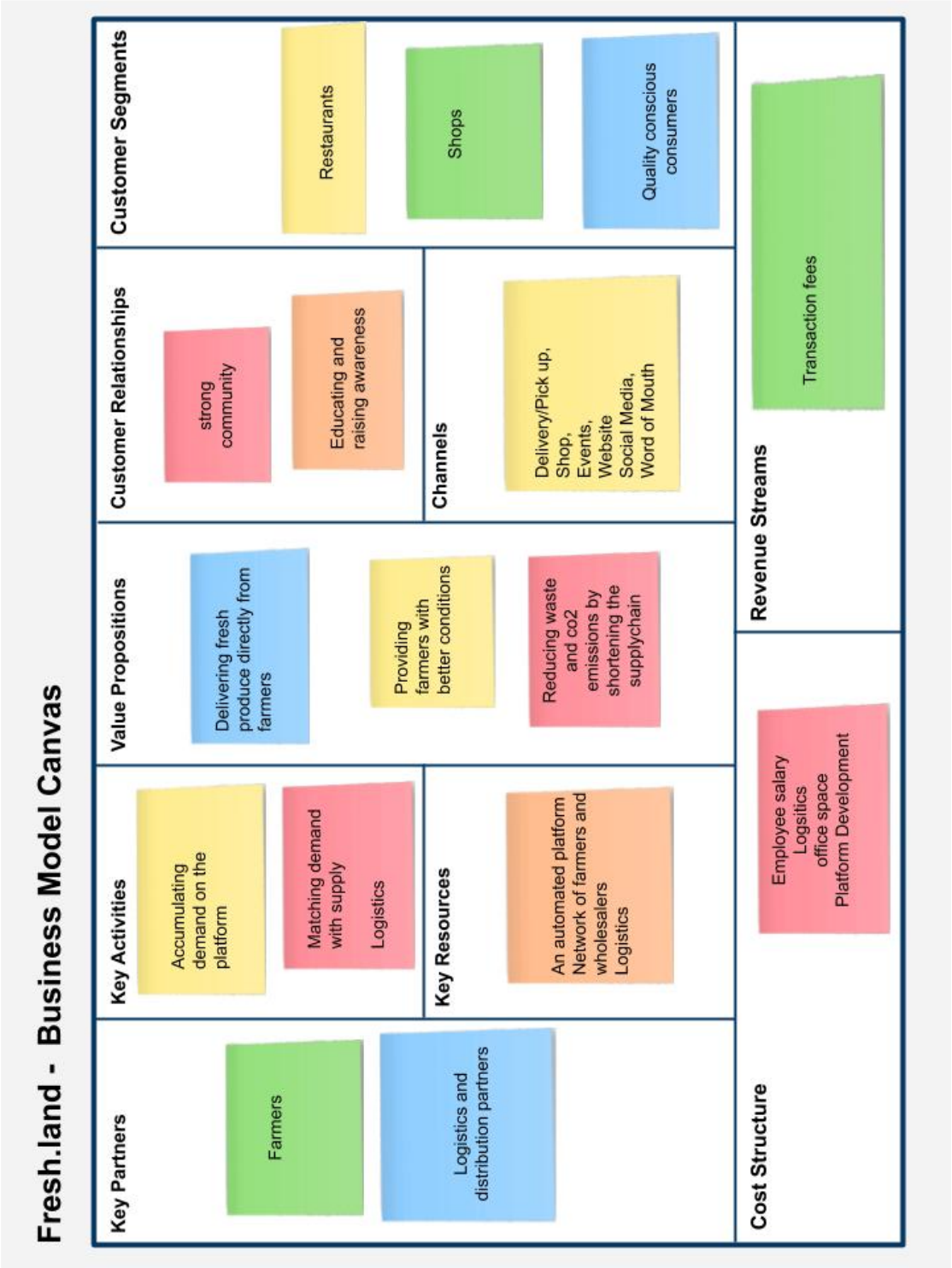
	Rise of Alternatives		
	Social Impact	Community Engagement	Information / Education for Consumer
Fresh.Land Founder	So the motivation is to provide an alternative for the food supply chain. An alternative that is better for consumers. You have the products quicker, faster, fresher and alternative that rewards the farmers to also grow their business.		
GRIM CEO	“one fourth of everything that's grown actually never gets from farm to market because they don't look perfect. And this is obviously a huge burden for the environment but then also it's a huge loss of resources of farmers' time, their land, their water, their passion that they put in growing it and then they can’t sell it. And then at the same time, consumers and also food businesses, they want to source and buy more sustainable fruits and vegetables. But sometimes they just don't know what the right thing is to do. So we then tackle this problem”.	people are so committed because they are part of something bigger, you know, they are part of changing the food system and they are a part of the GRIM crew, you know, it's more than just buying your vegetables so it, you'll really like, you want to be a part of it and you see that.	we've kind of ensured that it isn't just sustainable choice and we are really trying to be transparent about our choices. You know, we tell which farms it comes from, we tell why is it GRIM like actually here is a leaflet. You know, you get that, you know exactly what you're eating so you can trust us on that.”
DelDinMad CEO	the main thing is to share food in between people. So that's the main, that's the main goal to achieve. And, of course reduce food waste.	Actually, the first time I used it myself, I shared a cake with the neighbor and I haven't even spoke to that neighbor before, but afterwards we saying hi to each other and communicate right. So this also creates some kind of local community and that's of course one of the benefits of it also.	
TooGoodToGo Marketing Manager	“one of our main purposes for TooGoodToGo besides from being an app is creating a movement against food waste. Because we need to have everybody being aware about the fact that when you throw something out you're wasting food like you're wasting resources, that is a part of our climate change that's going on right now.”	it's a fast growing community worldwide.	we can be something more than an app because hopefully we change the habits of the consumers and of the stores so that there's so that there's not that much waste as we have now
TooGoodToGo Customer Engagement Manager	TooGoodTooGo within those three years it's been out there, could never scale into eleven countries if it wouldn't have been for profit oriented business model. (...) But it can do also do good if you'd actually want to do it for good. And then I think that's refreshing as well to realize that the board of directors that I work for, don't necessarily do what they do in order to only earn profits for themselves. They they want to do this because we have a mission together, a vision together.	Food waste and most of all the problems that we're dealing with right now in terms of climate change are something where people need to work as a community and we want to create that community and all we want is to put a label on fighting food waste and not just earning money on food waste that's being saved.	besides from being an app is creating a movement against food waste. Because we need to have everybody being aware about the fact that when you throw something out you're wasting food like you're wasting resources, that is a part of our climate change that's going on right now. and you can actually very easily do something good about food waste because it's not that big a problem
Plant Jammer CEO	50 percent of food waste today is happening in people's kitchens so it's already huge there. I think we could reduce that dramatically if people knew how to cook varied and If they didn't also could actually help the earlier part of the chain capturing stuff before it goes to waste and actually cooking out of it. (...) So that's why we're trying to use technology to invest in flexibility in people's homes (...) you're building your own recipes and you're learning about the basics of gastronomy along the way which gives you this superpower of being able to cook with anything. And once you get that flexibility out there - people are empowered. People get to actually cook what they know they should be eating more of and we get this flexibility that enables the whole food chain to be more efficient and better. That's the idea. So we want to start in people's kitchens rather than anywhere else. That doesn't mean that we stop there, that's where we start.	I have seen that communities are extremely strong now so my personal observation without looking and reading other peoples’ analysis is that actually no convenience and cost is fine to get people on and to like, and you get people to do it for the right reasons and they feel smart and then they will move, you don’t need convenience and cost. At least for my users, but when I read literature and study statistics it seems that costs and convenience is essential but is not as much for my users.	
Plant Jammer Front End Developer			Definitely (diminishg food waste) by the core technology. It's about, I guess both that you've bought stuff that you don't want to throw out, because people throw it out because they don't know how to use maybe two individual ingredients that don't make them think of an existing recipe. So there's that, and then hopefully also in the cooperation with supermarkets that they can help make users aware of off products that are going bad and people can buy that.
Plant Jammer Customer Engagement Manager	you kind of tell the app what you have and then regenerate the recipe based on the ingredients behalf. And with that you kind of one side reducing food waste. But on the other side, also learning how to cook impulsively because it really tells you, yeah, what do you can cope with what you have at home.	we've got this community and where you can post your recipe and people can share recipes.	Plant Jammer is really trying to educate people how to cook, but also how to cook healthy, sustainable, and quick and really use the things you have rather than needing to go to a restaurant or like buying premade things, (...) it doesn't take a lot. It's not expensive. It's not time consuming. It's not a pain. It's really just the simple, quick and easy way to learn how to cook.

	Market Environment				
	consumer waste	consumer influences	inefficiencies collaborating	inefficiencies waste	suboptimal goods
Fresh.Land Founder	in a normal situation 20% of that ore 30% of that would go to waste because no one wants to buy the ugly shaped or too small carrots or whatever.			"sometimes we have situations where a farmer is not able to sell their products, they have to throw them out because they don't have a buyer at the moment where they need to harvest. They don't have a buyer. It doesn't mean that the buyer doesn't exist. It just means that it's not on the radar."	in a normal situation 20% of that ore 30% of that would go to waste because no one wants to buy the ugly shaped or too small carrots or whatever. (...)So the supermarkets have higher standards of how it should look.
GRIM CEO			what the farmers do right now with the produce is they often just don't sell it because it doesn't make sense in a way that it's so much work for them to try to find buyers, which they don't have time for that.	30 to 40 to 60% of what farmers produce they can¨t sell. But then it's not necessarily all of that that we can sell because some of it is just maybe too bad or you know, there's different things. So it's really to understand like, what, what scale can we really go? Um, in terms of the produce supply. I mean, we know it's huge.	about one fourth of everything that's grown actually never gets from farm to market because they don't look perfect. And this is obviously a huge burden for the environment but then also it's a huge loss of resources of farmers' time, their land, their water, their passion that they put in growing it and then they can´t sell it.
TooGoodTo Go Marketing Manager		"it's becoming kind of like public demand that you as a store always a brand, do something sustainable and TooGoodToGo is an easy way for the store to show that here we don't waste food here, we care about the environment. So some of them use it as well as like branding purposes."			
Plant Jammer CEO	50 percent of food waste today is happening in people's kitchens so it's already huge there.	"We believe in a model that's much more pull driven so that you will have much more understanding of your user and rather than just saying a supply over here and in less demand over here and first to supply and then realize how to push it through people. We'd much rather see as one that's demand driven. So basically where you'll have much more transparency to us to what people eat when they eat and when they need it. And then based on that you're making supply decisions."	So we believe that some of the existing solutions sometimes just move food waste from one part of the chain to another one. We actually want to have the full stack solution.	"they try to push products to us by discounts and light colors on marketing pamphlets. And that's just by definition is gonna create food waste when you are a push model.	
Plant Jammer Customer Engagement Manager	I mean it's widely known that most of the food waste is generated in homes because already I think in the UK there's some data or I don't know that, I mean if everyone, obviously, you know, when you have packages of toast, everybody always leaves the last pieces of toast. And I mean that's what millions of tons of toast a week.				

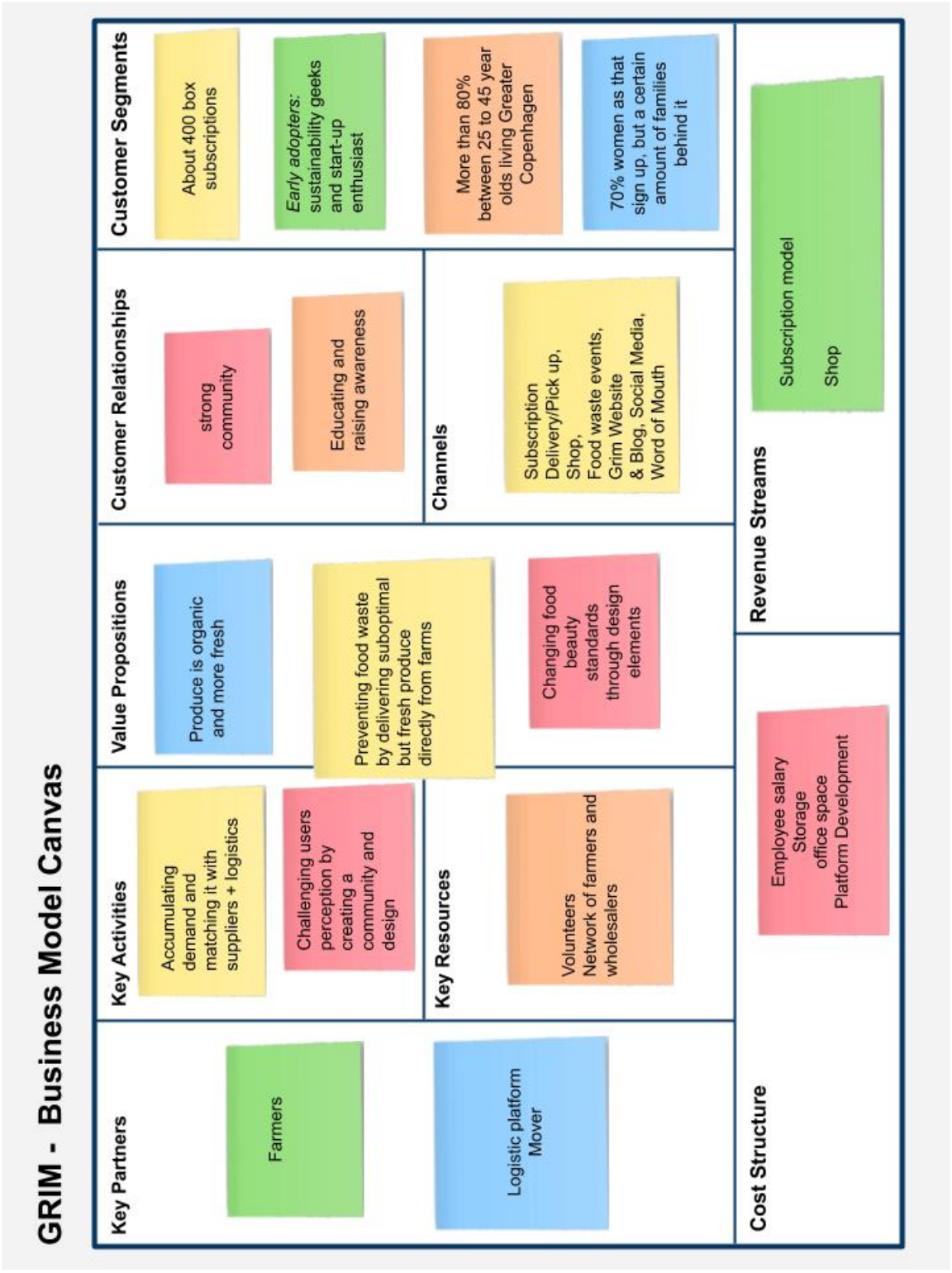
	Market Environment continued with traditonal supply chain actors				
	consumer waste	consumer influences	inefficiencies collaborating	inefficiencies waste	suboptimal goods
Farmer		*it's the consumers that decide what we produce. If they then decide in the way that we produce what they want. That's why I started producing organic, because it was more consumers that wanted organic produce. We try to make the consumers happy."*			
COOP Supply Chain Manager			*"That's a lot of inefficiencies (...) primary is the collaboration between the suppliers and the retailers that's a lot of inefficiencies. And still this sharing of a forecast is relatively low, especially on leaflets, and what we are moving on different offers because the retailers are really keeping the prices so close to them because of the competitive area in the marketplace."*	*We could reduce waste in a lot of ways. And some of it is is a lack of knowledge. Some of it is lack of willingness from retailers to show what we, what we expect. Our level of forecasting on vegetables and fruit is, is much less precise than what we're doing in all other products. Because the people we have on these areas, arent that well trained in forecasting and so on.*	*We are also delivering a lot of products when we are declining the products, based upon sending for example, where the quality isn't good enough, for us and then we are moving them to the zoo actually for animals to eat instead of us just throwing it out*
AMASS R & D Manager	Denmark we are personally responsible for about 100 kilos of food waste a year each, you know. But if you go to like Southeast Asia, it's about seven kilos, you know. The poor use everything, the hungry use everything, you know, and they make it delicious and we should be doing the same.				we as a species have that problem where no one would buy the last banana on a bench. (...) Again, 'cause they are big industry, they don't want food waste. So they try really well not to have it. But at the same time they're where they need to have full shelves, otherwise people won't buy the last thing that's there."

Appendix 3: Business Model Canvas' of Case Companies

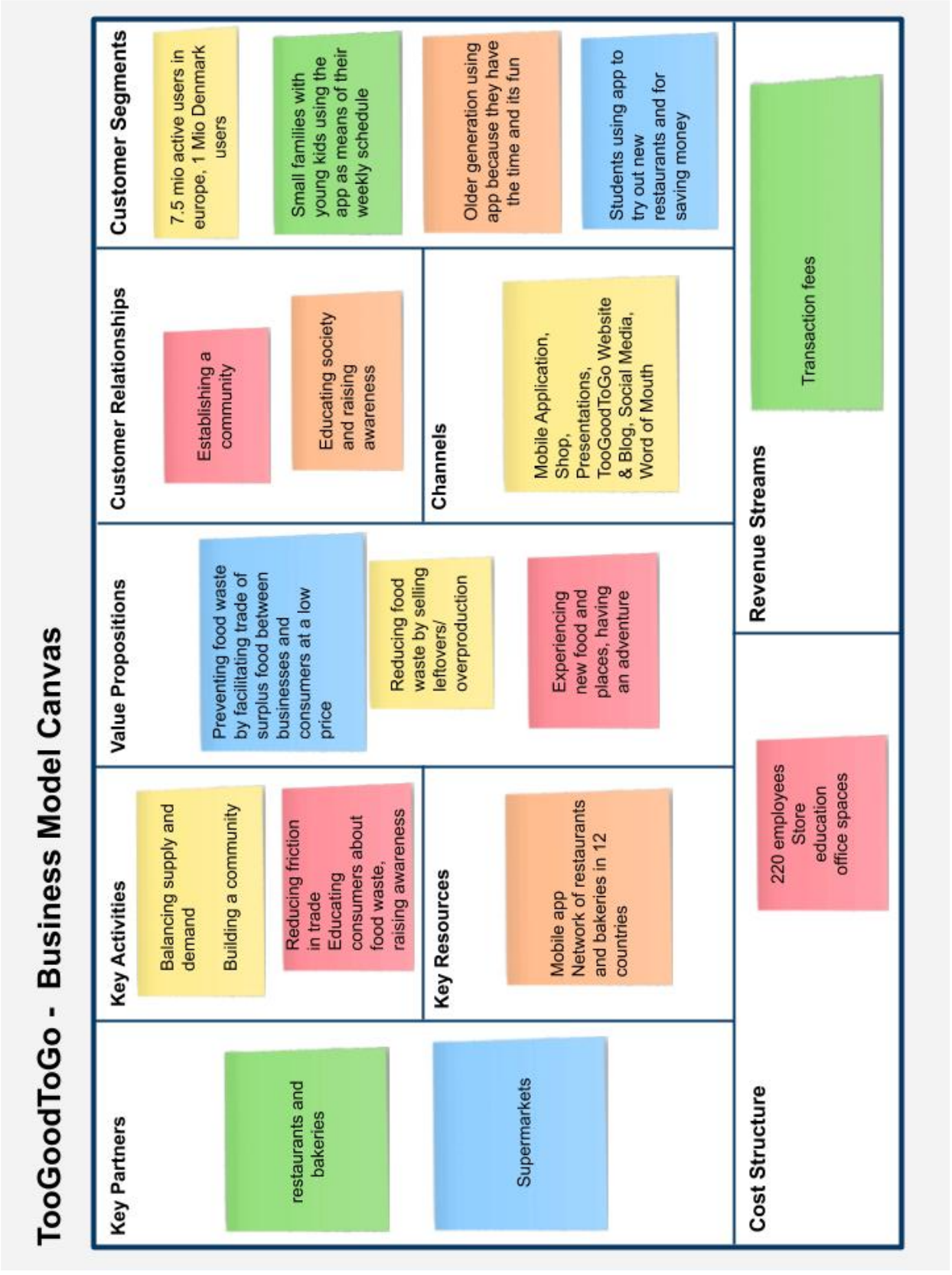
Appendix 3.1: Fresh.Land - Business Model Canvas



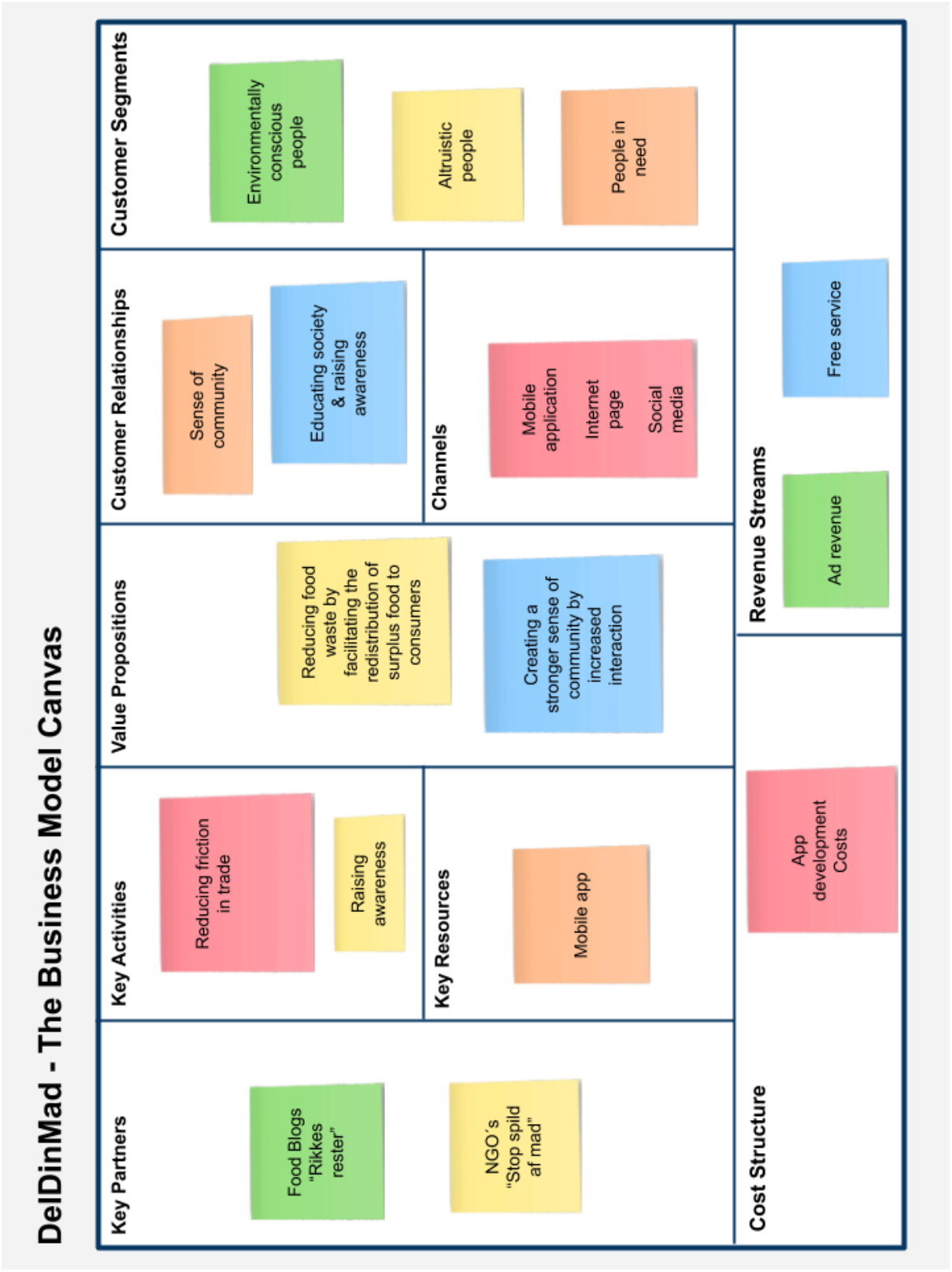
Appendix 3.2: GRIM - Business Model Canvas



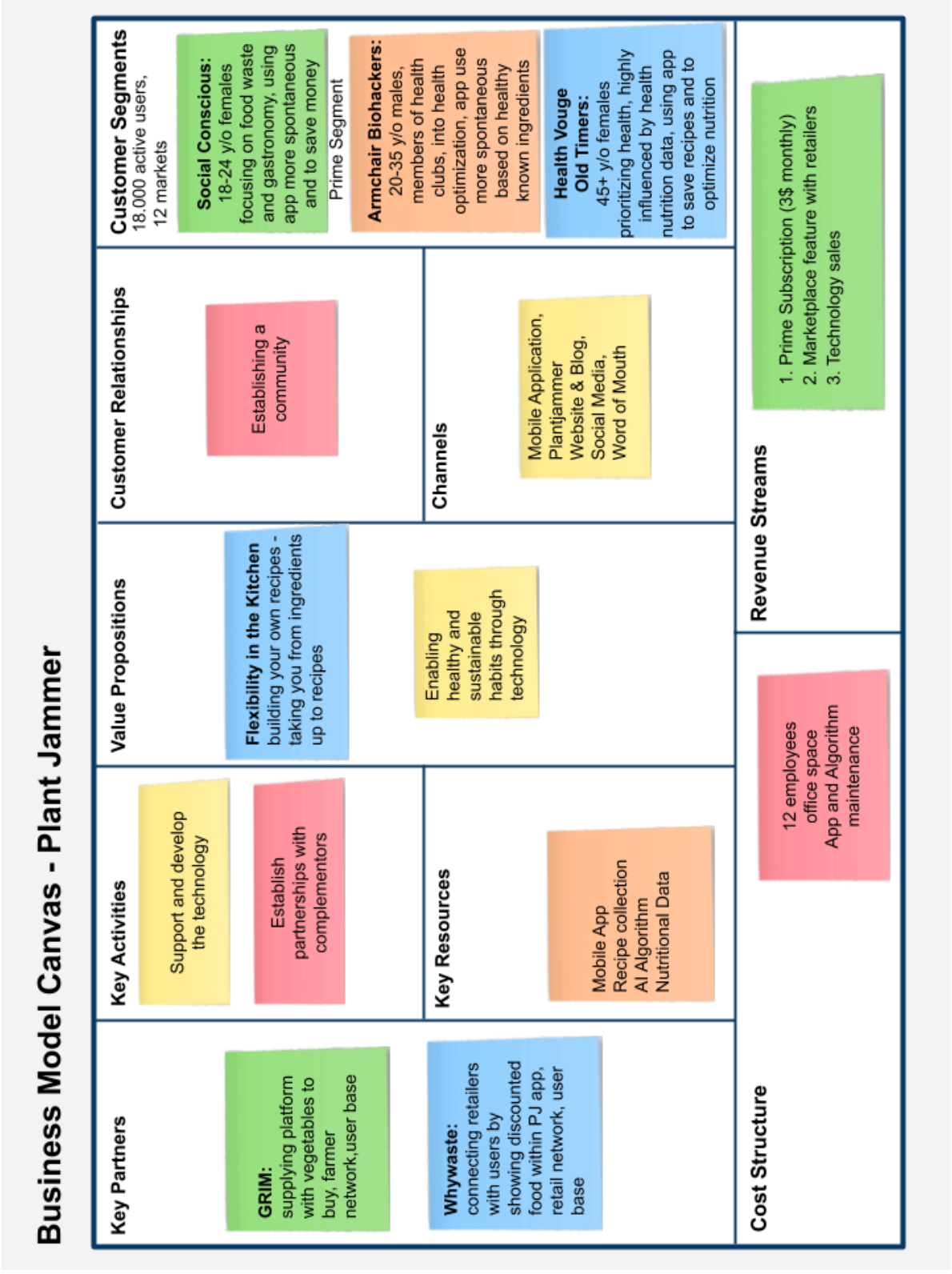
Appendix 3.3: TooGoodToGo - Business Model Canvas



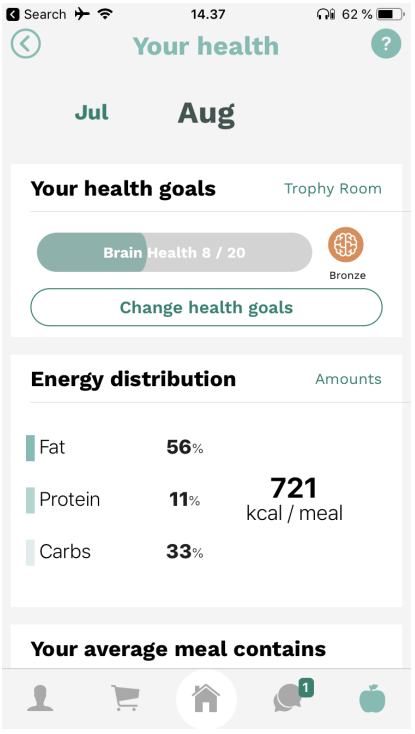
Appendix 3.4: DelDinMad Business Model Canvas

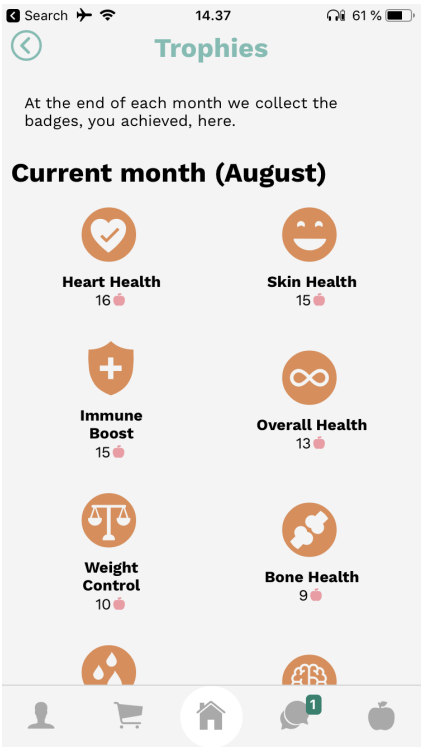


Appendix 3.5: Plant Jammer - Business Model Canvas



Appendix 4: Nudging Plant Jammer Interface





users can collect 'health apples' for every healthy dish they make until they reach a certain amount per week and eventually receive a trophy