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Establishing a sustainable business model: A multiple case study of plant-based food pioneers

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Entrepreneurship and innovation

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Preface

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Happy reading!

Ås, 16.05.2022

Elisabeth Fjelltun & Karianne Myklebust

Abstract

Background: Organizations are calling for a sustainable transition within the agri-food sector due to emissions associated with traditional food production. As a result, plant-based alternatives are becoming more prevalent in the market, both nationally and internationally. This recent trend and consumers becoming more interested in plant-based alternatives have led to the emergence of more plant-based firms and product lines.

Purpose: This study investigates how pioneers in the plant-based agri-food sector work to redesign their business model toward sustainability. Sustainable business models are an essential tool that can help contribute to the sustainability transition since it encourages firms to create environmental, social, and economic value in new ways. In recent years, research has been conducted about sustainable business models. On the other hand, there is a lack of research on how sustainability is incorporated within firms' business models and how this can be done in practice through a redesign process. Our study addresses this knowledge gap by answering the following problem statement: *“How do firms within the plant-based sector work to establish a sustainable business model?”*

Research methodology: We used a multiple case study design to answer the problem statement. The selection consists of micro-enterprises and SMEs within the plant-based agri-food sector. The unit of analysis is the firms' founders or managers. The data was collected through semi-structured in-depth interviews and further analyzed using the thematic analysis approach proposed by Braun and Clarke.

Results and implications: The study found a need for new knowledge on making plant-based food alternatives. The resources available within the plant-based sector were scarce, thus, making plant-based food production complex. The results from the study found that economic survivability was prioritized over social and environmental value creation within the firms. In addition, previous research indicates that the research field of sustainable business models is fragmented. Thus, the study results found that it was challenging to categorize the sustainable business models of the plant-based firms according to the archetypes proposed by Bocken. Therefore, we have further developed the framework by creating a new archetype we believe is more suitable for firms within the plant-based agri-food sector.

Sammendrag

Bakgrunn: Flere organisasjoner etterlyser et bærekraftig skifte i matsektoren på bakgrunn av utslipp forbundet med matproduksjon. Et skifte mot flere plantebaserte matalternativer har gjort sitt inntog på markedet de siste årene, både i nasjonal og internasjonal sammenheng. Dette har forårsaket nye konsumenttrender og dermed ført til et utspring av flere plantebaserte bedrifter og produktlinjer på markedet.

Hensikt: Hensikten med denne studien er å undersøke hvordan pionerer i den plantebaserte matsektoren jobber for å skape et skifte i etablerte praksiser mot bærekraft. Bærekraftige forretningsmodeller er nevnt som et viktig verktøy i den bærekraftige omstillingen som fører til at bedrifter må praktisere på nye måter for å skape økonomisk, miljømessig og sosial verdi. I nyere tid har det blitt fremlagt mye forskning om bærekraftige forretningsmodeller. Derimot har det vært lite fokus på hvordan bærekraft innlemmes i forretningsmodellen, og hvordan dette gjøres i praksis gjennom redesign. For å dekke dette kunnskapshullet i eksisterende forskning, vil vi besvare følgende problemstilling: "*Hvordan jobber bedrifter i den plantebaserte matsektoren for å etablere en bærekraftig forretningsmodell?*"

Metode: For å besvare problemstillingen har vi benyttet en flercase-studie som metodisk design. Utvalget består av mikrobedrifter og SMB i den plantebaserte matsektoren, hvor analyseenheten er gründer eller daglig leder. Vårt empiriske datagrunnlag ble samlet inn gjennom semistrukturerte dybdeintervjuer, og analysen ble gjennomført etter Braun og Clarkes fremgangsmåte for tematisk analyse.

Funn og implikasjoner: Studiens funn viser et stort behov for ny kunnskap for å lage plantebaserte matprodukter, samtidig er ressursene for å tilegne seg dette en mangelvare i den plantebaserte matsektoren. Våre funn tendenserer mot at økonomisk levedyktighet prioriteres over den sosiale og miljømessige dimensjonen i deres verdiskaping. Tidligere forskning om bærekraftige forretningsmodeller viser seg å være fragmentert. Våre funn viser at en bærekraftig forretningsmodell i den plantebaserte sektoren ble vanskelig å kategorisere etter Bockens arketyper for bærekraftige forretningsmodeller. Vi har derfor videreutviklet rammeverket med en ny arketype som vi mener passer for den plantebaserte matsektoren.

1. Introduction

1.1 Background

Sustainability has been a widely published and discussed term since 1987, when the Brundtland report was released (WCED, 1987; Chang et al., 2017). Today, the United Nations (2022a) states that climate change is one of the biggest challenges the world is currently facing. While the population, economy, and standard of living keep growing, so does the environmental impact triggered by an excess of greenhouse gases in the atmosphere (UN, 2022a). The Intergovernmental Panel on Climate Change (IPCC) found in their latest report (2021) that there were changes in every region of the entire climate system. The report also states that human influence and role in the climate system are irrefutable; however, the report also assures that human action still has the potential to reduce global warming while also determining the future of the climate (Zhongming et al., 2021).

One sector responsible for a relative amount of the world's emissions is the agri-food sector. This sector is directly responsible for around 26% of all greenhouse gas emissions that originate from human activity (Poore & Nemecek, 2018). The agri-food sector is also responsible for 32% of global terrestrial acidification and ~78% of all eutrophication. Poore & Nemecek (2018) also found that pollution from the agri-food sector can reduce biodiversity and ecological resilience and might change the species composition in a natural ecosystem. Poore & Nemecek (2018) found that meat, aquaculture, dairy, and eggs use around ~83% of the world's farmland and contribute to 56-58% of the total agri-food emissions. However, Poore & Nemecek (2018) also found that despite these products' high emissions, they only provided 37% of our protein and 18% of our calories (Ritchie & Roser, 2020). Therefore, Poore & Nemecek (2018) argue that sustainable food production should be pursued, even though such a change can be hard to achieve. The European Commission has created and implemented a strategy for sustainable food production called "Farm to Fork" that focuses on reducing the environmental and climate footprint of the EU's food system while also ensuring the livelihoods of farms (European Commission, 2020). Sustainable food production is defined by FAO (2018) as the management and preservation of the existing natural resources while also ensuring that the needs of current and future generations are met.

Nidumolu et al. (2009) have stated that firms are essential in reducing climate change. However, Markard et al. (2012) mention that it can be complicated for firms to facilitate a sustainable transition due to the sector being plagued with lock-ins and path dependencies. Sustainable entrepreneurial actors are pioneers that work to create a sustainable transition in their respective sectors through environmental, social, and financial value creation. (Tilley & Parrish, 2006; O'Neill & Gibbs, 2016; Gibbs, 2009).

Jørgensen and Pedersen (2018) argue that firms increasingly face challenges associated with climate change in their daily operations. However, they also mention that these challenges can represent new opportunities for renewal and innovation for micro-enterprises and SMEs. A possible opportunity is the introduction of more plant-based food products (Aschemann-Witzel et al., 2021). Plant-based protein and food is a growing trend in sustainable food production and innovation (Aschemann-Witzel et al., 2021). The Farm to Fork strategy proposed by the European Commission (2020) proposes changing the current consumption patterns and promoting a more plant-based diet to reduce the environmental impact. In addition, according to Aschemann-Witzel et al. (2021), there has been a growing consumer interest in choosing plant-based foods and reducing meat consumption due to an increase in awareness and concerns around environmental issues. The authors further argue that the consumer and policy interest in plant-based foods has prompted agri-food firms to rapidly launch plant-based products in the last few years in Europe (EUVEPRO, 2019; Aschemann-Witzel et al., 2021). Ulvenblad et al. (2019) have noted that in the past, agri-food firms have focused on traditional business models where economies of scale and production efficiency have been the focus. Yet, Ulvenblad et al. (2019) further note that the changes in the market and the increase in competition have prompted agri-food firms to innovate their business model toward sustainability, where the focus is on quality products and production to better compete against low-cost firms (Jørgensen & Pedersen, 2018). Therefore, Jørgensen and Pedersen (2018) and others argue that sustainability is becoming an integral part of how firms create, deliver, and capture value (Schaltegger et al., 2016; Schaltegger et al., 2012).

1.2 Purpose, relevance, and motivation behind the study

Bocken et al. (2014) present considerable literature on sustainable business models; however, they argue that there is no comprehensive research on how firms should embed sustainability within their business models. Sustainable business models are a large new field of study, and

we have found that the research so far is highly descriptive and conceptual. This thesis aims to address this gap by studying how pioneers establish sustainable business models, thus, focusing on how sustainable business model innovation works in practice. We studied this concept by analyzing important factors and dimensions that affect establishing sustainable business models, such as sustainable entrepreneurial actors and sustainable business model innovation. Our study further investigates what characterizes a sustainable business model and how they create value. By focusing on the characteristics and the value creation process of sustainable business models, we would also further develop our apprehension of the complexities involved in establishing these business models.

Tell et al. (2016) points out that there is also a research gap on business model innovation within the agri-food sector. This research gap, coupled with the agri-food sector's level of emissions, made us intrigued about this contextual area of study. We observed few studies about sustainable business models within this sector. As Aschemann-Witzel et al. (2021) note, there are favorable business opportunities in the plant-based food market derived from increased consumer and policy support (Euromonitor International, 2019; Fødevarerministeriet, 2018). This background prompted us to contribute to the study of establishing sustainable business models in the context of the plant-based sector.

This study is a part of a larger research project called “Incentives measures for Food System Transition” (VOM), coordinated by the Center for international climate research (CICERO) and funded by the Research Council of Norway. The Norwegian Institute of Food, Fisheries, and Aquaculture Research (Nofima) and the Research Institutes of Sweden (RISE) are both partners of the project VOM and are coordinating the present study. This study focuses on the plant-based food market and aims to analyze the business models of active firms in this sector and understand how they adapt to the sustainability transition.

1.3 The plant-based sector

Plant-based is a recent trend where consumers avoid animal-based products and use plant-based alternatives instead. There are various definitions of plant-based (Aschemann-Witzel et al., 2021). We have used the word plant-based to describe products that do not contain animal-derived ingredients or firms that create products with no animal-derived ingredients. Sales of plant-based products have increased rapidly in recent

years. Van Otterloo (2012) argues that food is a social practice; hence, consumers have the power to influence which foods are available and launched on the market.

Norgesgruppen, the biggest supermarket chain in Norway, stated that vegetarian product sales grew 50% between 2017 and 2019 (Evensen & Villalobos, 2020). Gonera and Milford (2018) found that plant-based food innovations in Norway often stay within their comfort zone; hence, they focus on extending existing product lines with similar ingredients. However, they noticed a trend in Europe where more plant-based firms use new raw materials to produce plant-based foods like lupin, oat protein, mycoprotein, and leghemoglobin (Gonera & Milford, 2018). Bloomberg (2021) reported that the plant-based protein market was valued at \$29.4 billion in 2020; however, they believed it could grow up to \$162 billion in 2030, making up 7,7% of the protein market. Hence, according to Aschemann-Witzel et al. (2021), it will be necessary for food firms within the agri-food sector to keep track of trends in the plant-based sector to develop products that meet consumer needs; thus, increase earnings. The agri-food sector includes agriculture, livestock, forestry, aquaculture, and products manufactured like food and beverages. The plant-based sector deals with creating plant-based products (Grande & Morales, 2015).

1.4 Problem statement

Based upon the gaps mentioned above, we have chosen the following problem statement to position this research project:

“How do firms within the plant-based sector work to establish a sustainable business model?”

To better explore our problem statement, we have created two research questions that will be presented during the literature review following the subsequent sections of interest.

1.5 Structure of the thesis

The thesis consists of six main sections. The first section is the introduction which explains the background for the topic, the field of the research, and presents the problem statement. In the second section, the theoretical framework is presented. The research questions will be presented along with the theoretical framework. In the third section, we will present the chosen method and design of the master thesis, the data collection approach, the analysis

method, and the cases involved in the study. In the fourth section, we will present the results from the interviews, which will be structured according to a thematic analysis method through main and subcategories. In the fifth section, we will discuss the results from the analysis against the theoretical framework to answer the research questions. In the sixth section, we will find a conclusion to the problem statement before explaining the thesis's limitations and giving recommendations for further research.

2. Theory

In this section, we will present relevant literature that guided us throughout the exploration of the problem statement while also assisting in answering our research questions. The theory section is divided into sustainable development and transitions, sustainable entrepreneurial actors, sustainable business model innovation, and sustainable business model design. Throughout the theoretical framework, we will examine the complexities of sustainability transitions and their end goal: sustainable development. Further, we will uncover who the sustainable entrepreneurial actors are and what motivates them. Next, we will disclose what business model innovation is and how such a process can be conducted sustainably. Lastly, we will bring to light what a sustainable business model is and the unique values such a business model can provide.

2.1 The transition toward sustainable development

There has been a growing focus on facilitating a transition toward sustainable development (UN, 2022b); thus, the research field of sustainability transition has received an increasing amount of attention (Chang et al., 2017). Sustainability transitions are multi-dimensional, long-term, large-scale, complex, and fundamental transformation processes where established and traditional socio-technical systems change toward sustainable development (Markard et al., 2012; Grin et al., 2010).

According to Johnston et al. (2007), it is essential to clearly understand the concept of sustainable development to navigate sustainability transitions successfully. Despite the original definition of sustainable development, there have been different applications of the term over time that have been used interchangeably. Thus, according to Johnston et al. (2007), creating a lack of clarity and contradictory definitions of the concept. We will be

using the definition of sustainable development provided by the United Nations throughout the thesis since it is one of the most widely accepted definitions. The definition proposed by the United Nations is the exact definition the sustainable development goals are built on today (UN, 2015): "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 41). Sustainable development integrates and balances the dimensions: Environment, economy, and society (UN, 2021; Johnston et al., 2007). The intent is that the dimensions should work together and amplify each other to meet the current generation's needs while also providing a sustainable future for generations to come. United Nations (FN, 2021) describes the dimensions in the following manner:

- The environmental dimension concerns taking care of the climate and nature as a renewable resource for humans.
- The economic dimension concerns ensuring economic safety for society and all humans.
- The societal dimension concerns ensuring that all humans have a good and fair starting point and support for their life.

2.1.1 Characteristics of sustainability transitions

Sustainability transitions are the societal transformation process toward sustainable development (Schlaile & Urmetzer, 2019). To better understand a sustainable transition, we will explore the different characteristics of the process proposed by Köhler et al. (2019). A sustainable transition within a socio-technical system is multi-dimensional because they consist of multiple elements such as user practices, cultural meanings, markets, technologies, policies, and industry structures. Thus, transitions become co-evolutionary because they usually involve changes in multiple interactive elements of socio-technical systems. A sustainability transition is also mainly a multi-actor process due to including a range of actors from different social groups with their own interests, beliefs, resources, capabilities, and strategies. In transitions, stability and change are strong characteristics due to the balance between radical change and path dependencies (Rotmans et al., 2001; Köhler et al., 2019). Conti et al. (2021) argue that the agri-food system particularly remains resistant to change. They further discuss this claim by stating that previous policies and distribution of power within the sector have created path-dependencies that favor mainstream food production methods and consumption habits (Conti et al., 2021). Sustainable transitions are also

long-term processes because the transition might span over decades. Boukid (2021) mentions that radical sustainable innovation takes a long time to develop due to its emergence in small niche applications. In the 1960s, one of the first textured vegetable proteins was launched (Riaz, 2001); however, according to Boukid (2021), it was not until recently that plant-based alternatives started to gradually move from the niche market toward becoming a mainstream product.

Köhler et al. (2019) also argue that there are multiple pathways in a sustainable transition, which means that many promising initiatives and innovations might affect the transition to different extents. Therefore, the future of sustainability transitions can be open-ended and uncertain due to the non-linear aspect of socio-cultural processes (Geels & Schot, 2007; Rosenbloom, 2017). One should also expect disagreements, contestation, and differing values during a sustainability transition. Köhler et al. (2019) discuss that sustainability itself as a notion is highly contested; therefore, different actors within the systems tend to disagree on what the best innovations and pathways are for a sustainable transition within their sector. Another characteristic of a sustainable transition is the role of normative directionality, which means public policies are essential when deciding the direction of a sustainability transition.

Markard et al. (2012) argue that sustainable transitions are highly complex due to the dimensions and the synergy between them. The authors say that many sectors today are plagued with lock-inns and path dependencies, which can aggravate the sustainability challenge. The lock-inns and path-dependencies are usually due to existing technologies and systems being highly intertwined, interactive, and dependent on each other, like user lifestyles and practices, business models, different actors, value chains, regulations, and even political structures (Markard et al., 2012). Due to these complexities, socio-technical systems, like the agri-food sector, usually go through incremental rather than radical changes (Markard et al., 2012; Geels, 2011; Conti et al., 2021; Frantzeskaki & Loorbach, 2010; Markard & Truffer, 2006).

Conti et al. (2021) explore further why the agri-food sector is particularly resistant to change and plagued by path dependencies. The first reason is technological solutions persist at the expense of new and better alternatives. Conti et al. (2021) argue that the old technology is socially embedded by being well-established; there are regulations and trust around the old process, thus, market acceptability. Further, Conti et al. (2021) argued that there are political

and economic factors where powerful actors (Bui et al., 2019) shape the direction of change within the agri-food sector to maintain the status quo and support their interests.

Even though sustainable transitions are complex, Köhler et al. (2019) and Jørgensen and Pedersen (2018) still believe it is something all firms should work toward to achieve sustainable development. Jørgensen and Pedersen (2018) further say that firms today hold a tremendous amount of power; therefore, they are primarily responsible for the environmental footprint (Jørgensen & Pedersen, 2018; Brauch, 2016; Hutchinson, 1996).

2.2 Sustainable entrepreneurial actors and their motivation

Sustainable entrepreneurial actors are firms (micro-enterprises and SMEs) that seek to combine and integrate business with environmental and social goals (Tilley & Parrish, 2006; O'Neill & Gibbs, 2016). Thus, the sustainable entrepreneurial actors aspire to change their respective sectors to become more sustainable through entrepreneurial mindsets and behaviors (Gibbs, 2009; Jolink & Niesten, 2013). Sustainable entrepreneurial actors are viewed as pioneers and key instigators of the sustainability transition (O'Neill & Gibbs, 2016; Schaper, 2002; Affolderbach & Krueger, 2016). Sustainable entrepreneurial actors have also been defined as someone who pursue change within their business sector's social relations and corporate culture (Isaak, 2017).

2.2.1 Sustainable entrepreneurial actors as market disruptors

O'Neill and Gibbs (2016) discuss that sustainable entrepreneurial actors tend to work in a contradictory space, thus limiting their broader impact on the economy (Sveningsson & Alvesson, 2003). They justify their claim by explaining how pre-existing values in the economy and politics, like continuous financial growth, have overall in the past been more heavily valued than environmental concerns (Cohen & Musson, 2000; Davies, 2013). Thus, O'Neill & Gibbs (2016) argue it can be difficult for the sustainable entrepreneurial actors to introduce substantial change within firms when the mainstream values and policies contradict their own (Philips, 2013). Pacheco et al. (2010) coined the term “green prison” to describe sustainable actions being punished rather than rewarded due to preexisting values and rules within the traditional economy. Therefore, Pacheco et al. (2010) believe sustainable entrepreneurial actors should influence the establishment of new business norms, government

legislations, and property rights that reward sustainable actions (O'Neill & Gibbs, 2016; Pinkse & Groot, 2015, Zahraie et al., 2016).

Sustainable entrepreneurial actors also tend to challenge institutionalized moral norms, thus, fostering a sustainable transition in the society. They create change by dissociating and delegitimizing from today's practices and moral foundations (Antadze & McGowan, 2017). Antadze and McGowan (2017) state that the work of sustainable entrepreneurial actors can be helpful in the sustainable transition since they have the power to create a discourse that can highlight critical environmental issues which have not been familiar or tangible to the public. However, previous research has also shown that sustainable entrepreneurial actors can struggle with balancing environmental and financial concerns at the same time while also tackling the values of the overall economy and consumer habits (Kearins et al., 2010; Kirkwood & Walton, 2010).

Nijkamp (2003) mentions that it is essential to remember that the notion of the sustainable entrepreneurial actor as a 'lone hero' at an individual level remains pervasive. He further elaborates that to view them as an individual solution would be too simplistic an explanation that does not consider the dynamic and complex landscape of the business environment (Nijkamp, 2003). However, they discussed how modern entrepreneurship is progressively focusing on organizing a complex force influenced by internal and external stakeholders.

Hörisch (2015) found that sustainable entrepreneurs who create their own firms can directly contribute to the sustainable transition by making and selling products and services that might replace less sustainable options and threaten the more dominant players. Sustainable entrepreneurs that create their own firms tend to contradict mainstream values; therefore, they often rely on niche markets (O'Neill & Gibbs, 2016; Affolderbach & Krueger, 2016). Affolderbach and Krueger (2016) also argue that niche markets are often plagued by narrow demand or are protected from market competition, thus also limiting the sustainable entrepreneur's transformative power.

2.2.2 Sustainable entrepreneurial actors within the agri-food sector

The United Nations (2022c) states that sustainable transitions within the agri-food sector could produce a healthier ecosystem and improve the livelihood and health of people. Therefore, Jolink and Niesten (2013) argue that there is an urgency for agri-food firms to change their production to be more sustainable. Jolink and Niesten (2013) found that

sustainable entrepreneurs wanted to create environmental value; however, they struggled with balancing their environmental motivation and the economic reality. In addition, they also found that sustainable entrepreneurs tend to have strong beliefs in their firms; thus, they also believed that their firm was an essential part of creating a sustainable change within the agri-food sector (Jolink & Niesten, 2013). Björklund (2018) has found that entrepreneurs find it easier to overcome innovation barriers if they have certain cognitive abilities like sufficient knowledge, decision flexibility, and access to information. However, McCauley (2022) has found that plant-based food production requires innovative technology; thus, creating a lack of information and technology barriers for sustainable entrepreneurial actors operating in the plant-based sector.

2.2.3 Summary

We found that entrepreneurs play a crucial role in solving complex environmental problems since they are inclined to innovate and take risks. Further, we found articles that describe what sustainable entrepreneurial actors are, their motivations, and how they potentially can change how we do business (York & Venkataram, 2010; O'Neill & Gibbs, 2016; Schaper, 2002). However, we have found little empirical research on how sustainable entrepreneurial actors create sustainable change within their firms through their daily practices (O'Neill & Gibbs, 2016). After our literature review, we found a need for more studies regarding sustainable entrepreneurial actors within the agri-food industry. Especially within a plant-based context, we found very few studies where the fields of sustainable entrepreneurial actors and plant-based sectors were coupled. This lack of research helped guide our thesis. We wanted to understand how sustainable entrepreneurial actors worked to redesign the firm to become more sustainable and how they work specifically within the plant-based agri-food sector.

2.3 Business model innovation

In the following subsection, we will explore how the literature discusses the redesign process of the traditional business model toward sustainability. Osterwalder and Pigneur (2005) describe a business model as a framework or a conceptual tool to understand how a company does business; thus, a business model reflects how firms create, deliver and capture value from business opportunities (Osterwalder & Pigneur 2010; Teece 2010; Johnson et al. 2008). A business model often consists of nine building blocks or elements whose purpose is to

identify which products and services the company deliver, to whom, and the resources required. The building blocks identified are customer segments, value propositions, channels, customer relations, revenue streams, key resources, key activities, key partners, and cost structure (Osterwalder & Pigneur 2010).

According to Chesbrough and Rosenbloom (2002), the traditional business model framework has favored economic growth and fulfillment of customer needs. However, Jørgensen and Pedersen (2018) state that firms need to rethink how they create, deliver, and capture value. They further state that these changes will not happen by themselves; thus, firms should actively redesign their current business models. Business model innovation describes how the firm redesigns their business model to create, deliver, and capture values in new ways (Foss & Saebi, 2016).

2.3.1 Barriers against business model innovation

The topic of business model innovation has recently received attention as it is the key to success for firms, according to Bocken et al. 2013 (Chesbrough, 2010; Lüdeke-Freund, 2010; Zott et al., 2011). Zott and Amit (2010) consider the utilization of opportunities as a central part of achieving business model innovation. On the other hand, it can be challenging for firms to understand their situation and analyze, identify, and describe opportunities to experiment and develop new business models (Chesbrough, 2010; Osterwalder & Pigneur, 2010). In particular, the agri-food sector is constantly changing, especially with new disruptive technologies that create both challenges and opportunities to gain a competitive advantage (Costa et al., 2007). For instance, according to Costa et al. (2007), consumers now have easy access to information about food products; thus, they also require more product variety according to dietary and other customized requirements. Hence, Franceschelli et al. (2018) argue that the agri-food sector requires new creative and innovative business models, thus, prompting sustainable business model innovation (Maloni & Brown, 2006; Bresciani et al., 2016; Santoro et al., 2017).

For firms to overcome barriers and challenges from the external environment, they must understand their business model and what potential new versions can look like (Saebi, 2016; Zott & Amit, 2010). Lüdeke-Freund et al. (2016) mention that it is easier to overcome barriers for SMEs because they have more resources and access to industry knowledge than micro-enterprises. Further, research has indicated that a low degree of business model

innovation can be due to organizational barriers which arise when a company lacks resources, such as lack of knowledge and the ability to identify new opportunities (Saebi, 2016). Even though business model innovation has proven to be challenging, those firms that emphasize innovating their business model are in a better position to take advantage of opportunities in the existing market or create new markets through innovation; therefore, increasing their chances of being financially viable in the long term (Saebi, 2016; Lüdeke-Freund, 2010).

2.3.2 Sustainable business model innovation

Jørgensen and Pedersen (2018) argue that the sustainability movement we are seeing today is just the beginning; therefore, there is a need for fundamental sustainable business model innovation within firms and entire sectors. Consequently, they say firms must reassess their business models in terms of sustainability to elevate their competitive advantage, ensure growth, and reduce their environmental impact (Ahmadi-Gh & Bello-Pintado, 2022; Jørgensen & Pedersen, 2018). Business model innovation for sustainability changes how firms or their value network create, deliver, and capture value or change their value proposition to significantly impact the environment or/and society (Bocken et al., 2014). Previously the value proposition focused on generating economic return; however, the value proposition within a sustainable business, in addition, provides measurable social and environmental value (Boons & Lüdeke-Freund, 2013).

Jørgensen and Pedersen (2018) mention three drivers for sustainable business model innovation. The first driver is the increasing pollution level and the ensuing environmental consequences. The second driver is modern technology. The third driver is that consumer preferences toward sustainability are changing. Franceschelli et al. (2018) point out that there is also much potential for sustainable business model innovation within the agri-food sector (Sandven & Smith, 1993; Costa & Jongen, 2006; Rama, 2008; Hou & Mohnen, 2013). Therefore, it is highly relevant to explore how pioneers work in this field to set the future agenda and influence the more dominant players.

2.3.3 Framework for sustainable business model innovation

Jørgensen and Pedersen (2018) have developed a five-step framework for sustainable business model innovation. The framework aims to capture the attributes of a newly redesigned business model that can both be profitable and sustainable at the same time. The five steps of sustainable business model innovation are redesign, experimentation, service

logic, circular economy, alliances, results, and three-dimensionality. The first step requires the firms to actively and frequently redesign their business models rather than standing still (Johnson et al., 2008; Mitchell & Coles, 2003; Jørgensen & Pedersen, 2018). Firms can do this through the second step, which is experimentation. Firms can conduct controlled experiments with their business model to uncover what works and when to make radical or incremental changes. Experiments are done in numerous ways, such as testing prototypes, market research, and evaluating and testing new business models. Making frequent iterations and increasing knowledge can increase the probability of creating a successful business model when implemented in the market (List & Gneezy, 2014; Andries et al., 2013; Jørgensen & Pedersen, 2018). Thirdly, the firms should use service logic in place of product logic during the transition; thus, they can shift their mindset to thinking about functionality and access over ownership (Bocken et al., 2014; Baines et al., 2009; Jørgensen & Pedersen, 2018). Therefore, promoting a more circular economy rather than a linear economy. The fourth step in the framework is shifting ideas based on a linear economy instead of focusing more on the circular economy. To achieve a transition of this magnitude, we need to create alliances, which is the fifth step (Kiron et al., 2015; Tencati & Zsolnai, 2009; Chesbrough, 2006; Jørgensen & Pedersen, 2018). The sixth step involves creating results that achieve concrete improvements regarding sustainability (Jørgensen & Pedersen, 2015; Schaltegger, 2011; Gond et al., 2012; Figge et al., 2002; Jørgensen & Pedersen, 2018). The sixth step is to accomplish three-dimensionality, which means that the new business model creates an interplay between environmental, social, and financial performance. By following this framework, the hope is that firms can achieve both profitability and sustainability by changing the way the company creates, delivers, and captures value (Jørgensen & Pedersen, 2018).

2.3.4 Summary

Jørgensen and Pedersen (2018) have explained that a business model is never complete, and preferably it should be redesigned continuously and reiteratively. For instance, Costa et al. (2007) point out that consumers, to a greater extent than before, are concerned about ingredients and content in the food they are buying due to health and environmental concerns. Further, McCarthy et al. (2016) note that business models within the food industry have previously been little researched, especially the business models of food producers. Therefore, they discuss that future research should focus on how food firms create new

business models, especially micro-enterprises since they can create new value propositions. Ulvenblad et al. (2014) elaborate by saying that studies about the food industry have in the past focused on product innovation within the firms and not the business models.

The theory of sustainable development, sustainable entrepreneurial actors, and sustainable business model redesign lead us to our first research question:

RQ1: How do entrepreneurial actors within the plant-based sector work to redesign their business model toward sustainability?

2.4 Sustainable business models

Bocken et al. (2014) believe that through sustainable business model innovation, a firm can translate environmental and social value creation into an economic return, thus creating a sustainable business model. A sustainable business model is “a business model that creates, delivers, and captures value for all its stakeholders without depleting the natural, economic, and social capital it relies on.” (Breuer & Lüdeke-Freund, 2014, p. 3).

Several unique features differentiate a sustainable business model from a traditional one (Goni et al., 2020). Boons and Lüdeke-Freund (2013) describe four requirements to determine whether a firm can be sustainable. Firstly, a sustainable business model considers all stakeholders’ perspectives in the value creation of the firm’s business model, including society and the environment, which are also critical stakeholders for achieving sustainability (Boons & Lüdeke-Freund, 2013; Bocken et al., 2014). Further, they claim this also includes facilitating close relationships with stakeholders and customers to motivate them to make responsible consumption and production choices. Secondly, sustainable business models also ensure sustainable growth by creating value like financial growth while also generating social and environmental value through, for example, solving social issues and reducing the environmental impact (Bocken et al., 2014; Schaltegger et al., 2016; Stoknes, 2015). Thirdly, the infrastructure in the sustainable business model must contain sustainable value chain management. Fourthly, a sustainable business model should distribute economic benefits and costs appropriately between the different stakeholders involved in the business model (Boons & Lüdeke-Freund, 2013). Other authors have, in addition, argued that sustainable business models should also focus on value creation that has traditionally been uncaptured (De Pádua Pieroni et al., 2018).

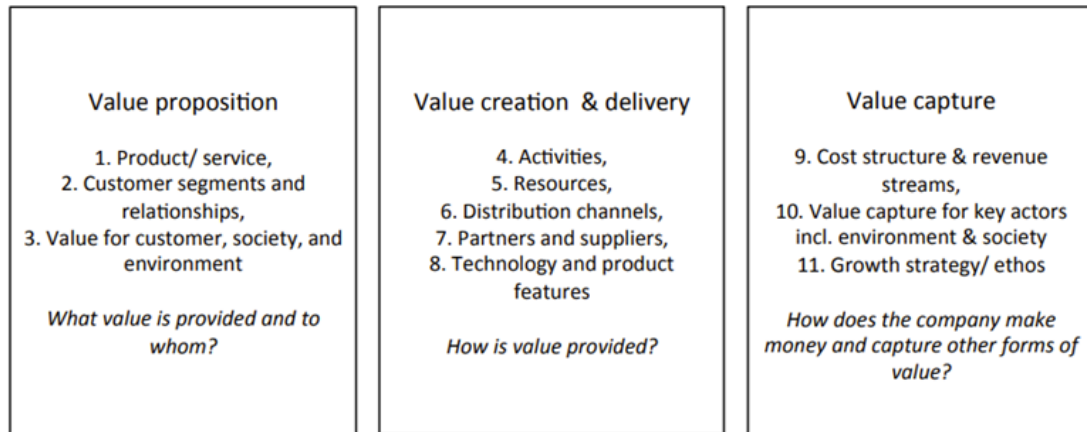


Figure 1: A conceptual framework created by Bocken et al. (2015) that emphasizes the triple bottom line (social, environmental, and financial) integrated into the design of a business model.

To summarize, Schaltegger et al. (2016) said that a sustainable business model helps in analyzing, describing, communicating, and managing (i) the firms' sustainable value proposition to their stakeholder and customers, (ii) its creation and delivery of value, (iii) and the way they capture economic value while regenerating or maintain social, natural, and economic capital beyond the organizational boundary. Jørgensen and Pedersen (2018) outline two different approaches for firms to manage the sustainable transition; To seize opportunities or to take responsibility. The firms that take responsibility focus on making their own operations more sustainable by limiting their negative impact on the environment and society. The firms that seize the opportunity focus on creating a profitable operation through products and services that reduce other firms' negative footprint.

Schaltegger et al. (2012) argue that the most challenging aspect of a sustainable business model is for firms to capture economic value while also delivering environmental and social benefits to all stakeholders. Further, Bocken et al. (2014) mention that the literature on the practice of sustainable business models is fragmented and vast. Additionally, there is little research about sustainable business models within the agri-food sector (Tell et al., 2016). In addition, according to Tell et al. (2016), the studies that have previously done focused on value mapping; thus, there is little empirical evidence on how firms within this sector work to achieve sustainability. Though, Ulvenblad et al. (2019) have found that the agri-food sector is experiencing pressure to increase efficiency and reduce costs from the larger food firms in the value chain due to a price-sensitive market. Therefore, they point out an increasing trend

where smaller agri-food firms tend to focus more on the environment and society during food production to ensure economic growth and market differentiation.

2.4.1 Archetypes of sustainable business models

Bocken et al. (2014) studied sustainable business models and suggested that the models can be organized into different patterns, which they call archetypes. By creating sustainable business model archetypes, Bocken et al. (2014) developed a grouping system that could help to increase the understanding of how firms can implement innovation for sustainability. These eight archetypes are divided into three groups: *Technological*, *social*, and *organizational*, depending on their dominant components.

- The technology grouping shows how sustainability is driven by technological opportunities within innovation and includes components such as manufacturing processes and redesign.
- The social grouping includes emerging social innovations such as consumer behavior.
- The organizational grouping describes how organizational innovation changes drive sustainability (Bocken et al., 2014).

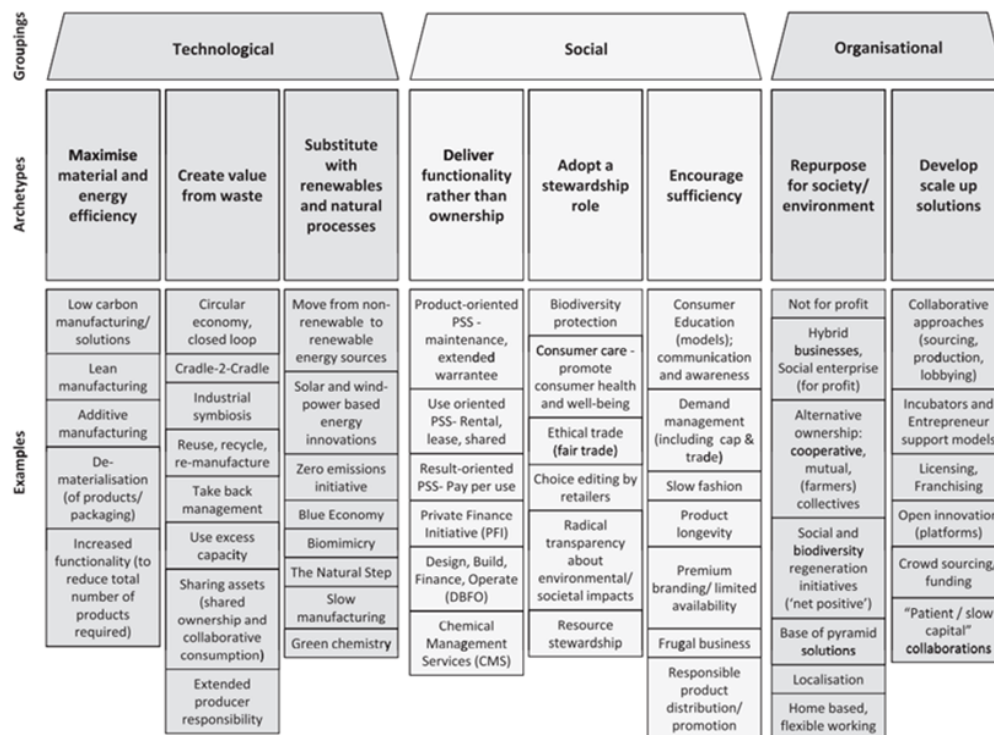


Figure 2: The sustainable business model archetypes proposed by Bocken et al. (2014).

We limit the descriptions of the archetypes and continue with the *technological* grouping as food innovation is mainly a technological opportunity that requires manufacturing processes, according to Barth et al. (2021) and Gupta and Abu-Ghannam, (2012). The first archetype in the technological grouping is: *Maximize material and energy efficiency*. This archetype focuses on generating less waste and emissions by doing more with fewer resources. The second archetype in the technological grouping is: *Create value from waste*. This archetype focuses on creating waste streams into valuable inputs for other products while also making better use of under-utilized capacity. The third archetype in the technological grouping is: *Substitute with renewables and natural processes*. The third archetype focuses on reducing the environmental impact and increasing the business resilience by reducing the use of scarce resources that can affect the firm's potential growth.

Bocken et al. (2014) elaborate that even though the archetypes can be applied in isolation, combining different archetypes is often necessary to ensure sustainability. Bocken et al. (2014) explain how sustainable business models can be categorized; however, the framework does not explain how sustainable business models are made. Further, a survey conducted by Ulvenblad et al. (2019) found that only 19% of 204 agri-food sector firms fully matched one of the archetypes proposed by Bocken et al. (2014). In 34% of the cases, two or more archetypes matched, and in 50% of the cases, no archetype matched. Thus, they raised the question of whether the archetypes are appropriate when categorizing business models within the agri-food sector.

2.4.2 Summary

Most researchers call for more studies on sustainable business models to develop more empirical data (Stubbs & Cocklin 2008; Boons & Lüdeke-Freund 2013; Boons et al. 2013; Upward & Jones 2016; Breuer et al. 2016). According to Ulvenblad et al. (2014), the research field of sustainable business models within the agri-food industry has received even less attention. Therefore, Tell et al. (2016) argue that there is a need for more research on sustainable business models in the agri-food sector. After the literature review, we put forward our second research question:

RQ2: *What characterizes a sustainable business model in the plant-based sector?*

3. Method

This section will explain the method and research design we have used for the study. In addition, we will present the data collection method, selection, recruitment, interview, and analysis method, assessment of the reliability and validity, and the ethical considerations.

3.1 Research methodology and design

Since the problem statement focuses on how something has happened, a qualitative method was used to understand the topic more thoroughly. The informants can present their views and reflections on a specific topic using a qualitative method. This will provide us with information and perspectives we would not have been able to collect by using numerical data (Silverman, 2014). Thus, a qualitative method is appropriate for our research project since the focus is on understanding how the firms work to establish a sustainable business model within the plant-based sector. We specifically wanted to investigate what drove their value creation and how they made sustainable values through their practices (Bell et al., 2019). Given that the field has rarely been researched, it was appropriate that we as researchers were exploratory when investigating the research topic.

Theory within sustainable business models exists but has received criticism for being fragmented and lacking conceptual perception (Boons & Lüdeke-Freund, 2013). At the same time, little research has been done on how specifically micro-enterprises and SMEs work differently to create a sustainable business model. Therefore, we have discussed using an abductive approach, a hybrid solution between induction and deduction. An abductive approach focuses on the researcher considering and weighing the best explanations or interpretations of various findings from the research (Mantere & Ketokivi, 2013). Using an abductive approach, we could adapt to the process by switching back and forth between theory and results. In addition, an abductive approach allows for creating new theories based on the results found (Yin, 2011).

A qualitative method explains why a phenomenon happens (Silverman, 2014). A case study is appropriate for the study as the problem statement contains “how” and “what” questions (Yin, 2014). We found a multiple case design would be the most suitable for the study as we were going to interview ten plant-based food firms; hence, they had a similar purpose and operated within the same system (Bell et al., 2019). Based on the selection of plant-based

firms, both micro-enterprises and SMEs (small to medium-sized enterprises), we could compare the firms to find common denominators and differences in how they worked to establish a sustainable business model. We used the literature presented in section two to prepare for the data collection and analysis. The unit of analysis was the founders and managers, as they participate in the daily operations and are part of the decision-making authority of the firms.

3.1.1 Data collection

We used semi-structured in-depth interviews when we completed the data collection for the study. This technique allowed the informants greater freedom to express themselves and answer the questions more comprehensively than in a structured interview. This interview technique asks open questions that follow a non-structured process while guiding the interviewee. The purpose is to create a safe atmosphere where the informant feels comfortable enough to share detailed information and allow the researcher to ask follow-up questions throughout the interview (Johannessen et al., 2016). When using semi-structured in-depth interviews, you are more likely to receive accurate data from the informant by creating an open dialog where the researcher can select the relevant information after the interview (Silverman, 2014). We believe this strategy is appropriate for the study since creating sustainable business models within the plant-based sector has been previously little research and is a phenomenon we want to understand more thoroughly.

3.2 Selection and recruitment

We used a purposive selection method to choose firms with sufficient knowledge about the area we want to study to ensure a representative selection (Johannessen et al., 2016). To achieve the best selection possible, we combined criterion and typical case sampling, both subcategories of a purposive selection method (Bell et al., 2019). The criteria for selecting firms are based on the presented theory section and the project VOM. The selection criteria used:

Tabel 1: Selection criteria for study

Selection criteria	Explanation
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Location	Firms operated in similar markets and climates as Norwegian firms (Sweden, Denmark, and Germany). Thus, the results can hopefully be relevant for Norwegian firms, benefiting the research project VOM. It was beneficial to choose firms in these locations because their climate is comparable to the Norwegian climate. By studying firms that operate in similar climates, we could talk with firms that use local ingredients and firms that use imported ingredients to make their plant-based products.
Size	Micro-enterprises and small and medium-sized enterprises (SMEs). The micro-enterprises needed to have under ten employees. Small and medium-sized enterprises could have anywhere between 11 to 250 employees (EU, 2022).
Defined as a plant-based firm	The firms needed to produce and sell plant-based products that could substitute animal-derived ingredients or products.
Product assortment	Plant-based substitutes for meat, fish, eggs, and dairy. The firms also needed to sell more than one product.
Proof of concept	The enterprises had to be launched and currently operating on the market. The only exception is if they have proof of concept and have received public funding of over 500 000 KR.

3.2.1 Recruitment

After we had established the selection criteria, we started the recruitment process. Our contact person at Nofima associated with the project VOM helped recruit based on the established selection criteria. The person in question helped to identify key people who worked in relevant firms with whom we contacted to conduct an interview. Further, to find even more relevant firms, we contacted the Research Institute of Sweden (RISE), an essential partner in the VOM research project. Research projects that use a qualitative method usually have a smaller selection due to the resource and qualitative interviews being a time-intensive method (Bell et al., 2019). The goal of our study was to interview 10-12 firms that produced plant-based products that can be used to substitute animal-derived ingredients or products. When we made initial contact with the firms, we maintained the dialog by answering questions and determining a date for the interview.

3.2.2 Presentation of the cases

During the data collection, we interviewed eleven informants from ten different firms. The selection of the firms is presented below. We have anonymized and generalized the information so that the firms would remain unidentifiable.

a) Company 1 – Whole-food meat replacers

Company 1 is a plant-based micro-enterprise in Denmark with eight employees. They create meat replacers based on various whole-food ingredients (Vegetables, rice, beans, spices, etc.). So far, they have launched four different whole-food meat replacers. We talked to one of the founders, who wanted to make whole-food alternatives tastier and more available.

b) Company 2 – Protein alternative from lupin beans

Company 2 is a plant-based micro-enterprise in Sweden with nine employees. Their protein alternative is tempeh made of local lupin beans. So far, they have launched three different lupin tempeh products. We talked to the founder, who wanted to create food security.

c) Company 3 – Protein alternative made from yellow peas

Company 3 is a plant-based micro-enterprises in Sweden with seven employees. Their protein alternative is made from sprouted, local, and fermented yellow peas. So far, they have launched eight meat-replacing products made from their protein alternative. We talked to the founder, who wanted to make a sustainable change within the agri-food sector while also providing a healthier plant-based alternative to the Swedish market.

d) Company 4 – Imitate meat with products made from peas

Company 4 sprung out from a family firm that previously focused on deli meat and charcuteries with around twenty-three employees. Today they are one of the more prominent Swedish plant-based firms. They have a wide selection of meat and dairy imitating alternatives. We talked to their development manager and one of their product developers, who said the firms aspired to create products that imitated meat and dairy alternatives that the consumers would find familiar. They are a plant-based small-sized enterprise.

e) Company 5 – Create dairy products from patented protein isolate

Company 5 created various dairy products based on a protein isolate they had developed through years of research and testing. Company 5 has a prominent position within the German plant-based consumer market and is also launching a b2b sector. They are not one of the largest plant-based firms in Germany; however, they are growing fast. We talked to the CEO, who said that they aspired to make their protein isolate more well known within the plant-based industry and create a more transparent agri-food sector. They are classified as a plant-based small-sized enterprise with around thirty employees.

f) Company 6 – Tempeh from yellow peas and quinoa

Company 6 is a plant-based micro-enterprise in Sweden with four employees. They make tempeh from local yellow peas and quinoa. They sell four products to restaurants and three to consumers

through retail stores. We talked to one of the founders, who wanted to provide environmentally friendly food alternatives.

g) Company 7 – Meat replacer made from wheat

Company 7 is a well-established firm in Germany that recently launched plant-based meat replacement mixes created mainly from wheat. Company 7 had been in business the longest of the firms we talked to and previously focused on creating organic baking mixes. Both operated with B2C and B2B. We spoke to the head of the sales, marketing, and product development department, who said the firm wanted to create more organic farming. They are classified as a medium-sized enterprise with two hundred and fifty employees who make plant-based and animal-derived products; however, most products are naturally plant-based.

h) Company 8 – Plant-based firm with a broad selection

Company 8 is a German plant-based medium-sized enterprise with ninety-nine employees who have operated within the plant-based market the longest of all the firms we spoke to. They have plant-based products with different ingredients within every category. We talked to the chief marketing officer, who said that the company worked toward encouraging more consumers to switch their diets towards more plant-based products.

i) Company 9 – Mung beans products as a meat alternative

Company 9 is a plant-based micro-enterprise with two employees in Sweden. They create plant-based meat alternatives from mung beans. So far, they have launched three meat-replacing products made from mung beans. We talked to the founder, who wanted to contribute organic products to the plant-based market.

j) Company 10 – B2B under development

Company 10 is a plant-based micro-enterprise in Sweden with three employees. They have not launched their company yet; however, they are collecting investments to build a factory where they plan to produce different protein mixes based on local ingredients that they will sell to other firms. They have received substantial funding from Vinnova (Verket för innovationssystem - Sverige). We talked to the founder, who wanted to contribute to the Swedish food transition with their company.

3.3 Interview Process

The interview guidelines were semi-structured with predetermined themes and questions. However, the guidelines were also flexible so that we could adapt the questions to the different firms we interviewed (Johannessen et al., 2016). The interview guideline was structured into four main parts. The first part was an introductory section in our interview guidelines to start the conversation and create a safe atmosphere for the rest of the interview. The next part of the interview guideline focused on understanding the firm's journey to becoming a plant-based firm. The last two parts concentrated on understanding how the firms worked with innovation to establish sustainable practices in their business model.

We adapted the questions throughout the interviews based on the informants' answers. We did this by asking follow-up questions on exciting topics or topics that needed further clarification. Throughout a few of the interviews, we had to reformulate some of the questions, as there were some concepts that the informants were unsure of. We had to reformulate the questions that used the term “business model.” The informants were often uncertain of how to answer this question; thus, it was necessary to give further guidance.

Based on the geographical distance and preferences of the informants, we conducted all ten of the interviews online through Microsoft Teams, and they lasted from 35 to 70 minutes. All but one of the informants had their cameras on throughout the interview. Thus, we observed the informants' facial expressions and attitudes during most interviews. We split the interviews between us, where one focused on taking notes, monitoring, and asking follow-up questions while the other held the interview.

3.4 Analysis

We started to analyze the data by writing transcripts from the interviews. When we code data, it is easier to categorize findings and compare the data with the literature to identify the significance of the results through reading the transcripts (Bell et al., 2019). We manually coded the interviews and employed a thematic analysis method, where we searched for important and repeating words and themes (Braun & Clarke, 2006). This has been an iterative process where we have organized the data several times. The analysis started when we transcribed the interviews and gained an overview of the scope of the data. After this process, we noted down central themes and words in the interviews and then coded the data to identify topics that could answer the problem statement. Then we reviewed each other's comments and the central themes and discussed them together. Afterward, we narrowed the main themes into three overarching categories and findings related to the research questions. Using a thematic analysis method, we could process the results in a flexible and structured way, allowing for data analysis through an open approach (Braun & Clarke, 2006).

3.5 Assessment of reliability and validity

Reliability has to do with the degree to which your study can obtain the same results when repeated (Bell et al., 2019). The study will be challenging to repeat due to using a qualitative approach. A qualitative study tends to reflect the context and the researcher's subjective,

making it hard to replicate (Bell et al., 2019). According to Evensen and Villalobos (2020), the plant-based sector has been rapidly growing, making the study results harder to replicate and verify through later research. Yin (2014) mentions that it is essential to provide information about the method used in research studies to increase their reliability. Therefore, we want to describe our study's context and approach as detailed as possible. Analyzing and interpreting the results objectively increases the study's reliability as it creates openness and transparency.

Securing validity in a research project helps increase the study's quality. Johannessen et al. (2016) mentioned that validity describes the degree the procedures and findings reflect the purpose of the study. A study has internal validity when the result represents the selection and the problem statement. External validity is determined by whether a study's results with a limited scope can be transferred to similar situations and contexts (Bell et al., 2019). To boost the internal validity of our study, we have done a thorough literature review. We also researched and gathered information about the firms before conducting the interviews to ensure they fit the selection criteria. We also strengthened the interview guide by reviewing it and having at least eight of our questions be the same for each firm. We video and audio recorded each interview to identify and confirm everything said. These recordings also made the transcription process easier. The research's internal validity is strengthened by describing our preparations, data collection, sample, and analysis method, which is the focus of our methods section.

Several recent studies have been conducted on sustainability within firms' business models. However, during our research, we wanted to provide insights into how plant-based food firms created sustainable business models. There were studies on sustainable business models, but they rarely described how the firms established their sustainable business models (Bocken et al., 2014). Thus, our study has focused on going more in-depth into this phenomenon by creating relevant interview questions that focused on how the firms worked to redesign their business model (Johannessen, 2016). The study's internal validity might be affected due to researching a specific sector and recruiting firms based on certain criteria. Therefore, conducting similar studies in other industries and contexts can contribute to a higher external validity.

3.6 Ethical considerations

Before we collected the data, we registered the research project in the Norwegian Centre for Research Data (NSD). We started the application to NSD the first week of January, and the project was approved 30 days before we began the data collection. All informants received a letter of consent they could sign before the interview was conducted. In the letter of consent, their rights regarding privacy and participation were presented, along with additional information about how the data would be stored at Nofima. In addition, we started the interviews with supplementary information about the study and explained the informants' rights related to anonymity. We also asked for permission to record the interview. To comply with GDPR legal data, a data management plan was implemented. Following recommendations from GDPR, the information about the storage of the data was included in this plan (Bell et al., 2019).

The video and audiotape will be kept electronically on a password-protected research server as a zip file with a password at Nofima. The transcripts will not contain personally identifiable information. We also decided to keep all identifiable information anonymous for data protection and to increase the participation and the chance of the interviewees sharing detailed information (Bell et al., 2019). All data except anonymized transcripts will be deleted as soon as the VOM project ends.

4. Analysis and results

This section will present the results from the interviews with the plant-based firms. We have utilized a thematic analysis method to compare the results and discover similarities and differences between the informant's answers. With the assistance of the thematic analysis method, we could effectively portray the informants' perspectives and views (Bell et al., 2019). Our results are divided into three sections following the structure of our thematic analysis method. Firstly, we present how the firms worked to redesign traditionally animal-derived products or ingredients reflected in the theme, *to redesign a traditional product*. Secondly, we reveal how the firms worked to defy established lock-ins within the agri-food sector, reflected in the theme *confronting established lock-ins*. Thirdly, we present the characteristics of a sustainable business model, reflected in the theme *characteristics of a sustainable business model*. The section will go more in-depth into the themes by presenting

subsections and actively using illustrative quotes to highlight the results. Throughout the section, we will actively compare how the micro-enterprises and small to medium-sized enterprises (SMEs) worked with the themes presented.

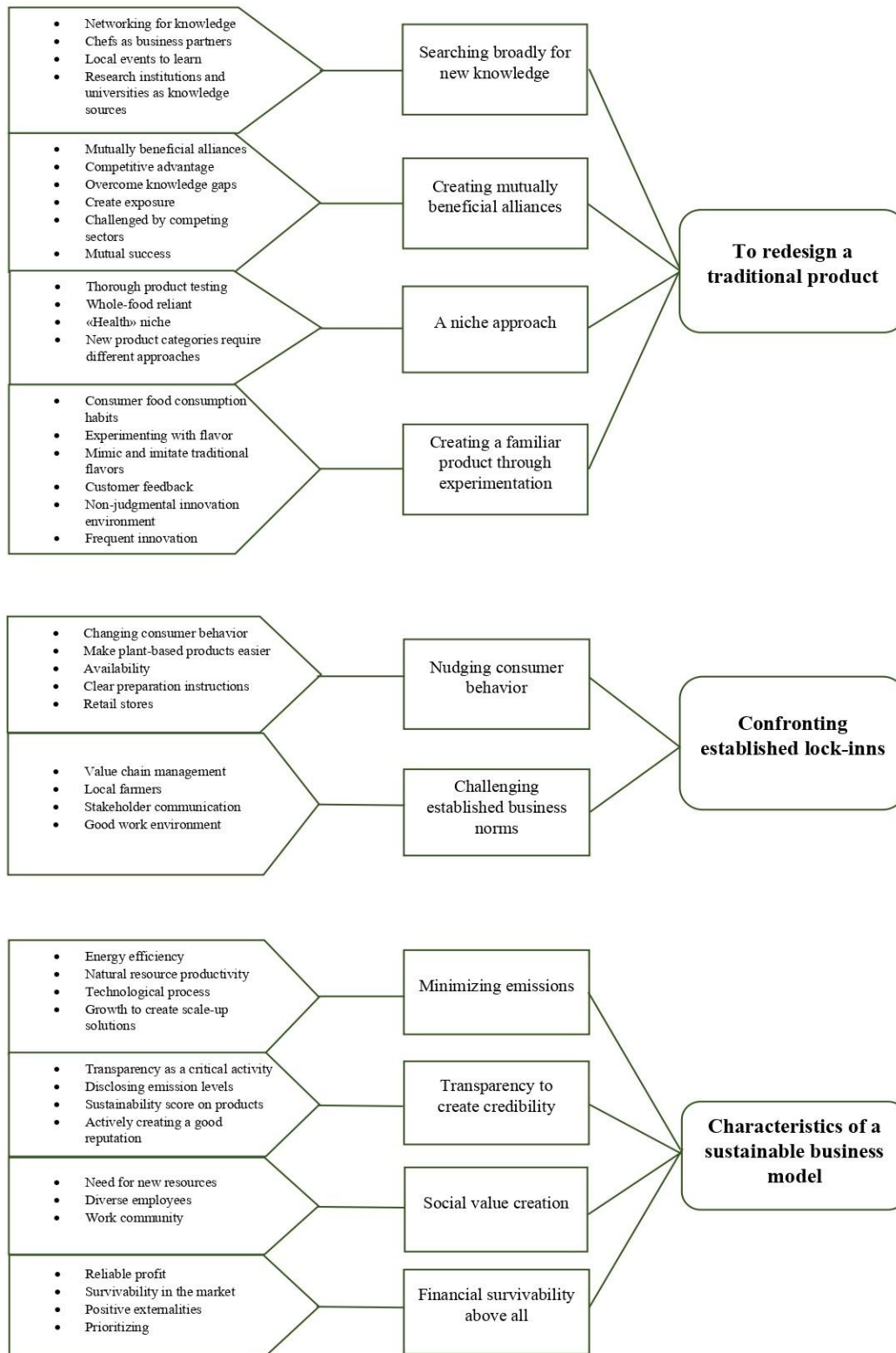


Figure 3: Data structure and themes from the thematic analysis.

4.1 To redesign a traditional product

This section will analyze how micro-enterprises and SMEs worked to redesign traditional products within the agri-food sector. The first part of redesigning a traditional product was acquiring new knowledge, reflected in the subtheme *searching broadly for new knowledge*. Further, the firms created alliances with other competing firms to learn and support one another, reflected in the subtheme *creating mutually beneficial alliances*. Moreover, the firms carried out a niche market approach as a starting point for their product innovation to properly test the products, reflected in the subtheme *a niche approach*. Lastly, the firms worked towards creating products that were familiar and tasty to the consumers through frequent experimentation, reflected in the subtheme *creating a familiar product through experimentation*.

4.1.1 Searching broadly for new knowledge

Throughout the interviews, the firms frequently spoke about the complexities of plant-based food production. Hence, in the analysis, we found that both the micro-enterprises and the SMEs searched broadly for new knowledge on plant-based food production. The firms had different approaches to gathering knowledge; thus, in this subsection, we will present how the micro-enterprises and SMEs worked to acquire more knowledge on product development.

In the search for knowledge on plant-based product development, the micro-enterprises actively used their own and friends' networks to find a person of interest. Among the micro-enterprises, the most common strategy was to seek out chefs or others skilled in food production in their network. The chefs helped the micro-enterprises to create tasty products by experimenting together.

My friend and I went together to talk about how we could make existing plant-based alternatives better, but we could not make the products right. So, we had to find a chef, and fortunately, in our network, we had contacts that knew a chef. We had a chat with the chef one night and asked him to make products for us. From that night, we started the micro-enterprise because the products were that good compared to what we could do ourselves.” - Company 1

In the analysis, we found that some of the micro-enterprises wanted to create a partnership with chefs. This was because the chefs could help fill the knowledge gap on how to produce plant-based foods within the firm; thus, they were essential resources to the micro-enterprises. The different micro-enterprises included the chefs in various degrees in their daily business. We noticed that the chefs either became a part of the founding team of the micro-enterprise, like in company 1, or they became product development consultants for the firm. Company 9 is an example of one of the firms that partnered with a local food producer that still occasionally works for the firm to help develop new product recipes.

“I think one of my strengths early on in the firm has been acquiring business partners who are better at certain tasks than myself.” - Company 9

Thus, we found that micro-enterprises created partnerships to acquire new knowledge through their network. Another less common strategy we found the micro-enterprises adopt was to use local events to gain knowledge about food production. For example, Company 2 struggled with knowing how to use lupin beans to create food; thus, they decided to visit a food hackathon. An incubator program organized the hackathon, and the goal was to find solutions to food security through food innovation. The micro-enterprises told us about how events like food hackathons gathered knowledgeable people on food production; thus, they were an excellent resource for acquiring knowledge about plant-based product development.

“I knew I would use the lupin beans, but I did not know how to use them. The hackathon helped and was critical in becoming a protein-based meat alternative.” - Company 2

The SMEs had operated in the plant-based market longer than the micro-firms; however, in the analysis, we still found that they lacked knowledge of plant-based food production. The analysis found that the SMEs searched for new knowledge on using new ingredients for plant-based food production or replicating traditional meat, dairy, egg, or fish products or recipes as closely as possible. The SMEs also often created their own protein mixes, which were the base for their products. The firms mentioned how creating protein mixes was challenging, mainly if they used new ingredients. Thus, the SMEs emphasized collaboration with research institutions and universities for successful product development. Company 5, for example, has developed a unique protein isolate that they use to create plant-based dairy products. It took the company five years to build the protein with research institutions and universities.

“A research and science institution helped to develop our protein isolate. We are open to collaborating with universities or research institutions with expertise in developing new products, which can help expand our knowledge.” - Company 5

4.1.2 Creating mutually beneficial alliances

The analysis found that creating alliances was an essential tool for firms to redesign their business models. The firms had different approaches when creating alliances since the micro-enterprises established their business model for the first time. While the SMEs actively worked to restructure the traditional business models within the agri-food sector. A common denominator between the firms was that they both worked to establish mutually beneficial alliances. The analysis found that the primary motivation behind creating an alliance was to build mutual benefits for the firms. This subsection will explore how the firms worked to develop mutually beneficial alliances.

“We cooperate with other firms when there is something we struggle to do or make ourselves.” – Company 7

Both the micro-enterprises and the SMEs created alliances with other competing firms. However, the motivation behind creating such alliances was different. For the micro-enterprises, they formed alliances with other firms to expand their networks and create exposure. The analysis found that micro-enterprises made alliances because they needed assistance with certain aspects of their firm. As a result of the alliances between the micro-enterprises, we noticed that the firms, for example, started to use common network connections; for example, we saw them share production facilities.

“We are planning to do product development together, and it will be a collaboration that will be important for us in the future. I will also mention that this alliance is in contact with another large food producer in this country that they will help to set us in contact with.” - Company 9

In the analysis, we found that the firms used trade fairs as an opportunity to exchange products with other plant-based firms and to create long-term alliances. The alliances helped generate exposure for the micro-enterprises by the allied firm displaying their products in recipes. Others mentioned how they featured each other’s products on their stands at the food

fair to create more exposure. Thus, the firm's products were often complementary to the alliances the micro-enterprises assembled.

“Through this experience, I have expanded my network. I believe anything can be possible when we are willing to be cooperative.” – Company 10

In the analysis, we found that the motivation behind the SMEs creating alliances with competing firms was utterly different from the micro-enterprises. The SMEs, especially in Germany, formed alliances with competing firms within the plant-based sector to create a common front against the dominant agri-food players. The SMEs wanted to avoid creating unnecessary competitive environments with other plant-based firms as they already met resistance from the meat, dairy, egg, and aquaculture lobbies and firms.

“The meat and dairy competition are very afraid of us. They have tried to sue us multiple times and put us out of the market. They tried to find whatever reason they could, like the name we used, was too close to the real product. But it never worked.” – Company 8

The SMEs told us that the meat, dairy, egg, and aquaculture firms tried to sue them. They also explain how operating in the plant-based market was complex due to laws regarding naming their products like traditional meat, dairy, egg, and fish products and recipes. The SMEs tried to avoid legal trouble by titling their products like the original product but with slight spelling differences. However, the SMEs told us that this strategy did not always satisfy the meat, dairy, egg, and aquaculture firms; thus, the plant-based SMEs were sued regularly. Hence, the analysis found that for the SMEs, it was essential to create alliances with other plant-based competing firms to withstand the pressure from the dominant industry players. We also found that the SMEs viewed their competitors as crucial partners in the plant-based agri-food transition. A shift from traditional meat, dairy, egg, and fish products would benefit the plant-based SMEs; thus, any firm contributing to this transition was an ally. Hence, we found that the success of the competing plant-based firms was seen as beneficial for the SMEs as it helped increase the overall popularity of plant-based food products.

“We do not see the other plant-based firms as competitors. Rather, we see them as partners in this evolution toward plant-based proteins.” – Company 5

4.1.3 A niche approach

The micro-enterprises and the SMEs used a niche approach for product innovation. The micro-enterprises created a niche approach by creating products that targeted health-conscious consumers by focusing on whole-food plant-based alternatives. The SMEs made a niche approach by targeting their releases of new plant-based product categories toward the vegan and vegetarian consumers. They told us that using a niche approach for product innovation was beneficial for thorough prototype testing. Thus, the firms could ensure product quality before reaching the mass market.

Due to their product selection, the micro-enterprises entered the plant-based sector through a niche approach. Five out of six micro-enterprises we interviewed made their products from whole-food ingredients. The analysis found that the plant-based alternative market was today dominated by firms that imitated animal-derived products and ingredients. Hence, the micro-enterprises tapped into a niche part of the plant-based market by making whole-food alternatives. The micro-enterprises told us that it was still a slow-growing sector despite the increasing popularity of whole-food plant-based alternatives. However, they also described that entering the plant-based market through whole-food alternatives was more available and cheaper than imitating animal-derived products. A niche approach to the plant-based market also allowed the plant-based firms to test their product prototype thoroughly in the niche consumer market. Hence, they could more easily adjust based on feedback to improve their products before reaching a more extensive customer base.

“The consumers have established food consumption habits. As a firm, it can be easy to overestimate the plant-based protein demand, but, in reality, it takes several years before most consumers are willing to try your plant-based products.” – Company 6

Some of the SMEs also used a niche approach when releasing products. The firms on the smaller side had a limited selection of products; thus, they released plant-based alternatives the consumers already ate regularly. However, the firms on the medium side had a wide selection of products; hence, they were often more experimental when they released products. The medium-sized enterprises told us they used a niche approach when they first released a plant-based alternative product category. The medium-sized enterprises explained how they first targeted the consumers classified as first adopters (vegans and vegetarians). The medium-sized enterprises then gathered feedback from the early adopters that they used to improve their products through frequent experimentation.

“We are planning to go into a new food category of egg alternatives. We believe vegetarians and vegans will be the early first movers for this category.” - Company 8

4.1.4 Creating a familiar product through experimentation

In the analysis, we found that the micro-enterprises and the SMEs worked to create flavors and products that were familiar to the consumers and resembled the animal-derived versions. The firms told us that they found consumers were picky in their food consumption habits. Thus, through frequent experimentation, the firms tailored their products to meet consumer requirements. The firms explained how consumer preferences had become much stricter, and for the consumer to try their product again, it needs to be tasty and familiar.

“The consumers' preferences always change, but the plant-based market is focused on taste right now. You cannot launch a product that does not taste good. It needs to be perfect.” - Company 4

Experimentation was necessary for the firms to reach the desired taste they envisioned for their products. The micro-enterprises and SMEs had different experimentation strategies for product development. Except for companies 9 and 10, the micro-enterprises told us that they experimented with local ingredients to create a better taste for their products. The micro-enterprises mentioned that using local ingredients helped their plant-based alternative products taste better and made them unique from the competition. The micro-enterprises we interviewed used fresh and local ingredients such as beans, peas, grains, and vegetables to create their products.

“We try to cultivate our ingredients as close as possible. That is both to do with environmental issues and sustainable transport. Vegetables that have not been lying around for too long create a better taste.” - Company 1

In addition, the micro-enterprises experimented with flavors and spices to create products that tasted good. The micro-enterprises discussed how they sought after chefs within the restaurant industry to help test, learn, and develop their products.

“For us, the flavor has always been the most important. The products we sell have been in the local market for a long time. But I discovered an opportunity to create a better taste in the product by adding spices, which brought our product to the next level.” - Company 9

The micro-enterprises also focused on creating flavors that mimicked traditional recipes. Company 3 explained how they used citrus, lime, and chili in their products to develop recognizable Asian flavors. Thus, the micro-enterprises could mimic flavors that the consumers recognized and found tasty.

“Swedish people love Thai food; products mimicking that flavor are easy to understand and recognize. That is the approach we have used during product development.” - Company 3

The SMEs also worked to create familiar flavors and tasty products; however, they focused more on imitating the taste of traditional meat, dairy, egg, and fish-based products and recipes. The SMEs explained that they wanted consumers to feel like they were not “missing out” when choosing their plant-based options; thus, it was essential to develop a taste and texture that imitated traditional products. The SMEs believed that if they created products the consumers found familiar, they would be able to convince more consumers to eat more plant-based food.

“We want to reach the meat consumers; that is our goal. We need to launch and produce products that consumers eat every day to reach these consumers. So, we have run tests on the ten food products most people eat, and we decided to make those. It is important to make it easy for the consumers to switch their meat-based products into plant-based ones.” - Company 4

To reach the mass market, SMEs highlighted collaborating with consumers. When the SMEs collaborated with consumers, they first concentrated on what the meat and dairy consumers ate frequently. According to the firms, the consumers were more willing to try alternative products of foods they often ate since they were familiar with the cooking and taste of these products. Thus, the SMEs focused on releasing classic products like burgers, sausages, minced meat, yogurt, milk, ice cream, coffee creamers, etc.

“We have created a plant-based range for normal people. The products are quick, easy, and it is something you could feed to both your husband and kids, and they would not mind because it tastes good.” - Company 7

The SMEs further directly collaborated with their consumers to collect consumer feedback. To better understand consumer preferences, the firms conducted taste tests as a prototype where the participants gave feedback on the taste and texture of their products. The firms

mentioned how consumer tastings were an essential resource in their innovation pipeline as the feedback was used as a source for their experimentation. The analysis found that experimentation was necessary for the SMEs to reach the mass market. This was because experimentation was required to be able to create plant-based products with nearly identical textures and flavors as the products they tried to imitate.

“When we launch a product, we include the consumers through tastings, testing, voting, and other surveys to understand if the product is ready for the market or not.” - Company 8

Further, the SMEs focused on frequent innovation to reach meat and dairy consumers. Company 4 used to be a part of a meat-based firm; hence, they explained they knew of meat products were supposed to taste like. However, replicating the taste and texture they wanted was not always easy. Thus, frequent innovation and product improvements were the firms’ focus.

“For us, innovation is key. We introduce an assortment of products frequently.” - Company 5

The SMEs said that imitating traditional meat and dairy products was hard; thus, they were bound to make several mistakes. Hence, throughout the interviews, the SMEs highlighted the importance of creating a non-judgmental innovation environment. The SMEs we talked to explained that making mistakes was accepted and even encouraged as a strategy to reach the mass market. The firms also told us that their focus was on continuously improving their launch and popular plant-based products to make them even better.

“Consumers and general testing of the product after launch are critical. Through the feedback, we know what we can improve.” - Company 5

4.2 Confronting established lock-inns

During the analysis, we found that the micro-enterprises and the SMEs worked to create environmental, social, and financial value through confronting established lock-inns. The firms talked about how consumers were bound by habit when choosing food products throughout the interviews. Hence, the firms explained that they worked towards changing consumer behavior, reflected through the subtheme *nudging consumer behavior*. According to the firms, competitors within the agri-food sector have previously focused on creating financial value, neglecting environmental and social value creation. The analysis found that

the firms actively changed the way the agri-food sector worked, reflected through the subtheme *challenging established business norms*.

4.2.1 Nudging consumer behavior

The micro-enterprises and the SMEs felt responsible for creating environmental, social, and financial value within the agri-food sector. The firms used different strategies to achieve environmental, social, and financial value creation; however, a common denominator was that they worked towards changing consumer behavior.

“We believe that it is essential to ensure sustainable operations in our firm. If you think of climate change, changing your dietary choices can influence it. There is no time left to wait for politics. We believe everyone needs to be responsible.” - Company 8

The analysis found that the firms’ first step when creating environmental, social, and financial value was to make plant-based food consumption easier for the consumers. The firms made their plant-based options easier for the consumers by providing clear instructions, ensuring ease of preparations, creating visibility, and providing availability.

“We try to make life easy for people. So, we try to make our products easy to find, easy to use, easy to understand, and easy to know what to do with.” - Company 7

The firms increased the accessibility of their products by selling them in well-known national and international grocery chains. Other firms also used e-retailers, hotels, restaurants, and smaller distributors. The firms mentioned that plant-based was not even an official category in the retail stores; thus, they had to make sure their products were visible to the consumers. Hence, both the micro-enterprises and the SMEs emphasized the importance of placement and advertisements within the retail stores.

“We have many products, so we try to sell them everywhere. We even sell them in football stadiums and snack vending machines at universities.” - Company 8

We also found that the firms made their products easier for the consumers by making the preparation process similar to the traditional products. Simply put, the consumers would not need to learn a new cooking technique to utilize the plant-based alternatives from the firms. Further, the firms talked about the importance of providing recipe ideas with their products to

make it easier for the consumers. In addition, the SMEs also focus on creating a broad range of products to make it easier for the consumers. According to the SMEs, a wide selection gave the consumers more options, developing more visibility, which was beneficial in changing their food consumption habits.

“We try to inspire the consumers by sharing exciting recipes that would make the consumers like vegetarian and vegan food more. We want to share how delicious these options are.” - Company 4

4.2.2 Challenging established business norms

We found that the micro-enterprises and the SMEs emphasized sustainable and social value creation throughout their entire value chain. The firms thought it was necessary to challenge established business norms within the agri-food sector due to increasing environmental challenges. A common denominator between them was that they tried to obtain a comprehensive view of their value chain.

“There are always possibilities for becoming more sustainable, be it on your sourcing, ingredients, or energy consumption. So yes, there is still work to be done. On the other hand, we are aware of that and continue to work hard, every day to become even more sustainable going forward.” - Company 5

Despite the lack of financial resources, the micro-enterprises felt responsible for confronting established business norms. Thus, they focused on making environmentally friendly choices where it was financially feasible in their value chain. We found that the micro-enterprises most often created environmental and social value by using local ingredients. Local ingredients generated environmental value as the production and ingredients caused low emissions. Lastly, the local ingredients created a financial value for the micro-enterprises as their ingredients made the firms stand out in the plant-based market. By using local ingredients, the micro-enterprises were also able to gain an overview of parts of their value chain. The micro-enterprises concentrating on environmental or social value creation had founders often motivated by personal convictions.

“I wanted to create my own plant-based brand as I wished to do something meaningful and positively contribute to the world and environment. I did not want to be neutral anymore.” – Company 3

The SMEs said it was essential to look at the entire value chain and its trickle-down impact when generating environmental and financial value. They stated that it is crucial to understand where they had improvement potential in their value chain and where a change would be the most impactful. Life cycle assessments were essential for the SMEs to reduce their impact and make nuanced environmental-friendly choices within their value chain.

“All aspects are important to consider when making a product. Glass is often used over plastic. On the other hand, glass needs to be reused repeatedly to have a better carbon footprint than plastic. So, in some instances, plastic is better.” - Company 8

When the SMEs had identified where they had improvement potential in their value chain, they often contacted the relevant stakeholders within the value chain. Company 8 discovered how they could choose where they received their electricity from (ex: coal, petroleum, or renewable sources) in Germany. They told us about how they encouraged their manufacturers financially to switch to renewable energy sources to reduce their firms' overall environmental impact. The other SMEs used a similar strategy where they said they either encouraged their partners financially or verbally to make more environmentally friendly choices. Another method employed by the SMEs was to create environmental contracts before they started collaborating with their partners.

“The suppliers we work with must sign a kind of environmental pact where they commit themselves to achieve the highest sustainable operations standards.” - Company 5.

The firms also worked toward creating social value through their product development. The firms worked to create social value by supporting local farmers and creating a supportive work environment. The micro-enterprises and the SMEs focused on deriving their ingredients as locally as possible; hence, they helped local farmers. The firms helped support the local economy and jobs in the area by supporting local farmers. In addition, they were able to reduce the environmental impact of their firm as their ingredients did not have to be transported as far geographically. However, the firms also expressed certain ingredients were not possible to source locally. Specifically, the SMEs sourced several of their ingredients abroad as they could not grow locally, for example, soy. The firms also utilized ingredients not commonly used in plant-based food products that were more environmentally friendly. The firms could capture a previously uncaptured value within the agri-food sector by using uncommon sustainable ingredients.

“We produce locally with local ingredients. If we go abroad, we will also use local raw materials and do the same process there.” – Company 6

The SMEs’ social value creation was focused on establishing a good work environment by allowing room for mistakes during product development. The SMEs recognized that plant-based food innovation was a new practice. Hence, it was essential to create a work environment where mistakes were allowed and not necessarily seen as a negative thing. Instead, mistakes were seen as a lesson the firm could learn and improve from as a community.

“Oh god, I can remember a thousand different mistakes we have made. We often make mistakes, but it is one of our main motivation drivers as we can learn from the mistakes we just made.” - Company 4

4.3 Characteristics of a sustainable business model

The analysis found several characteristics of the plant-based firms' sustainable business models. The main characteristic of the business models was that they aimed to integrate and create environmental, social, and financial value throughout the entire firm. The firms achieved this by creating plant-based food alternatives that were tasty, available, and environmentally friendly.

The results discussed in previous sections are essential to understanding the core of the sustainable business models in the firms we interviewed. We discovered that a sustainable business model within the plant-based sector could be hard to categorize. This was due to the sustainable business models having too many characteristics. The analysis found that the sustainable business models in the firms we interviewed combined different characteristics from the various sustainable business model archetypes from Bocken et al. (2014). Thus, throughout the analysis, we found no single archetype that could properly categorize the sustainable business models of the firms we interviewed. This subsection will present the characteristics of the firm's business models through the lens of the sustainable business model archetypes. This subsection is divided into minimizing emissions, transparency to create credibility, social value creation, and financial survivability above all.

4.3.1 Minimizing emissions

The firms employed several strategies to maximize and restructure their value chain to ensure efficient and sustainable operations. A focus on maximizing the firms' operations to create scale-up solutions was one of the leading environmental characteristics of plant-based firms.

“Our focus is on changing the traditional supply chain. The traditional supply chain of the agri-food sector has previously focused on buying raw materials for the lowest price and creating the cheapest production where the firms could achieve a hefty profit margin.” - Company 2

The firms worked to improve their value chain by using fewer natural resources per kilo of plant-based products produced. Further, the firms tried to conserve water and energy use by changing their production. However, to make a more significant difference, the micro-enterprises mentioned that they needed to scale their production to use fewer natural resources per product made.

“We work actively to figure out ways to optimize the use of resources. We want to create plant-based products that use less water and energy. We have noticed that it is more energy-efficient to scale up the firms' production.” - Company 3

Most micro-enterprises had access to manufacturing facilities run by other firms, though they could not achieve scale-up solutions due to their small production. Several of the micro-enterprises shared that they had not optimized their production systems. Some even mentioned that much of their production happened in a small manual production facility run by the company's founder. In contrast to the micro-enterprises we interviewed, some of the SMEs owned production facilities. Hence, the SMEs had an advantage in maximizing their operations as they had technology and machinery that could produce high-quality and energy-efficient plant-based food products. Thus, the SMEs could easily create scale-up solutions by possessing profitable and sustainable production facilities.

“Our machines are working 24/7. The technology can guarantee consistent product quality. Each product has the same number of ingredients, proportions, and nutrition values because we have machines that can efficiently do everything. So, the production point of view has become highly optimized.” - Company 7

The SMEs stated that creating scale-up solutions for the firms was resource-intensive, though they collaborated with other actors to ease the burden. The SMEs mentioned that the

investment in their own production facility was worth it because they could more optimally use their ingredients and other natural resources, which created a more sustainable food-production system. The SMEs that had achieved scale-up solutions argued that they could not single-handedly change the agri-food industry. Therefore, they argued that all firms within the sector should work towards making large and small climate-friendly changes within their firms to ensure both financial and environmental value creation in the future.

“At the start of our business, we spent a lot of money because we wanted to buy machines. We have pumped most of the money back into farming and into machines. To promote sustainable farming, we need to produce good products, and we can only produce excellent quality products if we have machines to do that.” - Company 7

4.3.2 Transparency to create credibility

Building transparency was one of the main characteristics of the plant-based firms. They build transparency by actively working toward disclosing their emission levels to the consumers. The micro-enterprises and SMEs worked to comprehensively understand their value chains to disclose to the consumers where they had improvement potential.

“We try to know where we can improve as a business and communicate that to the consumers. We do not have any issue telling our consumers what we need to work on.” - Company 5

We interviewed several SMEs that conducted greenhouse gas protocols for their plant-based food products. The SMEs used greenhouse gas protocols to collect detailed information about the life cycle of their ingredients. Thus, the firms could determine what ingredients polluted the most and how a change would impact the life cycle stage. The small to medium-sized firms could then share this information with their consumers to create transparency. Company 8, for example, shares a sustainability score on their products that disclose their emission level.

“All of this information is included on the product's label. Its full lifecycle assessments for carbon dioxide emissions of water, animal welfare, and rainforest deforestation effects are not only calculated and printed on one product but also compared to 110,000 other products”. - Company 8

The micro-enterprises also tried to calculate the environmental impact of their products. However, their lack of funds stopped them from doing as thorough calculations as the SMEs. Nevertheless, the analysis found that the micro-enterprises used the available funds to create transparency with their consumers.

“Our products are very climate-friendly with an extremely low footprint. We have done some climate analyses that stated that our products' pollution levels were quite low, and we think these reports show that our products are sustainable.” - Company 3

The micro-enterprises and the SMEs also actively worked to disclose where and how they source their ingredients. Choosing ingredients with a minimal environmental footprint was necessary as the firms wanted to reduce their environmental impact and create a good reputation with the consumers. We found that this helped build transparency around the firms' operations through the analysis. During the interviews, several informants told us that agri-food firms in the past lacked transparency, which had regularly caused controversies within the sector. They further explained that they wanted to set a new industry standard by being transparent.

“The minimum standard in this sector is being honest and transparent. If you are not, then shoppers will no longer buy your product. So, it is necessary for all actors in the plant-based food industry.” - Company 5

4.3.3 Social value creation

There are several characteristics of social value creation of sustainable business models in the plant-based sector. The firms worked towards generating social value by creating jobs. The micro-enterprises created jobs by establishing and growing their firm. The SMEs created jobs by growing as a firm, needing new resources by hiring additional employees. Additional characteristics of the SMEs' business models were making a good and safe work environment. A good and safe environment was essential when creating a climate for learning and development in a work community. The SMEs also emphasized the importance of a good and safe work environment for employee retention.

Our employees are our most valuable resource. We got a low turnover of employees. They found out the grass was not greener on the other side. They came back, and we are grateful since the employees are our primary innovative strength.” - Company 7

The SMEs also made the workplace more diverse and inclusive. The firms highly valued diverse human capital as a resource because they provided a wide range of ideas and different points of view. Some of the SMEs admitted to not having a diverse workplace now; however, they worked toward being more diverse during their hiring process. Hence, we found that striving for a diverse workplace is characteristic of the social value created in the SMEs' sustainable business models.

“We work toward being more inclusive and diverse as a firm in terms of the composition of the employee population.” - Company 5

Another characteristic of the sustainable business model is that the firms create social value for the society by collaborating with local farmers. The micro-enterprises told us that they wanted to support local farms to increase the food security in their country. The micro-enterprises further explained that food security is becoming a more relevant theme due to external circumstances like the covid-19 pandemic and recent wars.

“I want to spread knowledge about food and security to make the world better. My firm also uses more local ingredients to achieve this goal” - Company 2

4.3.4 Financial survivability above all

The study found that the firms worked toward balancing environmental, social, and financial value creation; however, the financial value was almost always prioritized. The firms were mainly created to fulfill the social mission of facilitating a transition toward more plant-based food. Though the core of the firms was for-profit; thus, the firms sometimes prioritized financially viable choices even though such decisions would negatively affect the environment.

“It is important to look at the costs. Sometimes, we will lose some of our gross margins when changing toward more sustainable packaging. We often find this investment worth it because we want to be sustainable. But sometimes the profit loss will be too big, and we will try again or not improve the packaging.” - Company 8

The firms focused on generating a reliable profit level to scale up their firms. Hence, we found that financial survivability and growth were always the main objectives for the firms. The firms focused on financial value; however, we still found that their operations also tried

to make positive externalities that spilled over to the society. We believe financial value was prioritized due to the firms regarding their growth as necessary to achieve a sustainable transition in the agri-food sector toward plant-based food; thus, essential to create a positive change. The firms focused on financial value; however, we still found that their operations also tried to make positive externalities that spilled over to the society.

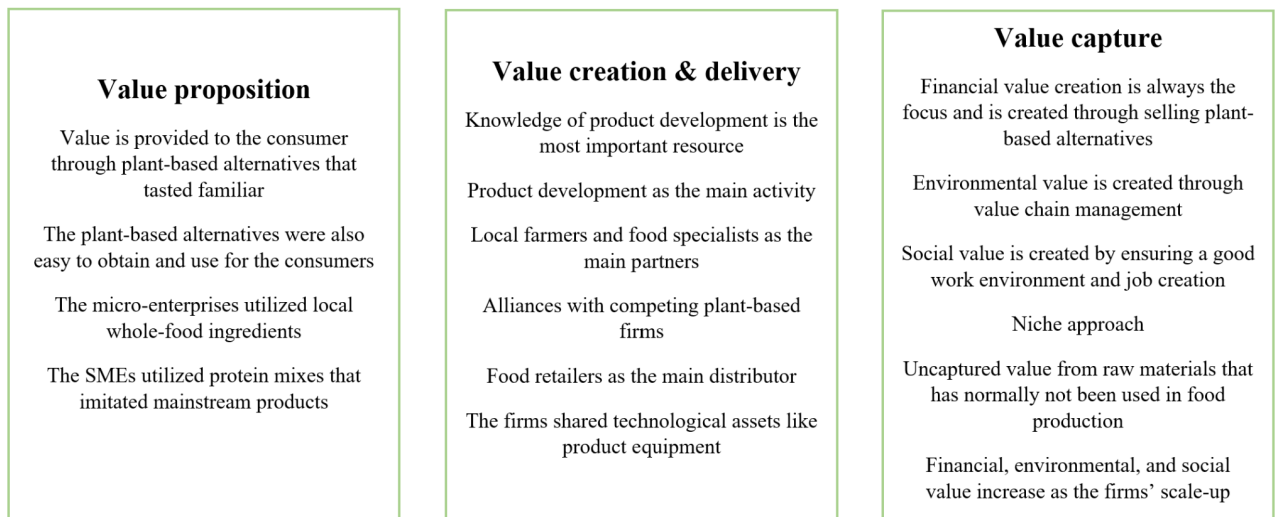


Figure 4: Results summarized through the conceptual framework created by Bocken et al. (2015) that emphasizes the triple bottom line.

5. Discussion

The purpose of the study has been to investigate how firms work to establish a sustainable business model within the plant-based sector. We will discuss the first research question, where we uncover how plant-based micro-enterprises and SMEs work to redesign their business model toward sustainability. Then we will discuss research question two, which examines the characteristics of a sustainable business model in the plant-based sector. This section aims to answer the problem statement by discussing the research questions in the light of the theoretical framework and the results. Our wish is that the study can create new insights into the sustainable transition and develop new knowledge in a previously unexplored field.

5.1 Integrating the triple bottom line throughout the business model

This subsection is divided into how the firms' *utilized the opportunity to create a new mainstream value, acquire new knowledge to create and deliver value, achieved three-dimensionality by capturing new value, and form alliances to overcome market barriers*. The discussion is organized according to the conceptual framework developed by Bocken et al. (2015) that emphasizes the triple bottom line. In this subsection, we will discuss and reflect on research question 1:

«How do entrepreneurial actors within the plant-based sector work to redesign their business model toward sustainability?»

To summarize the general findings, the firms redesigned their business model toward sustainability by offering plant-based alternatives that were easy and familiar to the consumer. They did this through frequent experimentation with partners that also supplemented the firms with new knowledge on product development. The alternatives were distributed to well-known retail stores. Through this process and additional activities where the firms generated environmental and social value, they redesigned their business model toward sustainability.

5.1.1 Utilizing the opportunity to create a new mainstream value

Aschemann-Witzel et al. (2021) found a growing consumer interest in choosing plant-based foods and reducing meat consumption due to increased awareness of environmental issues. Jørgensen and Pedersen (2018) mention that one of the key drivers for sustainable business model innovation was that the consumers' preferences toward sustainability were changing. Hence, agri-food firms must create value in new ways to ensure sustainable growth. The study found that most plant-based firms utilized the opportunity of changing consumer preferences by creating value in new ways by developing familiar and easy plant-based alternatives. Zott and Amit (2010) regard the utilization of opportunities as a central part of successful business model innovation.

The firms worked to create plant-based alternatives that imitated products within the mainstream agri-food sector. O'Neill and Gibbs (2016) argue it can be difficult for the sustainable entrepreneurial actors to introduce substantial change when mainstream values

contradict their own (Philips, 2013). Hence, by imitating mainstream products, the firms could closely adhere to mainstream values and create a consumer familiarity while providing value in new ways through plant-based alternatives. Further, the firms tried to replicate the preparation process of mainstream food products. By recreating a similar preparation process, consumers would not need to learn new cooking techniques when choosing plant-based options. Conti et al. (2021) explain that old technologies and systems are often socially embedded and well-established; hence, there is generally higher market acceptability. Therefore, by replicating mainstream preparation processes, the firms could increase the market acceptability of their plant-based alternatives by making them easy to use for the consumers. To conclude, we found that the firms provided value to the consumers by creating tasty, familiar, and easy plant-based alternatives. We will explain how they worked to develop tasty, familiar, and easy plant-based alternatives in the following subsection.

5.1.2 Acquire new knowledge to create and deliver value

Product development was the most important activity for the plant-based firms since they were a vessel to create and deliver value. The study found that the firms lacked the resource knowledge when developing plant-based alternatives; hence, they had to acquire knowledge to redesign their business model. This is consistent with Björklund's (2018) previous research that found that cognitive abilities can help firms overcome innovation barriers. The micro-enterprises and the SMEs discussed that the complexities involved with plant-based food production were the primary reason they sought after new knowledge. Saebi (2016) explained that organizational barriers arise when a company lacks the resources to identify new business opportunities. We found that the firms were affected by this organizational barrier as the micro-enterprises lacked both financial and knowledge resources while the SMEs lacked knowledge resources. To cover the knowledge gap, both the micro-enterprises and the SMEs utilized different opportunities to acquire the necessary knowledge to develop plant-based alternatives.

The firms both used their network to gain more knowledge on product development. The micro-enterprises mostly used their personal network to acquire new knowledge, while the SMEs sought knowledge from external research institutions. Hence, we found that the SMEs utilized their market experience, financial resources, and more extensive external networks when requiring more knowledge. Lüdeke-Freund et al. (2016) found that SMEs can

overcome barriers more quickly due to having more resources and access to industry knowledge than micro-enterprises, which is consistent with the results of our study.

McCarthy et al. (2016) mention a lack of research on how food firms create new business models, especially micro-enterprises since they can create new value propositions. When acquiring knowledge, the micro-enterprises actively used chefs and food specialists who could help with plant-based product development. This led to business collaboration, where their personal network connections became partners and took part in their business venture. The knowledge resources or partners the micro-enterprises required had to fill an essential role within their business as they had fewer financial resources than the SMEs. The micro-enterprises also created mutually beneficial alliances with competing firms to establish themselves in the plant-based market and gain exposure. In these alliances, the firms promoted each other's products and exchanged network connections. Jørgensen and Pedersen (2018) mentioned that firms willing to share their business model and work together have a better starting point for environmental value creation.

Plant-based product development for the firms was a multi-actor process involving different actors with the same interests in other social groups (Köhler et al., 2019). We found this to be accurate as many actors participated in the product development process, like the firms, consumers, and chefs. These actors worked together to develop familiar flavors and tasty plant-based alternatives through experimentation. Köhler et al. (2019) also argue that there are multiple pathways to a sustainable transition. We noticed that the micro-enterprises and the SMEs used two distinct pathways when developing familiar flavors.

The micro-enterprises experimented with local ingredients, different spices, and other flavor enhancers to create a familiar taste. Jørgensen and Pedersen (2018) argue that redesigning a business model cannot be done overnight; therefore, it is beneficial for the firms to conduct controlled experiments to uncover what works for their business model. We found that the micro-enterprises did these controlled experiments with chefs to create prototypes of their products with different flavors and spices. Jørgensen and Pedersen (2018) mention that experimentation could increase the probability of building a successful business model when implemented in the market (List & Gneezy, 2014; Andries et al., 2013; Jørgensen & Pedersen, 2018). The micro-enterprises also experimented with their products by launching prototypes in the market, then using the feedback to make improvements. According to

Jørgensen and Pedersen (2018), prototyping is a common experimentation approach used when firms innovate their business model toward sustainability. The SMEs conducted controlled experiments primarily facilitated through consumer testing. Developing a taste and texture that imitated traditional products was important for the SMEs; hence, they conducted taste tests with the consumers. The SMEs also used a niche approach when releasing new plant-based product categories (Plant-based egg and fish alternatives etc.). Therefore, a niche market approach targeting first market adopters was a method to experiment for SMEs as they could test their latest products and adjust them using this approach before targeting the mass market.

The firms used primarily well-known retail stores to distribute their plant-based alternatives and create visibility. The firms mentioned that developing visibility within the retail stores was sometimes quite challenging since plant-based was not an official category in most retail stores. Hence, we also found that creating visibility during distribution was a multi-actor process described by Köhler et al. (2019). The retail stores' importance was due to their influence on product visibility within their stores. Conti et al. (2021) mention that path-dependencies within the agri-food sector favor established food production methods and consumption habits. We found that this might be one of the explanations for why creating visibility within the retail stores was challenging for the plant-based firms, as there was a lack of official systems for their products. The plant-based firms adapted to this barrier by redesigning their business model by having a more significant focus on in-store marketing through, for example, offering taste tests, thus, creating visibility.

5.1.3 Achieving three-dimensionality by capturing new value

Jørgensen and Pedersen (2018) state that firms should be more responsible and reduce their environmental and social footprint (Brauch, 2016; Hutchinson, 1996). Throughout the analysis, we found that both the micro-enterprises and the SMEs focused on creating environmental, social, and financial value. This sense of responsibility was something SMEs had to a greater extent than the micro-enterprises. The lack of resources like knowledge, finances, and access to technology in the micro-enterprises' daily operations was the main reason the micro-enterprises took less responsibility for environmental and social value creation. Jørgensen and Pedersen (2018) further said that frequently redesigning a business model is necessary to accomplish three-dimensionality, which is an interplay between

environmental, social, and financial performance. When the firms created environmental, social, and financial value, they considered consumer choices, the agri-food sector, and existing technologies. This is consistent with Kohler et al. (2019) study, which states that sustainable transitions are co-evolutionary since they involve several aspects that affect one another.

The SMEs sought to obtain a comprehensive view of their value chain to create economic, social, and environmental value through their firm. The micro-enterprises also invested extra resources into getting an overview of their value chain, although we found that they generally had less of an overview than the SMEs. Further, the micro-enterprises described that it would be difficult for them to be perfectly environmentally and socially sustainable while generating a profit and complying with consumer demands. Kearins et al. (2010) and Kirkwood and Walton's (2010) research found that it can be challenging for firms that lack resources to know what to prioritize when balancing environmental, social, and financial value creation, which is something we found the micro-enterprises struggle with.

The micro-enterprises also captured value by entering the plant-based market through a niche approach. The niche approach of the micro-enterprises was to launch plant-based alternatives targeted at health-conscious consumers with whole-food ingredients. Entering the plant-based market through a niche approach was beneficial for the micro-enterprises as whole foods alternatives were cheaper and more accessible to produce. In addition, the micro-enterprises were also using an opportunity in the niche plant-based market as Costa et al. (2007) say that consumers are becoming more concerned about the ingredients and the content in the food they are buying due to health and environmental concerns.

Service logic is a step in the framework proposed by Jørgensen and Pedersen (2018) for sustainable business model innovation. We found that this was a step both the micro-enterprises and the SMEs practiced when redesigning their business model. We found that the firms entered partnerships with food production facilities to produce their products. Hence, the firms achieved service logic by thinking about functionality and access rather than ownership in their production facilities. By focusing on functionality by letting more actors take part in the production, they could minimize the impact on the environment by offering production facilities with the capacity and new technology that increase the chances of balancing environmental, social, and economic goals. This is consistent with Antadze and

McGowan (2017), who argue that sustainable entrepreneurial actors challenge institutionalized norms, thus fostering a sustainable transition. By distancing themselves from established business norms and practices, the sustainable entrepreneurial actors could create new business standards in the sector over time (Antadze & McGowan, 2017).

The firms worked towards creating social value through their product development. The micro-enterprises pursued change in the agri-food sector by supporting local farmers and creating social value. Conti et al. (2021) argued that the agri-food sector is particularly resistant to change and plagued by path dependencies. Jolink and Niesten (2013) argued that there was an urgency for agri-food firms to create more sustainable products. By supporting local farmers, the micro-enterprises were able to challenge these lock-ins while also working toward making food firms more sustainable. Therefore, we found that the micro-enterprises created social value by sourcing their ingredients from local farmers.

The SMEs worked to create social value by creating a supportive work environment. Saebi (2016) mentions that employees must understand their firm's business model to successfully redesign it toward sustainability (Zott & Amit, 2010). Hence, it was essential to create a decent work environment where the employees had enough knowledge about the firm and felt inspired by the company. Further, the SMEs emphasized creating a non-judgmental environment where frequent innovation and product improvements were the focus. We believe this was an important step the SMEs took to create results that achieve concrete improvements regarding sustainability. Producing results is also the sixth step in Jørgensen and Pedersen's (2018) framework for sustainable business model innovation. Jørgensen and Pedersen (2018) distinguish between two types of sustainable business models: those built to make the firms' practices more sustainable and those constructed to solve environmental challenges not created by the company itself. The results found that the firms worked mainly to solve environmental challenges not created by themselves; thus, they focused on reducing other firms' negative footprint on the environment as well as their own.

5.1.4 Alliances to overcome market barriers

Throughout the study, we found several barriers that the firms met operating in the plant-based sector. These barriers were relevant as they affected how the firms worked to create and deliver value. During the interviews, the SMEs described the struggle of naming their imitation products as they were bound by legislation that made it illegal for their

products to be called the same as the traditional meat, dairy, egg, and fish products. Conti et al. (2021) stated that political factors supported by powerful actors within the agri-food sector decided the direction of change in the industry and worked to maintain the status quo to defend their interests. Although we are not investigating the legal landscape, we found that public policies might have a part in deciding the direction of sustainable change within the agri-food sector thus, creating a barrier for plant-based firms (Köhler et al., 2019). In addition, the SMEs were pressured by dominant players within the traditional agri-food sector. Köhler et al. (2019) found that disagreements, contestation, and differing values are characteristics of a sustainability transition due to sustainability itself as a notion is highly contested. We found that this was the case within the agri-food sector, as different actors within the system tended to disagree on the best pathway for creating a sustainable transition within the sector. The SMEs we talked to proclaimed that the best way was to transition toward more plant-based food. However, according to the data collected, it does not seem like the traditional dominant players agreed, as many tried to sue the plant-based firms. The term “green prison” was created by Pacheco et al. (2010) and can be used to describe the situation of the SMEs. We found that “green prison” is a fitting term to describe the situation. The firms’ sustainable actions (creating plant-based foods) are being punished rather than rewarded due to preexisting values and rules within the traditional system.

To navigate the plant-based sector's legal landscape, the SMEs tended to develop alliances with competing firms. Jørgensen and Pedersen (2018) stated alliances are essential for firms as they allow them to support each other through barriers that arise through a business model redesign process. Jørgensen and Pedersen (2018) further support this sentiment by stating that creating alliances is essential in establishing profitable and sustainable solutions. Jørgensen and Pedersen (2018) discuss how two allied firms can generally make sustainable solutions more widespread across and within sectors, thus creating a more significant environmental impact than one firm. Nijkamp (2003) had a similar view. They stated that sustainable entrepreneurs are seldom lone heroes and that modern entrepreneurship should instead focus on creating alliances with actors with similar purposes. Hence, the study found that creating alliances with competing firms in the plant-based sector assisted in generating a more significant environmental impact. In addition, it also helped to withstand dominant players within the agri-food sector and escape the “green prison” through supportive alliances.

Another barrier for the plant-based food innovators was relying on a niche market. O'Neill and Gibbs (2016) stated that sustainable entrepreneurs that contradict mainstream values often rely on niche markets (Affolderbach & Krueger, 2016). Through the analysis, we found that the plant-based firms opposed the mainstream values of the agri-food sector by focusing on plant-based product innovation. One can argue that the plant-based sector is still seen as a niche market due to Boukid (2021) and Aschemann-Witzel et al. (2021) saying that plant-based alternatives have just recently started to become more mainstream among the consumers. Further, according to O'Neill and Gibbs (2016), a drawback to the niche market approach was that they tended to be plagued by narrow demand, thus, limiting the firms' transformative power. This was true for the micro-enterprises since they had limited consumers. Most micro-enterprises have fewer consumers due to their brief time operating in the market. Although, we also found that a few of the micro-enterprises had operated in the plant-based sector for up to three years and still struggled to gain enough resources to scale their business in a viable way. Since the SMEs usually had a broader selection and focused on launching new categories and familiar products, we did not find that a niche approach limited their transformative power. Contrary, we discovered that a niche approach for the SMEs could increase their transformative power as they used experimentation through prototyping to meet consumer demands better. Boukid (2021) mentioned that sustainable innovation could take longer to develop due to it emerging in niche markets. However, Hörisch (2015) found that sustainable innovation over time might replace less sustainable options and threaten the more dominant players; hence, they contribute to the sustainability transition. Therefore, we found that a niche approach could be beneficial for the firms if they could capture emerging opportunities.

5.2 The need for a new archetype

This subsection will use the archetypes proposed by Bocken et al. (2014) to characterize the plant-based firms' sustainable business models. The archetypes are different groupings of solutions and mechanisms that contribute to creating sustainable business models. Bocken et al. (2014) argue that firms should have business models that consider the three dimensions of sustainability, which are environmental, social, and financial value creation. Further, Bocken et al. (2014) state that these sustainable dimensions should be integral to how the firms create, deliver, and capture value. We will use this framework as a starting point for organizing this subsection. This subsection will be divided into *technological characteristics*,

social characteristics, organizational characteristics, no perfect archetype, and proposing a new archetype for plant-based firms. In this subsection, we will discuss and reflect on research question 2:

What characterizes a sustainable business model in the plant-based sector?

To summarize, through analyzing the results, we found that the sustainable business models of the firms within the plant-based sector used a combination of these archetypes: *Maximise material and energy efficiency, create value from waste, adopt a stewardship role, repurpose for society/environment, and develop scale-up solutions.* However, we also found that none of the archetypes characterized the sustainable business models of the plant-based firms thoroughly. Hence, we have proposed a new archetype for plant-based firms called *adopt a knowledge-driven approach.*

5.2.1 Technological characteristics

The archetype for *maximise material and energy efficiency* focuses on generating less waste and doing more with fewer resources to reduce emissions (Bocken et al., 2014). The analysis found that the firms specifically worked with integrating sustainability within their internal processes. The focus was to use fewer natural resources and energy to produce plant-based foods. The firms were constantly looking for improvements in the value chain by testing new raw materials or acquiring resources like production facilities and machines to do more with less of their resources, thus, reducing their emission. Several of the SMEs had their own production facilities and offered other firms to rent these premises. By sharing assets, the firms could ensure sustainable growth and reduce their environmental impact by providing shared assets (Schaltegger et al. 2016), which is compatible with the archetype to *create value from waste.*

5.2.2 Social characteristics

Another characteristic of the plant-based firms was that they felt responsible for being an accountable producer by being transparent and sharing detailed information about their ingredients and their product's life cycle. The archetype *adopt a stewardship role* seeks to maximize firms' positive societal and environmental impact by engaging actively with all stakeholders to ensure their well-being (Bocken et al., 2014). The environment and society are seen as stakeholders in this archetype. The results show that this archetype is firmly

rooted in the plant-based food firms. Bocken et al. (2014) further argue that typical practices within this archetype use certifications to ensure more sustainable production and consumption patterns. In addition to being open and honest about emission levels and disclosing the ingredients used in their products. The firms we interviewed prioritized this to ensure environmental-friendly operations and generate consumer trust. The firms also used certifications like greenhouse gas protocols to measure and manage the emissions of their ingredients.

Bocken et al. (2014) explain that the archetype *adopt a stewardship role* also ensures consumer health and well-being. We found that this archetype could be applied to the agri-food sector as firms can potentially encourage consumers to have a more sustainable diet by providing products using local ingredients. Ulvenblad et al. (2019) point out an increasing trend where smaller agri-food firms tend to focus more on environmental and social dimensions in their food production to ensure economic growth and market differentiation. Our study reflected these results as the plant-based micro-enterprises supported local farmers to create market differentiation. De Pádua Pieroni et al. (2018) further argue that sustainable business models should, in addition, focus on creating value that has previously been uncaptured. We found this to be accurate as several of the plant-based firms used non-traditional plant-based ingredients like local beans and lupin to create their plant-based products.

According to Bocken et al. (2014), employee welfare is also essential to the archetype *adopt a stewardship role*. We found that the SMEs worked actively to establish a decent work environment through a focus on employee learning, growth, and diversity. They mention that employees are one of the most important resources and their main innovation strength. Hence, we found that the plant-based firms worked to establish social value by ensuring employee satisfaction in their daily operations.

5.2.3 Organizational characteristics

Develop scale up solutions was also a characteristic archetype of the plant-based firms' business models. Developing scale up solutions revolves around delivering sustainable solutions on a larger scale to maximize value for the society and the environment (Bocken et al., 2014). According to Bocken et al. (2014), developing scale up solutions are often combined with other archetypes. We found this to be accurate as *develop scale up solutions*

was highly intertwined with *maximise material and energy efficiency* within the plant-based firms. However, we also found that many of the micro-enterprises in the study struggled to scale up production due to insufficient resources. The lack of resources resulted from a lack of knowledge, product equipment, and technology which affected the firm's ability to scale up their plant-based production and consequently use fewer natural resources. The micro-enterprises also operated in a niche section of the plant-based market, resulting in slow growth. Another archetype we found characterized the sustainable business models of the plant-based firms was *re-purpose the business for society/environment*. This archetype focuses on social and environmental benefits rather than economic profit. They do this through being driven by a social mission that generates positive externalities for society. We found this was true for the plant-based firms as even though they were for-profit, they also existed to fulfill a specific social mission, to create a transition toward plant-based food. The firms valued economic growth; however, we found that this was due to them seeing growth as necessary to achieve a sustainable transition in the agri-food sector toward plant-based food; thus, essential to create a positive change. Hence, we found that the firms focused on financial value; however, we also found that their operations made positive externalities that spilled over to the society.

5.2.4 No perfect archetype

Barth et al. (2021) and Gupta and Abu-Ghannam (2012) mention that food falls under the technological archetypes as it requires manufacturing processes and redesigns. We found that the plant-based firms' business model had features from the technological archetypes; however, the social archetype grouping best characterized the firms. There are several reasons why we believe our results differ from previous research.

- The founders and the firms were highly motivated by environmental, social, and financial value from the conception of the plant-based firms.
- Acquiring knowledge on a new topic like plant-based food innovation is a process that includes the involvement of human resources.

We believe that the social archetypes, in particular, *adopt a stewardship role* characterized the business models of the plant-based firms due to the factors above. The plant-based firms and founders were usually motivated by making a difference in the sustainability transition when establishing their firms. This could either be through social or environmental value creation.

These factors being at the forefront since the firm's start were reflected in their business model. The plant-based sector, despite its growth, is still seen as a niche sector (Aschemann-Witzel et al., 2021); hence, the founders of the firms also had to be highly motivated and be visionaries to establish and grow their plant-based firms. We found this to be particularly true for the SMEs that had operated in the plant-based market, sometimes up to ten years. According to Aschemann-Witzel et al. (2021), the plant-based sector has seen recent growth, which is also shown in the data from Norgesgruppen that states vegetarian products sales grew 50% between 2017 and 2019. Thus, we can assume that the SMEs had to operate in an even more complicated market when they first launched their plant-based firms. Further, since the plant-based sector is new, the firms also focused on requiring knowledge, which is a process involving human relations. Employees are essential resources for the plant-based sector; therefore, the firms had to redesign their business model for social value creation. These are the main factors we believed influenced our results that found the plant-based business model could be categorized within the social grouping of the business model archetypes proposed by Bocken et al. (2014).

5.2.5 Proposing a new archetype for plant-based firms

Although the social archetype is the most characteristic of the sustainable business model for the plant-based firms, we still believe there is no specific archetype that adequately characterizes the firm's business model. Comparable results were found in the study conducted by Ulvenblad (2019), which shows that only 19% of 204 agri-food firms fully matched one of the proposed archetypes. Hence, we found a need for a new archetype to categorize the sustainable business model of plant-based firms properly. Compared with the theoretical framework and the results, we created an archetype called *adopt a knowledge-driven approach* that could help categorize the plant-based firms' business models better.

We believe *adopt a knowledge-driven approach* would be appropriate for describing the business model of plant-based firms in the agri-food sector. The archetype is based on both the characteristics of their business models and how they worked to redesign, as discussed in 5.1. We found that the most significant characteristic of the plant-based firms was that they were highly knowledge-driven. We believe this was due to the plant-based sector still being somewhat unexplored (Aschemann-Witzel et al., 2021). A knowledge-driven approach guided the plant-based firms toward creating partnerships and alliances. These partnerships

and alliances further helped the plant-based firms collect various resources, mainly knowledge. The knowledge they collected helped shape the firm and their value creation toward sustainability; thus, their value proposition. Therefore, we found that *adopt a knowledge-driven approach* would be appropriate to characterize the plant-based firms' sustainable business model. Even though *adopt a knowledge-driven approach* can help to categorize the plant-based firms', Bocken et al. (2014) note that even though the archetypes can be used alone, it is necessary to combine the different archetypes to obtain radical environmental change. Thus, we believe *adopt a knowledge-driven approach* should not be used alone. Instead, it can be used as a supplement that can be combined with the business model archetypes already proposed by Bocken et al. (2014).

6. Conclusion

6.1 Overall conclusion

This study aimed to understand how sustainable entrepreneurial actors in the plant-based sector redesign their business models toward sustainability. In addition, the study aimed to find the characteristics of the subsequent sustainable business models. We conducted in-depth interviews with founders and managers within the plant-based sector to answer the problem statement:

“How do firms within the plant-based sector work to establish a sustainable business model?”

The drive for new knowledge, especially on product development, was the factor that influenced how the firms worked. Knowledge influenced the plant-based alternatives the firms produced and, in the process, the partners the firms created to help them with product development. The firms' knowledge and industry experience also influenced the type of resources they could obtain. The SMEs with more resources got knowledge through close collaboration with the consumers and research institutions. The micro-enterprises relied on a niche part of the plant-based sector to gain knowledge resources. Further, knowledge influenced how the firms captured value through establishing a three-dimensionality in their business model. Lastly, knowledge influenced the barriers the firms met and how they overcame them through establishing alliances with competing firms. Hence, knowledge was

crucial for their firms since it affected how they established a sustainable business model within the plant-based sector. We believe knowledge was an essential resource as the plant-based market has been unexplored until recently (Aschemann-Witzel et al., 2021).

To grasp how firms established a sustainable business model, we found it essential to understand their characteristics. Hence, we used the business model archetypes proposed by Bocken et al. (2014) as a framework to find their characteristics. These archetypes characterized their business models: *Maximise material and energy efficiency, create value from waste, adopt a stewardship role, repurpose for society/environment, and develop scale up solutions*. Previous research has stated that firms within the agri-food sector can be categorized within the technological archetype grouping (Barth et al., 2021). However, we found this inaccurate as the plant-based firms' business model had features from the technological, social, and organizational archetypal groupings. Hence, we found there was no perfect archetype, and we proposed a new archetype that could help categorize the business models of plant-based firms. The new archetype proposed was *adopt a knowledge-driven approach*. We believe this archetype could help categorize the business models of the plant-based firms as they were highly knowledge-driven, and their business model was influenced by how they obtained knowledge. Knowledge also guided the firms' innovation toward acquiring a more sustainable business model. Thus, we found that firms within the plant-based sector worked toward establishing a sustainable business model through acquiring knowledge that helped shape their firm and guide their innovation efforts.

6.2 Implications and limitations

6.2.1 Theoretical implications

Previous research on how firms establish a sustainable business model is limited, especially within the agri-food sector. We have a greater understanding of how firms within the plant-based sector work to establish a sustainable business model through the sustainability dimensions (UN, 2022), sustainable business model innovation (Jørgensen & Pedersen, 2018), and the sustainable business model archetypes (Bocken et al., 2014). The literature review found no framework that provides firms within various sectors guidelines on practicing and integrating the three dimensions of sustainability within their business model. Therefore, the focus of this thesis has been to understand how plant-based firms work to integrate these dimensions, thus, creating a sustainable business model. The discussion on

how the plant-based micro-enterprises and the SMEs worked to incorporate a three-dimensionality within their business model will be valuable insights for other firms within the agri-food sector. Further, the study has extended the sustainable business model archetypes proposed by Bocken et al. (2014) by proposing the new archetype *adopt a knowledge-driven approach*. We believe this archetype can be beneficial to categorizing the sustainable business models of plant-based firms if developed further.

6.2.2 Practical implications

The study aimed to understand a lesser-known phenomenon that few studies have previously researched: sustainable business models within the plant-based sector. The study can have a low degree of transferability due to the phenomenon lacking previous studies. However, we made several exciting discoveries throughout the research and developed a sustainable business model archetype relevant to the plant-based sector and other sectors with similar attributes. We predict the archetype can be suitable for other new sectors that have seen recent growth, which also characterized the plant-based sector.

Furthermore, the results and discoveries of the study might be of value to others who wish to study the phenomenon further. Specifically, the results will be helpful for the continuation of the project VOM that Nofima will further facilitate. The discoveries might also benefit firms in the agri-food sector who want to establish a plant-based product range or individuals who wish to create a plant-based firm. One of the most important things to take away from this study is the value of knowledge and, consequently, human resources for plant-based firms. The study has also introduced barriers prevalent in the sector, helping raise awareness of typical barriers firms might encounter when operating within the plant-based sector.

6.2.3 Limitations of the study

The study results are context-specific because the focus is on firms that operate within the plant-based sector in Northern Europe. On the other hand, the study has found new insights into how entrepreneurial actors proceed to establish a sustainable business model. We believe these results can be applied to other plant-based firms as we have identified crucial factors that describe how these sustainable business models are established. However, this concept has not previously been investigated within this context, so the transferability of the study results is low.

We used semi-structured interviews to study this relatively unknown phenomenon. When using a semi-structured interview approach, we found that the data collected became varied; thus, hard to structure. Therefore, it was challenging to get an overview of all the data collected to answer the problem statement. Another limitation of the study was that the interviews were conducted across Microsoft Teams. Interviewing the informants physically could enhance the study results as we could observe how they work in practice at the firm, thus, creating further insights. In addition, we have included both micro-enterprises and SMEs within the selection of the study. It has been interesting to compare the different sized firms; however, the selection was uneven, with six micro-enterprises and four SMEs. In addition, the selection of each of the different sized firms was somewhat limited to get an overall picture of the situation. Our results do not have detailed information on how the firms' plant-based products are textured and processed and their ingredient composition, as this information is classified as trade secrets. This is also a limitation of the study as we did not get a complete picture of how they worked to create their plant-based products. The last implication of the study is that it is difficult to research something that is happening right now within the sustainable transition. Since we studied a phenomenon happening now, it is conceivable that a similar study later will have different results.

6.3 Recommendations for further research

We found several areas that could be interesting to study further. How sustainable business models are created should be researched further, both in the plant-based sector and other sectors, to find the replicability of this study's discoveries. These studies should also preferably be conducted over an extended period as the plant-based sector is frequently changing due to the agri-food sector being amidst a sustainability transition. These are topics we believe can be exciting and appropriate to study further:

- The legal landscape within the agri-food sector and how it affects the development of plant-based firms. An interesting perspective here could also be to study the alliances competing plant-based firms built to withstand the dominant players in the sector.
- A longitudinal study to look at different development trajectories in the plant-based sector after a few years.
- Make a similar study but discuss the results against other sustainable business model frameworks than the archetypes proposed by Bocken et al. (2014). We would

recommend the sustainable business model taxonomy proposed by Lüdeke-Freund et al. (2018).

- Investigate the newly proposed archetype *adopt a knowledge-driven approach* to find if it is relevant for other sectors. This archetype can also be studied further, in general, to develop it further.
- Study the interplay between environmental, social, and economic sustainability from a long-term perspective. It would be interesting to see if societal development contributes to strengthening the environmental bottom line.

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8. Appendix

Appendix 1: Recruitment letter



*Name of person, Company
name, & address*

Object: participation in a research project and availability for an interview

Place, date

Dear, **Name**

We are Karianne Myklebust and Elisabeth Fjelltun, Master's students in the fifth year of the degree in Entrepreneurship and Innovation at the Norwegian University of Life Sciences. We are conducting our master thesis project in collaboration with Nofima, the Norwegian Institute of Food, Fisheries and Aquaculture Research (www.nofima.no), and RISE Research Institutes of Sweden (www.ri.se) in the framework of the project VOM (*"Incentives measures for Food System Transition"*).

Our project aims at investigating the plant-based food market and in particular, the business models of companies that are active in this sector. The final goal is to understand the challenges of operating in such a growing market and the characteristics of a sustainable business model while collecting successful case studies and lessons that can contribute to the overall food system transition.

We firmly believe that (*Company X*) is a relevant case study for our thesis project, as it ... We would greatly appreciate including *Company X* in our research to learn more about your business model. Therefore, we would like to ask kindly whether you would be available for an interview.

We are planning to conduct a single interview for approximately one hour. The interview is planned to be conducted in late February or early March. We would like to assure you that the company name and other sensitive information will be kept confidential.

We look forward to hearing from you and we hope that we could consider your company as part of our project! Please, do not hesitate to contact us if you have any further questions.

Sincerely,

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Appendix 2: Interview guidelines

Background questions:

1. What are your position and work tasks at company X?
2. Can you tell us about your education and earlier work?

SMEs: Since when have you been working for the company? Did you fulfill a different function within the company in the past?

Strategy and mission:

3. What was your/your company's motivation and strategy for entering the plant-based sector? How would you describe the journey?
4. While entering the plant-based market, has your company met any barriers, and how did you and the company overcome them? Example: Regulations, consumer perception, product, politics, economics, funding, market trends).
5. Can you recall an event or a person who was critical to the start or the success of the plant-based product/business? Please describe the situation. (e.g., investment, employee competency/know-how, internal resistance to change).
6. How do you believe your business influences established business norms and consumers' perspectives etc.? Why is it important to challenge these established norms for your business?

Sustainable redesign and business model innovation:

7. What is your company's approach to product innovation? Radical or incremental? To which extent is your product innovation a joint effort with external organizations? Research, influencers, consumers, stakeholders?
8. How does your company combine the environmental concerns and consumer demands to create a sustainable and profitable plant-based line/product?

9. Can you tell us one success and one failure story about implementing a sustainable change within the company? How did this positive or negative story affect the company's overall strategy?
10. What are your company's plans to expand the business? What is your company's plan to become even more sustainable? How will you combine these efforts?

Sustainable business model:

11. Could you describe the current company's business model?

SMEs: How has it evolved? What has been the role of new technology in these changes? Focus on the most essential changes.

Micro-Enterprises: What would you say is the most crucial part of your business model? Customer segment, Value proposition, Distribution channels, Customer relations, ex: Communication, Revenue streams, Key resources, Key activities, Key partners, & Cost structure

12. What makes your company unique compared to other firms in the plant-based market?
13. What value creation (Product or activity) are you proudest of and why?
14. Which role does public or other funding play for business model/product/technology/sustainability innovation?

Closing questions and e-mail questions:

15. Is there anything you would like to add?
16. E-Mail: In general, how would you describe the economic state of your company?
Example: Share the percentage growth from each year.
17. E-Mail: How many employees does your company employ?
18. E-Mail: Other results or notes you want to share?

Appendix 3: Letter of consent



Are you interested in taking part in the research study

“How firms work to establish a sustainable business model within the plant-based sector: A multiple case study of plant-based food innovators.”

This is an inquiry about participation in a research project. The primary purpose is to explore how plant-based food innovators work to establish a sustainable business model. In this letter, we will give you information about the purpose of the data collection and what your participation will involve.

Purpose of the project

This study is a part of a larger research project called *“Incentives measures for Food System Transition”* (VOM), coordinated by the Center for international climate research (CICERO) and funded by the Research Council of Norway. The Norwegian Institute of Food, Fisheries, and Aquaculture Research (Nofima) and the Research Institutes of Sweden (RISE) are both partners of the project VOM and are coordinating the present study. This study focuses on the plant-based food market and aims at analyzing the business models of firms that are active in this sector as well as understanding how they adapt to the sustainability transition. The research questions we seek to answer are:

- How do entrepreneurial actors within small and large plant-based enterprises work to redesign their business model toward sustainability?
- What characterizes a sustainable business model in the plant-based sector?

Who is responsible for the study?

Nofima in Norway is the responsible institution for this study. Laura Carraresi and Antje Gonera, Senior scientists at Nofima, will be the project leaders responsible for the study. Professor Elin Kubberød of the Norwegian University of Life Sciences (NMBU) will, in addition, be the academic supervisor. Bengt Aldèn from RISE will contribute as a project partner. The data collection will be done by Karianne Myklebust and Elisabeth Fjelltun, Master's students at NMBU. They will further write a master thesis on the findings from this study.

What does participation in the project imply?

This project will collect data through semi-structured interviews that will last for approximately one hour. There will be a private discussion on where and how it is most appropriate to conduct the interview. The interview will contain questions about the themes described above. The interviews will be video- and audio-taped, transcribed, and anonymized. The findings will be used in scientific publications, a master thesis, and other relevant uses.

Participation is voluntary

Participation in the project is voluntary. If you choose to participate, you can withdraw your consent at any time without giving a reason. All information about you will be made anonymous. There will be no negative consequences if you choose not to participate or later decide to withdraw.

Your privacy – how we will store and use your data

We will process your personal data confidentially and follow data protection legislation and research ethics guidelines and principles. Nofima will be responsible for storing the data, while Karianne Myklebust and Elisabeth Fjelltun will be responsible for analyzing and collecting the data. We will replace your name and contact details with a code when working with the data. The list of names, contact details, and respective codes will be stored separately from the rest of the collected data, and we will store the data on a research server at Nofima. The video and audiotape will be kept electronically on a password-protected research server as a zip file with a password at Nofima. During the project, Laura Carraresi, Antje Gonera, Elin Kubberød, Karianne Myklebust, and Elisabeth Fjelltun will have access to the video and audio recording and it will be deleted as soon as the project ends. The transcripts will not contain personally identifiable information. We will only use your personal data for the purpose specified in this information letter. The data will be processed in Norway.

What will happen to your personal data at the end of the research project?

The data collection will be done in March, and it will be analyzed by March/April 2022. The recordings will be deleted after the completed analysis. The following transcriptions will be anonymized. The anonymized transcribed interviews will be archived at Nofima to continue the project VOM.

Your rights

So long as you or your business can be identified in the collected data, you have the right to:

- Access the personal data that is being processed about you
- Request that your personal data is deleted
- Request that incorrect personal data about you is corrected/rectified
- Receive a copy of your personal data (data portability), and
- Send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?

We will process your personal data based on your consent.

Based on an agreement with Nofima and NSD, the Norwegian Centre for Research Data AS has assessed that personal data processing in this project follows data protection legislation.

Where can I find out more?

If you have questions about the project or want to exercise your rights, contact:

- Laura Carraresi, Nofima, Senior scientist, by e-mail: laura.carraresi@nofima.no, or

Phone: +47 64 97 01 72

- Antje Gonera, Nofima, Senior scientist, by e-mail: antje.gonera@nofima.no, or Phone: +47 64 97 04 55
- Elin Kubberød, NMBU, Professor, by e-mail: elin.kubberod@nmbu.no, or Phone: +47 41 04 24 35
- NSD - Norwegian Centre for Research Data, by e-mail: personverntjenester@nsd.no, or Phone: +47 55 58 21 17
- Nofima Data Protection Officer, Mia Bencze Rørå, by e-mail: mia.rorae@nofima.no, or Phone: +47 64 97 03 94

Yours sincerely,

Karianne Myklebust
Master student

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Tel. +47 90 23 16 23

Elisabeth Fjelltun
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Declaration of consent

I have received and understood information about the study “*Unraveling how firms work to establish a sustainable business model within the plant-based sector: A multiple case study of plant-based food innovators.*” - and have been allowed to ask questions.

I consent to participate in the semi-structured interview and for my personal data to be processed until the project's end date, approx. 15. June 2022.

(Signature, date)



Norges miljø- og biovitenskapelige universitet
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