

Thesis
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Planting the seed in the storm: How FoodTech start-ups use crises to diffuse their offering

A multiple-case study of start-ups' market-shaping processes in crises

Abstract

With the Covid-19 pandemic, the war in Ukraine, and inflationary pressures, the world has experienced significant crises unfolding right after another in the recent past. Start-ups, being impacted not the least, need to understand how they can use such stormy times to advance market formations beneficial for them. As such, this study seeks to research how start-ups shape markets in crises. While market-shaping has gained significant attention in the literature, the lack of empirical evidence and a comprehensive understanding of the impact of crises on start-ups' market-shaping warrants the need for further theoretical development. This study employs a multiple-case study investigating FoodTech start-ups in Sweden and Germany. Building on grounded theory in conjunction with temporal bracketing, this study provides empirical evidence for the existing theory on market-shaping in times of crisis. Thus, it shows that a vision can be successfully implemented by targeting a niche market with a few key actors and subsequently expanding into the wider market. The study further demonstrates the need for a complementary perspective on market-shaping in crises. This perspective shall include building a pathway to realize the vision through developing technology and operations, as well as anticipating successive crises. The last step involves active waiting by focusing on profitability. As such, this study adds to the body of knowledge in the market-shaping domain by including the angle on the market-shaping steps internal to the focal firm in the context of crises. The contributions can be considered a playbook for managers of *FoodTech* start-ups that helps them define which actions to take during crises.

Keywords: Market-shaping, Market-shaping process, Crises, Start-ups, Food market

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Thank you!

A stylized, handwritten signature in black ink, consisting of a large, sweeping 'G' followed by a horizontal line and a small flourish.

Gordon Gausmann

A handwritten signature in black ink, featuring a large, stylized 'L' and 'K' with a horizontal line and a small flourish.

Lucas Käfer

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List of Abbreviations

B2B	Business-to-Business
B2C	Business-to-Consumer
CME	Connected market economies
D2C	Direct-to-Consumer
MVP	Minimum viable product
MVS	Minimum viable system

Key Concepts

Concept	Definition
Bricolage	Refers to the creative construction of solutions using potentially diverse resources or capabilities available to the focal firm (T. Baker & Nelson, 2005).
Business-to-Business (B2B)	Refers to the trade of goods and services between two businesses.
Business-to-Consumer (B2C)	Refers to the trade of goods and services between a business and consumers.
Crisis	Refers to “a sequence of events that can have substantial negative consequences if not managed appropriately” (Pedersen et al., 2020, p. 315). In the scope of this study, we focus on crises caused externally, such as the Covid-19 pandemic or the war in Ukraine.
Direct-to-Consumer (D2C)	Refers to the direct distribution of goods or services to consumers by bypassing intermediaries like retailers. This can be considered a form of a B2C business model.
FoodTech	Refers to the ecosystem of start-ups operating in the agri-food market. Respective start-ups are characterized by offering technological improvements and digitalization within the agri-food market. This includes all stages along the food value chain, from production to consumption.
Minimum viable system (MVS)	Refers to the lower meso-layer of the focal firm’s environment, which represents the focal firm’s strategic network or ecosystem. This comprises the key actors that multilaterally help to realize the envisioned market (Adner, 2017; Möller et al., 2020; Nenonen & Storbacka, 2020).

1 Introduction

Panta rhei

These words of Greek philosopher Heraclitus, expressing that the only constant is change (Barnes, 2002), adequately describe the food market. Technological improvements and digitalization observed in other sectors and industries, such as *Industry 4.0*, reached the food market and can be seen in the emergence of *FoodTech* (Fakhar Manesh et al., 2021; Jafari-Sadeghi et al., 2021; Petrolo et al., 2022). Prominent examples are the producer of plant-based meat substitutes *Beyond Meat* or the Swedish alternative dairy brand *Oatly*, which successfully influenced the eating habits of many consumers and received multi-billion-dollar valuations (Bellon & Manjesh, 2019; Terazono & Evans, 2021). Usually, start-ups have technological innovations developed to be readily available. However, the market launch constitutes the key challenge that is not overcome, irrespective of superb product performance (Caniëls & Romijn, 2008). In the words of the *Beyond Meat* CEO, “getting the innovation that’s in our labs to market is the most difficult part, and it’s the most difficult part for any business” (Shapiro, 2021). This makes researching how firms diffuse technological innovations in the market relevant (Boon, Magnusson et al., 2022). Such diffusion perspective merely focuses on getting a significant share of the addressed market to use an innovation (Boon, Edler, et al., 2022). In brief, start-ups need to change the market to be more favorable to them – a concept called market-shaping (Hawa et al., 2020; Keränen et al., 2023; Sprong et al., 2021).

Crises hold the potential to induce such change in an existing market and are considered fertile ground for these very changes (Kuckertz et al., 2020; Nenonen & Storbacka, 2020). Therefore, investigating the impact of crises on market-shaping activities comprises an uprising avenue of research. However, the current literature is predominantly conceptual and hence necessitates empirical substantiation. Further, it is contended in this study that the contemporary market-shaping theory is not comprehensive enough to incorporate the impact of crises. This is especially relevant for start-ups, as they are considered to be thoroughly affected by crises (Kuckertz et al., 2020; Pedersen & Ritter, 2022). Yet, current literature in the market-shaping domain solely depicts crises as a potential starting point for market-shaping, thereby neglecting the significance of crises. This complication calls for developing a market-shaping theory that diverges from the existing endowments.

In recent years, the world experienced major crises with increased frequency and magnitude. The Covid-19 pandemic (hereafter referred to as ‘pandemic’) or the war in Ukraine, to name two crises, amplified the relevance of crises, not the least for start-ups in the food market. The pandemic has exposed many previously existing weaknesses in global food supply chains (Apostolopoulos et al., 2021). After the pandemic, the war in Ukraine has caused another major disruption of global, and especially European, food supply chains (Jagtap et al., 2022). Consequently, considering crises in the diffusion of a novel offering becomes imperative for start-ups. Building on the theoretical foundation of this study, these crises hold opportunities that presumably persist beyond the crisis into the future (Apostolopoulos et al., 2021; Kuckertz et al., 2020; Nenonen & Storbacka, 2020). For instance, during the pandemic, one of the phenomena has been the increased consumption of alternative proteins, such as food made from plants, yeasts, or fungi (Morach et al., 2022). Hence, these disruptive times constitute fertile ground for start-ups active in this market. To advance the understanding of how start-ups can plant the seeds for change in this environment, we pose the following research question.

How are FoodTech start-ups using crises to diffuse their offering in the market?

Seeking to answer this question, this study is structured in the following six sections. In this section, we introduce this study's purpose and research question. Second, we provide a comprehensive overview of the fundamentals and current state of research in market-shaping. Third, we present our multiple case study's context and research design. Fourth, we present the findings of our multi-case study and the thereby derived market-shaping process in crises. This entails a comparison of the findings of the studied cases. Fifth, we discuss the findings of our study considering the reviewed literature. Lastly, we provide a conclusion on the contributions of this study and elaborate on opportunities for future research.

The contributions of this study address the shortcoming of the current market-shaping process rooted in crises. As such, we attempt to develop the existing theory of market-shaping. The study highlights that current conceptualizations of market-shaping crises must be complemented by an internal perspective on the firm. By investigating the empirical context of *FoodTech* start-ups during the pandemic, we further substantiate this research avenue with empirical evidence. Furthermore, by developing a framework derived from empirical observations, we create a playbook for practitioners to prepare for the next crisis.

2 Literature Review

2.1 Technology as Origin of Market-shaping

The recent crises, thoroughly shaping global markets, amplified the view on crises as opportunities firms can capitalize on (Nenonen & Storbacka, 2020; Pedersen & Ritter, 2022). This gives rise to the perspective that firms shall shape markets, contrary to the traditional notion of firms adapting to the market in natural selection processes. More and more, firms actively push the market to be more favorable to them, thereby influencing future market properties (Jaworski et al., 2000; Patvardhan & Ramachandran, 2020). As a result, market-shaping research is gaining importance (Flaig et al., 2021b; Nenonen & Storbacka, 2021). Essentially, the holistic concept of shaping markets is unified through the deliberate efforts of market actors to advance the formation and transformation of a market individually or collectively to establish a new offering (Keränen et al., 2023; Sprong et al., 2021). This can materialize in gaining market share and revenue as well as enhanced customer satisfaction and loyalty, amongst others (Stathakopoulos et al., 2022; Storbacka et al., 2022). This notion makes the market-shaping literature an integral part of this study. Transferring this research avenue to the proposed research question, this study seeks to answer how *FoodTech* start-ups are shaping markets in crises.

This first abstract shall briefly introduce how technological innovations relate to market-shaping. Novel technologies' potential to shape a market depends on three interconnected factors, (1) customer desirability, (2) business viability, and (3) technological feasibility (Furr et al., 2014; Kindström et al., 2018). Given the focus of this study on the diffusion of a novel offering, which presupposes the adoption of it by the customers, the first factor is the most relevant. One of the biggest barriers to a technology's effective diffusion is ignoring the necessary socio-cultural adjustments (Planko et al., 2016). Technological advances must be accompanied by the establishment of a market that can be targeted, comprising value chains and legislative as well as institutional changes (Köhler et al., 2019; Planko et al., 2016). This market creation comprises push and pull factors. Producers must be enabled to push the technology in the market while it has to be demanded by consumers. Raising awareness is crucial for creating these pull dynamics (Foxon & Pearson, 2008; Markard & Truffer, 2008b; Planko et al., 2016). Hence, socio-cultural changes are critical in market-shaping. To advance those changes demonstrating the core technology's advantages is crucial (Planko et al., 2016). A commonly referenced approach to drive such changes is starting with the creation of a niche

market (Geels, 2005; Markard & Truffer, 2008a). A question yet to be answered is which offerings are suitable for the mass market and which are posed to be exchanged in niche markets. Conventionally, niche markets are marked as predecessors of mass markets. However, it cannot be generalized that all niche markets develop into a mass market (Boon, Magnusson, et al., 2022).

2.2 Market-shaping Process

2.2.1 Synopsis of Market-shaping

As a foundation for introducing the market-shaping process, the following abstract provides a general conceptualization of market-shaping. Scholars consider changing resource linkages and mobilizing actors as key aspects of market-shaping (Nenonen, Storbacka, & Windahl, 2019). The market-shaping efforts of a single firm comprise the purposive creation of new resource linkages to challenge the status quo and achieve an advantageous market setting (Cova et al., 2021; Hawa et al., 2020; Kachouie et al., 2018; Kindström et al., 2018). Fundamentally, shaping a new market encompasses the creation of new arenas for the exchange of offerings. These steps of inducing change can be described as a process in which a new or modified post-shaping market emerges and at least temporarily co-exists with the pre-shaping market (Storbacka et al., 2022). Hence, markets are not formed in isolation as they are interlinked in broader ecologies of markets. Instead of creating a novel market, actors might strategically move to adjacent markets or are influenced by developments in neighboring markets (Boon, Edler, et al., 2022). Besides the deliberate actions of a firm to shape a market, vice versa, markets shape the firm as much as firms shape markets. The market-shaping dynamics are marked by continuous reciprocal adjustments of firms and respective markets (Nenonen et al., 2020; Teece, 2011). Besides a new operating environment (Storbacka et al., 2022), the outcome of market-shaping processes is the emergence of new business models (Planko et al., 2016).

The literature offers a plethora of approaches to conceptualize market-shaping. In contemporary research, meso-level analyses, putting collectives at the heart of the research, are gaining interest (J. J. Baker & Nenonen, 2020; Boon, Edler, et al., 2022; Hawa et al., 2020), while also research on macro-level with a broader scope on the whole market is apparent (Keränen et al., 2023; Ottosson et al., 2020). Building on the research question with start-ups as the subject of the analysis, the scope of this research is on the micro-level. Such micro-level perspective is extensively researched (i.e., Flaig et al., 2021a, 2021b; Jaworski et al., 2000; Kindström et al., 2018; Kleinaltenkamp et al., 2022; Nenonen & Storbacka, 2020; Werner et

al., 2022). Regarding the focus of the analysis, the current state of research sheds light on different aspects of market-shaping. Necessary capabilities (Nenonen, Storbacka, & Windahl, 2019; Werner et al., 2022) and activities (J. J. Baker & Nenonen, 2020; Kindström et al., 2018) for market-shaping are well-researched. Other academic contributions focus distinctively on market-shaping strategies (Flaig et al., 2021a; Jaworski et al., 2000; Kleinaltenkamp et al., 2022). Further research can be found on specific perspectives, such as market-shaping intention (Hawa et al., 2020) or the conjunction of market-shaping and value propositions (Nenonen et al., 2020). To gain a comprehensive understanding of how *FoodTech* start-ups shape markets, it is imperative to add a temporal perspective. The significance of such an approach lies in recognizing that market-shaping is a continuous, ongoing process that unfolds over time. Given that the diffusion of a start-up's offering hinges on engaging with partners and customers, examining the interactions in the market ecosystem becomes crucial. However, the abovementioned research areas in the domain of market-shaping primarily take on a static perspective. Thus, they are limited in their capacity to explore the complex, dynamic nature of market-shaping (Nenonen & Storbacka, 2021; Pontikes & Rindova, 2020). Hence, conceptualizations of market-shaping processes on the micro-level are foremost relevant for this study.

2.2.2 Conceptual Market-shaping Process

In this notion, market-shaping can be depicted as a process comprising three phases (1) infusion, (2) formation, and (3) retention. (1) Infusing market change comprises the development of a vision, a product, and the respective business model. These early market-shaping activities are usually on firm-level and not apparent outside the focal firm. (2) Subsequently, moving into collective market-shaping in the formation phase, additional actors are selectively onboarded on the shared vision of the market. A market network with other actors is developed, institutions are influenced, and a common narrative is created. (3) The third phase of retention is marked by a focus on fostering the resilience of the market and obviating the demise of the newly formed market (J. J. Baker & Nenonen, 2020; Flaig et al., 2021b; Nenonen & Storbacka, 2020). Integral building blocks along the market-shaping process are iterations. Embracing such an iterative process can be marked as an entrepreneurial approach (Nenonen, Storbacka, & Windahl, 2019). This matches the focus on start-ups as focal market-shaping actors. In such iterations, a firm has to manage different time horizons in its

activities so they foster each other. The activities can be long-term oriented with inherently higher uncertainty or characterized by clear action-result relations (Kindström et al., 2018).

With the steps taken as part of the market-shaping process, the focal firm has to reconfigure the (1) network of market actors, redesign the (2) exchange, and reform (3) institutions (Nenonen, Storbacka, & Windahl, 2019). These three *building blocks*, as we call them, are a recurring theme among scholars, as illustrated in Table 1 (to be found on p. 8) (Nenonen, Storbacka, & Frethey-Bentham, 2019; Nenonen, Storbacka, & Windahl, 2019; Nenonen & Storbacka, 2020; Ottosson et al., 2020; Storbacka & Nenonen, 2021). Followingly, the aspects of the three elements that are integral for the perspective on the market-shaping process in this study are presented.

(1) Network

The formation of a new market is driven by different actors across different arenas (Boon, Magnusson, et al., 2022; Dordi et al., 2022). Actors that indirectly support the innovation are crucial for its diffusion. They advance market-shaping by pushing for changes on a more general level than the innovation's specific target (Keränen et al., 2023). Through the interaction of stakeholders, narratives emerge, which in turn contribute to the shaping of markets (Boon, Edler et al., 2022; Boon, Magnusson, et al., 2022; Werner et al., 2022). These can stem from the offering, especially the values and practices the offering is characterized with, at the core of the market-shaping efforts. Strong narratives can draw other offerings into the new market and cause the demand to surge. By this, new market categories are established and legitimated. For instance, in the case of *Pulled Oats*, this resulted in the emergence of a new meat substitute category in Finland (Vaskelainen et al., 2022). Moreover, market-shaping might involve efforts to prompt and coordinate other market actors by expending effort, future planning, and tailoring means to achieve the overall end in mind (Hawa et al., 2020). A firm can incentivize other actors to engage by creating an environment that makes it attractive for others to support the market-shaping efforts (Kjellberg et al., 2015). Critical market-shaping tasks can be delegated to other central market actors or even policymakers at different levels to let them take the lead in shaping the market on the firm's behalf (Werner et al., 2022). New entrants, especially start-ups, are associated with enabling innovation and disruption in research. Incumbents, on the contrary, are said to exhibit a defensive approach investing efforts into avoiding market change (Smink et al., 2015). This argument can be refuted for the following two reasons. First, extensive external pressure (e.g., acting sustainable) may make the change of market norms inevitable (Keränen et al., 2023). Second, research can be found

that challenges the notion of incumbents as blockers of innovation (Berggren et al., 2015; Dijk et al., 2016), making incumbents relevant supporters in market-shaping.

(2) Exchange

One crucial aspect of enabling exchange is that actors agree on a quantification of value in monetary terms. This has to be considered on two dimensions, (1) the market in which the offering of the firm is exchanged, and (2) the capital market through which the firm accesses financial resources. The first dimension comprises activities that facilitate supply and demand. A resource gets a traded value through a transaction constituting an equilibrium of supply and demand (Ottosson et al., 2020). Re-designing exchange can be expressed as an adjustment of the firm's business model (Nenonen, Storbacka, & Windahl, 2019). Looking at the offering exchanged on the market, exchange practices are shaped by supplier capabilities and user demands (Boon, Magnusson, et al., 2022).

In light of the second dimension, shaping exchange practices further entails enabling investments. This entails being able to estimate risk and returns. As a transaction defines the value of a resource, an investment implies a monetary valuation of an expectation (Ottosson et al., 2020). Capital markets are an integral enabler for innovations, as the diffusion of novel technologies strongly relies on access to capital. The high-risk nature of such investments, in conjunction with insufficient expected returns, however, limits access to funding (Demirel et al., 2019; Dordi et al., 2022; Karltorp, 2016). To overcome this challenge, start-ups can attract impact investors willing to forego financial returns. This requires the start-ups to effectively signal a sustainable impact on the market (Barber et al., 2021; Demirel et al., 2019), reemphasizing the importance of creating an appealing narrative and highlighting the interconnectedness of these elements.

(3) Institutions

Firms are not solely the key actors in markets. According to scholars, other institutions, such as the public sector or non-profit organizations, must also be considered (Boon, Magnusson, et al., 2022). Thus, analyzing the strategies to diffuse an innovation has to go beyond the market-based perspective. Policies are a powerful lever for the adoption of novel technologies in market-shaping theory (Boon, Magnusson, et al., 2022; Planko et al., 2016). For instance, public actors can advance an innovation through investments that attract private firms to subsequently enter the market as well (Magnusson et al., 2022).

Paper	Exchange	Institutions	Network
Nenonen & Storbacka (2020).	<ul style="list-style-type: none"> The exchange process consist of the product, the price or pricing, and the matching methods. 	<ul style="list-style-type: none"> Institutional transmitters are representations and norms. 	<ul style="list-style-type: none"> The actor network comprises the supply network, customer side features, and provisions.
Nenonen, Storbacka & Windahl (2019).	<ul style="list-style-type: none"> Redesigning exchange includes developing products, adjusting price and modifying the matching methods. 	<ul style="list-style-type: none"> Institutions are being reformed by influencing representations and norms. 	<ul style="list-style-type: none"> Reconfiguring networks consists of modifying the own supply network, the customer-side features and provision.
Ottosson, Magnusson & Andersson (2020).	<ul style="list-style-type: none"> Exchange practices are enabled by the quantification of value, the matching of supply and demand through pricing or segmenting, as deriving a risk-/turn profile of investments. 	<ul style="list-style-type: none"> The narrative is constructed by shaping expectations of market participants. These can be considered "socially constructed stories that have an underlying moral". 	<ul style="list-style-type: none"> Proving the system comprises legitimizing the value creation potential. These are the "material and organizational arrangements that facilitate production, distribution, and use".
Nenonen, Storbacka & Frethey-Bentham (2020).	<ul style="list-style-type: none"> Exchange is being altered by a change of tangible product or service properties, scope of offering, pricing logic or price level. Additionally, changing the way how providers find customers or reverse alters exchanges. Adjusting customers & use comprises changing how customers use the product or service, changing the customer or user groups, changing value perceptions of customers, or changing the supporting infrastructure use. 	<ul style="list-style-type: none"> Norms are challenged through changes in technical standards, governmental regulation and social conventions. 	<ul style="list-style-type: none"> Changing supply comprises changing the number of providers or the number of providers' partners, changing the way how providers collaborate with suppliers or other providers, and changing the type of supplier. Representations are reformed by changing the used terminology, the descriptions used by media, the market research and statistics, and changes in industry associations.
Storbacka & Nenonen (2021).	<ul style="list-style-type: none"> Reworking exchange comprises adjusting sales item, pricing logic, and matching method. 	<ul style="list-style-type: none"> Norms are being reformed by challenging standards, rules, and laws. 	<ul style="list-style-type: none"> Networks are reshaped by changing the infrastructure, or structure and roles of actors. Representations are revised by changing the labels, research, and organizations. Reforming norms comprises the challenging of social norms.

Table 1: Building blocks of market-shaping

2.3 Market-shaping Process rooted in Crises

2.3.1 Impact of Crises on the Market-shaping Process

Crises shall hereinafter be understood as “a sequence of events that can have substantial negative consequences if not managed appropriately” (Pedersen et al., 2020, p. 315). Relevant in the context of this study are the consequences crises imply according to the definition. Those comprise the potential to alter customers' expectations for exchanges, partners, and institutions (Harrison & Kjellberg, 2016). As such, crises create a new environment to which market actors need to adapt. Consequently, denoted as changing the environment of a focal firm, the market-shaping process is affected by crises (Pedersen et al., 2020; Pedersen & Ritter, 2022). In the literature, the changed market environment is commonly seen as an opportunity from which the market-shaping process can be initiated (Kindström et al., 2018; Kuckertz et al., 2019; Newig et al., 2019; Nijhof et al., 2022; Reisch, 2021). The reason for this is twofold. First, a crisis destabilizes a market, comprising the opportunity to move the market in a favorable direction with less effort compared to a rigid market network (Nenonen & Storbacka, 2020). Second, the market narrative is challenged, offering the opportunity to manifest the own vision within the market (Nenonen & Storbacka, 2020). It can be argued, however, that the market-shaping potential rooted in a crisis is limited to invigorating existing trends, especially in the context of the food sector (van der Gaast et al., 2022b). As the study of van der Gaast et al. (2022b) reveals, the pandemic accelerated the trend of shortening supply chains in start-ups that were already apparent due to pre-existing sustainability concerns. No matter the potential such opportunities hold, they can often only be capitalized on briefly (Ansoff, 1975, 1980; Pedersen & Ritter, 2022). To not miss such an opportunity once it appears, making use of crises thus entails being prepared for them (Kuckertz et al., 2020). Hence, it can be argued that market-shaping depends on previous actions taken to create responsiveness and resilience (Pedersen & Ritter, 2022). Responsiveness denotes the ability to adapt activities and resources to crisis-driven changes. Resilience defines securing the *modus operandi*, i.e., ensuring the production is ongoing through automation during the crisis and swiftly recovering from it (Pedersen & Ritter, 2022). Embedding this in the context of the research question – How are FoodTech *start-ups* using crises to diffuse their offering in the market? – it has to be noted that start-ups respond to crises with a *bricolage* approach (Kuckertz et al., 2020). This approach defines creatively combining internal resources of the focal firm and external resources that the firm can access through its network (T. Baker & Nelson, 2005; Kuckertz et al., 2020). In line with the market-shaping domain, this includes capitalizing on the network of respective start-

ups. But it further includes taking measures to become financially sound, for instance. As such, it should be understood as a holistic crisis response, including steps to foster resilience and actively build pathways to realize the vision (Kuckertz et al., 2020; Patvardhan & Ramachandran, 2020). This may be explained by the observation that start-ups are the market actors most vulnerable to crises. A reason for that is the lack of attention by other actors as incumbents, investors, and customers the start-up is dependent on, who are shifting it on the crisis and become less explorative (Kuckertz et al., 2020).

2.3.2 Current Theory Framework

Despite the relevance of crises for market-shaping, this research avenue has yet to be adequately investigated (Pedersen & Ritter, 2022). The contributions of Nenonen & Storbacka (2020) in the form of a conceptualized process provide a valuable starting point for delving into this field. Given the market-shaping opportunity a crisis holds, the initial step of this process is an analysis of the current state of the market. As soon as aforementioned opportunities arise from a crisis, firms need to conceive those as the right time to engage in market-shaping (Nenonen & Storbacka, 2020). The origin of the market-shaping process then is the development of a vision for the market rooted in dissatisfaction with the status quo and ways to achieve the desired state (Flaig et al., 2021b; Nenonen & Storbacka, 2020). As presented before, initial market-shaping efforts should target a niche market. Hence, a firm driving the market-shaping process has to define which actors constitute this niche in which the most basic functions of the vision can be executed. This *minimum viable system* (MVS) is a fundamental component that underpins any market-shaping vision (Konietzko et al., 2020; Nenonen & Storbacka, 2020). It can be conceptualized as the lower meso-layer, which represents the strategic network or ecosystem of the focal firm. This layer entails a set of partners that need to interact in a multilateral manner to realize the envisioned state of the market (Adner, 2017; Möller et al., 2020; Nenonen & Storbacka, 2020). The focal firm subsequently has to scale the changes onto the mass market. In line with the aggregated contributions of market-shaping scholars, such changes need to target the network, exchange, and institutions (Nenonen, Storbacka, & Frethey-Bentham, 2019; Nenonen, Storbacka, & Windahl, 2019; Nenonen & Storbacka, 2020; Ottosson et al., 2020; Storbacka & Nenonen, 2021). Due to the reciprocal nature of market-shaping, the driving firm must adapt its business model to the new market environment (Nenonen & Storbacka, 2020). Through these steps, market actors are supported in challenging the narrative of the market and nudged to replace

their mental models. This enables the firm to originate new resource linkages (Kleinaltenkamp et al., 2022). Once the appetite for change has been induced, the market-shaping firm has to quantify the benefits of the novel market network for its actors. Building on the shared value of the market, the engagement of the actors has to be secured. The instrument to implement this objective is the creation of an infrastructure that drives collaboration (Nenonen & Storbacka, 2020). This part of the process strengthens the newly formed resource linkages (Kleinaltenkamp et al., 2022). The market-shaping process rooted in a crisis, according to Nenonen & Storbacka (2020), is illustrated in Figure 1.

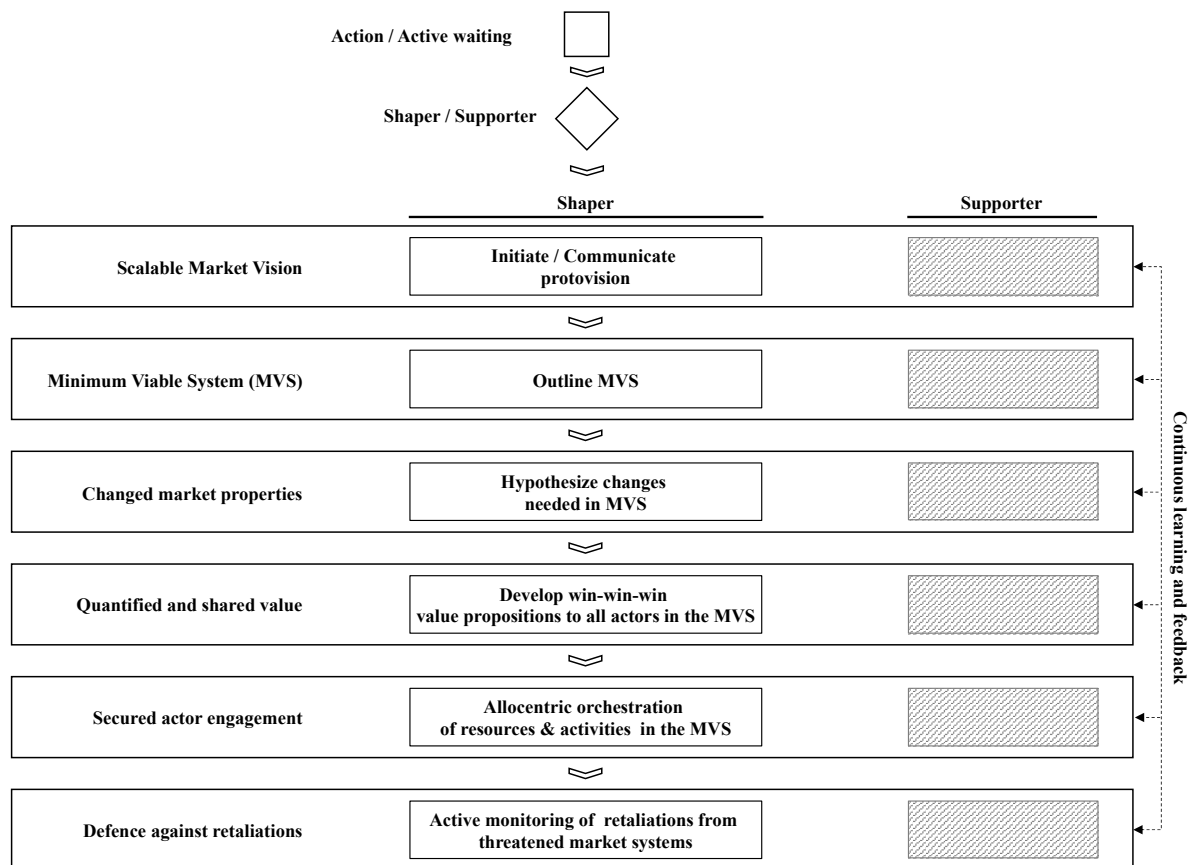


Figure 1: Existent market-shaping process rooted in crises
(Own illustration based on Nenonen and Storbacka (2020))

In the process model, it is distinguished between firms driving the market-shaping efforts and ones supporting it. This study attempts to research how start-ups proactively shape markets. Hence, the implications for shapers in the existing theory are most applicable. A closer look at the process reveals that it has a significant intersection with the holistic market-shaping process derived from the meta-analysis conducted by Flaig et al. (2021b). The key distinction lies in

the initiation of the market-shaping process only incorporated by Nenonen & Storbacka (2020). The scalable market vision corresponds to the infusing phase of the general market-shaping process, while the following four steps can be tied to the formation phase. Subsequently, the defense against retaliations can be found in the retention phase, according to Flaig et al. (2021b). Followingly it can be stated that market-shaping rooted in crises is mainly differentiated from the general market-shaping process by discovering the opportunities a crisis holds. This makes understanding the market disruptions caused by a crisis the distinctive component of the market-shaping process in crises.

2.3.3 Shortcomings of the existent Theory Framework

This study asserts that despite the existence of a process framework for market-shaping during crises, additional research in this area is necessary. This assertion is based on two distinct premises. Firstly, the presented framework is predominantly conceptual and necessitates empirical substantiation through further research. Secondly, it is contended that the proposed framework, while useful, is not comprehensive enough to address the far-reaching impact of crises on market-shaping. Arguing for the first call for research, as a conceptual framework, the presented market-shaping process is not rooted in empirical evidence. Beyond that, the existing contributions of market-shaping scholars may only be of limited value to assessing how *FoodTech* start-ups are diffusing their offering. The reason is that market-shaping activities depend on the context (Keränen et al., 2023). Considering the second rationale for further research, the presented process of market-shaping in the context of crises in its original form is insufficient to guide the research of this study. The process is built on the notion of shocks, as such, including events characterized by mainly positive effects on the focal firm (Pedersen & Ritter, 2022). However, this research shall be focused solely on crises. By narrowing the research domain, it attempts to maximize the creation of valuable contributions. Embracing such crises focus, the presented effects of crises on market-shaping give rise to the claim that the process for market-shaping in crises has to diverge from the general market-shaping process significantly. Arguably, the respective market-shaping process has to contemplate the negative consequences a crisis bears. In other words, the market-shaping process in crises, not the least for start-ups, has to incorporate an internal perspective on the focal firm. Hereby, reconfiguring the market has to be tied to reconfigurations within the firm. To understand how start-ups shape markets in times of crises, a holistic process encompassing manifold perspectives is necessary. Hence, the given market-shaping process lacks insights into how the focal firm acts upon the

vision itself. Figure 2 illustrates the shortcoming of the existent theory framework argued for above. In short, we pose the current process of market-shaping in crises is insufficient to explain how start-ups use crises to shape a market. This shortcoming guided the design of this study's methodology, further described in the following section.

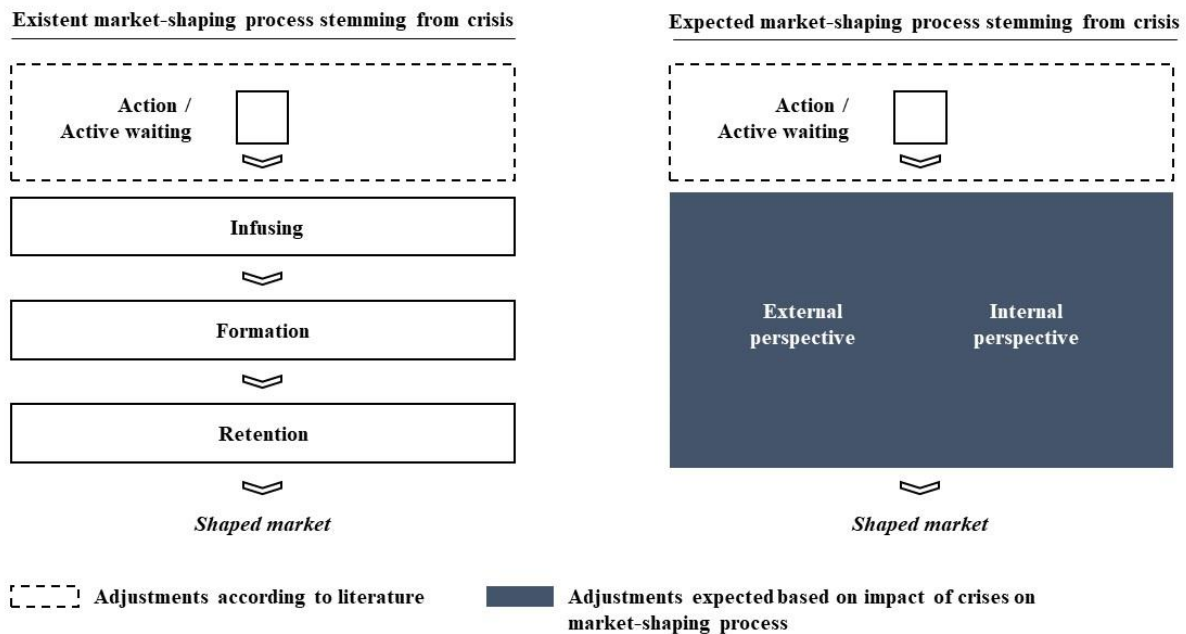


Figure 2: Illustration of shortcomings of existent literature

3 Methodology

3.1 Methodological Fit

3.1.1 Orientation

The objective of this research is to arrive at a holistic understanding of the market-shaping processes rooted in crises, which harmonizes the findings derived from the collected data with existing theory on market-shaping. Based on the limited sophistication of the existent theory elaborated in the literature section, we decided on an abductive research design focusing on inductively developing a market-shaping process. This approach allows for the combination of existing theory and empirical data to discover new concepts (Arbnor & Bjerke, 2008). We see such a reciprocal approach, considering theory and empirics, as best suited to develop an understanding of the market-shaping processes rooted in crises (Dubois & Gadde, 2002). Working abductively allows for an interpretation of the theory and the discovery of wrong assumptions requiring the creation of new theories (Timmermans & Tavory, 2012). Further, limiting the research to purely deductive or inductive methods may impede the potential to conjunct theory and data (Ridder, 2017). Hence, abductive research methods are suitable to answer our research question and develop the theoretical constructs for market-shaping in crises (Gill & Johnson, 2010).

The epistemology of our research can be defined as interpretivism. The nature of market-shaping conveys that markets are socially created artifacts. This implies that markets do not exist in an objective meaning. Actors form the market, fostering cognitive structures that stabilize the market (Callon, 1998; Granovetter, 1992; Kjellberg et al., 2012; Rosa et al., 1999). This makes interpretivism – marked as grasping subjective meanings – the most applicable research tradition (Bell et al., 2022). Accordingly, this research aims to create an understanding of the market-shaping phenomena based on the sensemaking of the individuals engaged in the process (Orlikowski & Robey, 1991). Embracing an open-minded research approach to explore the emergence of novel theory further advocates an interpretivist orientation (Edmondson & Mcmanus, 2007).

3.1.2 Method

This research is based on the collection of qualitative data. Collecting data is an integral pillar of this work to ensure our study is rooted in empirical reality (Eisenhardt, 1989). While market-shaping is a broadly researched field, adding the locus of crises minimizes the available endowments in research as outlined in the literature. For such research, nascent or intermediate

in maturity, working with qualitative data is most suitable. Respective data comprises more explorative potential needed to shed light on yet to be researched phenomena (Edmondson & Mcmanus, 2007; Ridder, 2017). According to Eisenhardt (1989), multiple-case studies are especially prone to derive the explorative potential of qualitative data. The design of this multiple-case study will be outlined in the following section.

3.2 Research Design

3.2.1 Context of the Case study

The case selection demands profound considerations, as the impact of crises differs among different sectors (Pedersen & Ritter, 2022). In this context, the food sector offers an attractive setting. It is affected by manifold forces that can cause a crisis, such as changes in the climate, political shifts, or health risks. Besides the many triggers of crises, the sector's value chains are especially vulnerable to disruptions because of the perishable nature of food (Bhattacharya et al., 2021; Blessley & Mudambi, 2022; Stone & Rahimifard, 2018). Based on the rationale that the food sector is extraordinarily prone to crises, the research is devoted to a case within this context. As mentioned in the literature section, start-ups are most thoroughly disrupted and forced to act by crises (Giones et al., 2020; Kuckertz et al., 2020). Hence, investigating start-ups within the food sector promises to yield vast insights. The following abstract shall provide the necessary theoretical background to form an understanding of the case study and provide the context of the case firms. To classify the case firms, the steps of the food value chain are applied. These steps consist of (1) agriculture, (2) transforming, (3) converting and packaging, (4) shipping and selling, as well as (5) consuming (Cucagna & Goldsmith, 2018; Kuckertz et al., 2019).

In Table 2, the case firms comprised in the primary data collection of this research are presented. The respective start-ups emerge in six subsectors of *FoodTech*, (1) innovative farming systems, (2) farming improvements, (3) innovative food, (4) agricultural management, (5) food processing, and (6) delivery and consumption (AgFunder, 2023; Five Seasons Ventures & Dealroom, 2023).

Subsector	Description of case firms
Innovative farming systems	Innovative farming systems comprise regenerative agriculture, vertical as well as precision farming, and sustainable aquaculture. One start-up at the forefront of this development is case firm 8. The Stockholm-based start-up operates vertical farms in containers located within urban areas. The locally grown vegetables are delivered directly to restaurants, selected retailers, and consumers.
Farming improvements	The scope of farming improvements consists of sustainable fertilizers, methane reduction technologies, sustainable irrigation systems, as well as crop protection and insurance. One of the international leaders in the field of methane reduction technologies is Case firm 10. The company developed an algae-based feed additive that significantly reduces the greenhouse gas emissions of cattle farming.
Innovative food	A field that received increased media attention in recent years is innovative food. This sector comprises precision fermentation, seaweed, and alternative proteins. Case firm 3, producing plant-based fish alternatives, and case firm 4, producing a vegan egg substitute, are active in the field of alternative proteins.
Agricultural management	Agricultural management contains farm management software, IoT and sensing, farm robotics, mechanizations, and equipment, as well as agribusiness marketplaces. In the space of farm robotics, mechanizations & equipment, Case firm 6 developed a robot for mechanical weed control in open crop farming. Case firm 9 uses blockchain technology to track the supply chains of the agri-food sector and thus enables more transparency for food producers and consumers.
Food processing	Food processing entails the sectors of reusable and sustainable packaging, midstream technologies, and sustainable supply chains. In the field of midstream technologies, case firm 7 is developing procedures to extract nutrients from by-products of food production.

Delivery and consumption	The delivery & consumption subsector of <i>FoodTech</i> consists of cloud retail infrastructure, restaurant marketplaces, eGrocery, online restaurants, and meal kits, as well as in-store retail and restaurant tech. Active in the final stage of the food value chain are case firms 1, 2, and 5. Case firm 1 operates an eGrocery platform, selling overstocks of dry goods, while case firm 2 is active in the field of online restaurants and meal kits, delivering cooked meals. Case firm 5 operates a Direct-to-Consumer (D2C) business model, selling vegan meat alternatives through its online shop to consumers.
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Table 2: *Classification of case firms*

3.2.2 Case study Design

We conducted a multiple-case study to gather data, allowing us to understand the crisis-driven market-shaping dynamics in the context of *FoodTech* start-ups. Conducting a multiple-case study appears to be the most suitable approach for multiple reasons. Firstly, the approach enables an in-depth exploration of the impact crises had on the start-ups and their respective responses and provides a better understanding of the context. Secondly, the approach allowed for the use of multiple sources of evidence, such as secondary data in the form of reports or news coverage. Additionally, this approach allowed us to draw practical insights from the interviews. Most importantly, the approach proved suitable to test as well as generate theory, which fits the abductive research approach (Eisenhardt, 1989). We investigated multiple unique case firms under different circumstances. This helped us generate more generalizable insights, thus increasing the validity of the study (Eisenhardt, 1989). The main data collection method for the case study is interviews with the management of *FoodTech* start-ups and industry experts. These are organized in a semi-structured approach to avoid collecting data without clearly understanding its intended purpose (Edmondson & Mcmanus, 2007). Table 3 provides an overview of the conducted interviews (a more detailed overview can be found in Appendix C). Besides the perspectives of the case firms, the case study covers external and holistic perspectives through interviews with central actors in the *FoodTech* ecosystem, such as investors and institutions. We conducted interviews with one investor and three institutional actors. Here, investor 1 is providing development funds for *FoodTech* start-ups. Institution 1 organizes events to accelerate innovations and is an advisor to *FoodTech* start-ups. Institution 2 is an association of *FoodTech* start-ups advocating for more support for the sector from

political institutions. Additionally, Interviewee 14 (Institution 2) was the founder and CEO of a start-up that served consumer and business clients that went bankrupt in the aftermath of the pandemic. Institution 3 can be described as a food innovation think tank backed by the European Union.

Case	Interviewee	Role	Firm	Stage in value chain	Duration
	Interviewee 1	Chief Strategy Officer	Firm 1	Shipping and selling	39 min
	Interviewee 2	Chief Commercial Officer	Firm 1	Shipping and selling	54 min
	Interviewee 3	Founder & CEO	Firm 2	Shipping and selling	27 min
	Interviewee 4	Founder & CEO	Firm 3	Transforming	31 min
	Interviewee 5	Senior Marketing Manager	Firm 4	Transforming	53 min
B2C	Interviewee 6	Chief Retail Officer	Firm 5	Shipping and selling	40 min
	Interviewee 7	CEO	Firm 6	Agriculture	39 min
	Interviewee 8	Founder & CEO	Firm 7	Transforming	40 min
	Interviewee 9	Founder	Firm 8	Agriculture	44 min
	Interviewee 10	CEO	Firm 9	All	21 min
B2B	Interviewee 11	Founder & CEO	Firm 10	Agriculture	23 min
	Interviewee 12	Investment Manager	Investor 1		42 min
	Interviewee 13	Founder & partner	Institution 1		57 min
	Interviewee 14	Chairwomen	Institution 2		25 min
Both	Interviewee 15	Member of food think tank	Institution 3		23 min

Table 3: Overview of interviews

By complementing the interviews with secondary data, we relied on multiple sources of evidence to validate our data and supplement our database (Patton, 2014; Yin, 2014). This enabled us to enrich our data set with additional information on the market-shaping process of *FoodTech* start-ups. Furthermore, this provided an external perspective and allowed us to validate the interviewees' statements. The used secondary data contains reports covering the *FoodTech* sector, news coverage and press releases of the case firms and competitors, the case firms' websites, blogs of actors in the food ecosystem, and interviews with founders of *FoodTech* start-ups. An overview of the secondary data collected can be found in Appendix A. Building our cases on various firms reveals patterns that make a common market-shaping process rooted in a crisis visible. We, therefore, focused on creating a diverse set of start-ups in the case selection. Such purposeful case selection is especially crucial for research stemming from existing theoretical frameworks and maximizes the potential to develop the existing theory (Eisenhardt, 1989; Ridder, 2017). To ensure a diverse data sample, we classified the examined start-ups based on their business model, stage in the food value chain, as well as their location. The selected start-ups represent the entire food value chain and are located across Sweden and Germany.

Based on the business model of the start-ups, two cases were built. The first case comprises *FoodTech* start-ups with a *Business-to-Consumer* (B2C) business model targeting end consumers. This case includes start-ups selling their offering through partners, such as retailers. The second case is built on data about start-ups with a *Business-to-Business* (B2B) business model targeting commercial clients. The case study will comparatively explore the similarities and differences between the two models in the market-shaping process rooted in crises. It has to be noted that for some of the firms, the distinction between B2C and B2B is somewhat fluid. Exemplarily, case firm 7 inherently is a B2B start-up with the vision to target its offering at incumbents in the food market. Interestingly, the start-up developed and launched a consumer product to showcase the underlying technology. Whereas other start-ups, such as case firms 5 and 8, expanded their business, serving both consumers and customers. Thus, insights derived from case firms classified as B2B start-ups may be relevant in the B2C case and vice versa.

3.2.3 Research Process

In the research process, it first had to be questioned if *FoodTech* start-ups are considering crises in their efforts to diffuse their offering in the market. Based on the analysis of secondary data and the initial interviews, this became apparent early on that this is the case. Secondly, a framework for the market-shaping process rooted in crises is derived from the collected data – this process is described in more detail in the data analysis section. Driven by our abductive research approach, the creation of the framework is conjoined with existing theory as the sensemaking of data was guided by the existing theory. The pandemic functioned as a model crisis to carve out this process due to its prevailing and thorough impact on the food sector (Cloutier & Langley, 2020).

3.3 Data Analysis

3.3.1 Data Collection

Data collection design

Our data collection can be divided into two parts. Firstly, we collected secondary data through desktop research. The process of collecting secondary data began before conducting the interviews and extended beyond the end of the interview process. Secondly, a majority of the data collection consisted of the interviews mentioned above. These interviews were conducted in the format of focused interviews (Merton et al., 1990). The interviews were led by an interview guide. To prepare the interview guide, we considered findings from secondary data.

By drawing on additional sources, the interviews are designed to generate triangulated findings (Eisenhardt, 1989). The questions are designed openly to maximize the explorative potential of the data collection. Our initial interview guide can be found in Appendix B. This guide was constantly adjusted to incorporate new patterns that emerged during the interviews. For instance, during the course of the first interviews, we narrowed down the range of the questions, focusing on questions seven to 12, due to their contextual importance and the fact that in-depth answers to all questions would exceed the temporal scope of the interviews.

Data collection process

In the course of the interviews, we allocated ourselves to unique roles. One person took the interviewer role, interacting with the interviewee, while the other person took the note-taker role. After covering the questions of the interview guide, the note-taker had the opportunity to ask questions to the interviewee that arose during the interview. This approach was supposed to allow for the emergence of different perspectives and, by that, enhance the creative potential of the research (Eisenhardt, 1989). We alternated the unique roles in the interviews. Switching roles mitigated the bias of having a single interviewer (Patton, 2014).

As the foundation of our analysis, we coded the interviews independently and hereinafter compared our results to enhance confidence in our findings (Eisenhardt, 1989). Before coding, we created transcripts of all the conducted interviews. We used the transcription feature of Microsoft Teams and manually corrected speech-recognition mistakes to create semi-verbatim transcriptions of the interviews. We adjusted the text of quotes presented in this study to improve clarity and reading flow without changing the statement's meaning. We started the coding after most interviews had been conducted. This approach enabled us to defamiliarize with the empirics and allowed an unbiased coding process (Timmermans & Tavory, 2012). For coding the data, we relied on the qualitative text analysis software *Quirkos*. This was motivated by the possibility of multi-user collaboration and the visual sorting of insights. For the sake of clarity, we decided only to upload the interview transcripts to *Quirkos*. Insights generated through secondary data were collected in a separate file, which we later linked to the insights generated through the interviews. This enabled triangulation of the findings while ensuring a better overview in *Quirkos*.

3.3.2 Grounded Model

For the research on the market-shaping process rooted in crises, we oriented our data analysis on the objective of creating a grounded model. In other words, we strive to create theoretical contributions by forming connections between concepts obtained from gathered data (Corbin & Strauss, 2008; Gioia et al., 2013). To create such a model, we connected the empirical data to existing market-shaping theory (Glaser & Strauss, 1967). This approach was influenced by the temporal bracketing strategy according to Langley (1999). In general, a process analysis seemed most suitable, as understanding patterns in events is an essential building block for developing process theory (Langley, 1999). The intermediate maturity of the relevant literature makes pattern-matching and searching for mechanisms from which generalizations can be formed the primary objective (Ridder, 2017). One argument for using temporal bracketing for the process analysis is its potential to derive generalizable findings compared to other strategies that would be applicable to our research. Further, its focus on making sense of mechanisms in place appeals to our purposes (Langley, 1999).

The coding process intended to highlight relevant parts of the interviews, label those parts, and establish relationships across them. Our coding process comprised three steps. Initially, each of us conducted an open coding round individually to identify insights and categorize them into first-order concepts. Subsequently, we clustered these first-order concepts into market-shaping steps. Building on the created second-order steps, aggregate themes were established. These third-order aggregates form the process of market-shaping rooted in a crisis (Gioia et al., 2013). The last step, the aggregation of themes was guided by existing theoretical contributions, as mentioned in section 3.2.3. By aggregating the discovered themes into themes based on critical events, the research attempts to carefully set accurate temporal breakpoints – dividing collected data into phases to ensure the validity of the findings. Accordingly, the data is transformed into a set of linked, distinct blocks (Langley, 1999). An integral part of building the grounded process model was drawing conclusions across the units of analysis of our cases, e.g., the different start-ups (Yin, 2014).

Figures 3 and 4 visualize the aggregation of concepts for the B2C and B2B cases, respectively. We identified 37, respectively 30 underlying market-shaping concepts among the B2C and B2B start-ups. These codes are a conjunction of general market-shaping concepts (no shading) and concepts related to crises (grey shading). Abundant insights about the market-shaping efforts of the case firms could be derived from the interviews. However, only a small share of it was valuable to build an understanding of market-shaping distinctively in crises. The general market-shaping concepts complement concepts related to

crises to arrive at a holistic market-shaping process. Aggregating the codes into the second order dimension, 10 and 9 market-shaping steps are apparent. These form five themes within the market-shaping process – (1) *Infusing vision*, (2) *Building MVS*, (3) *Expanding MVS*, (4) *Anticipating*, and (5) *Network*.

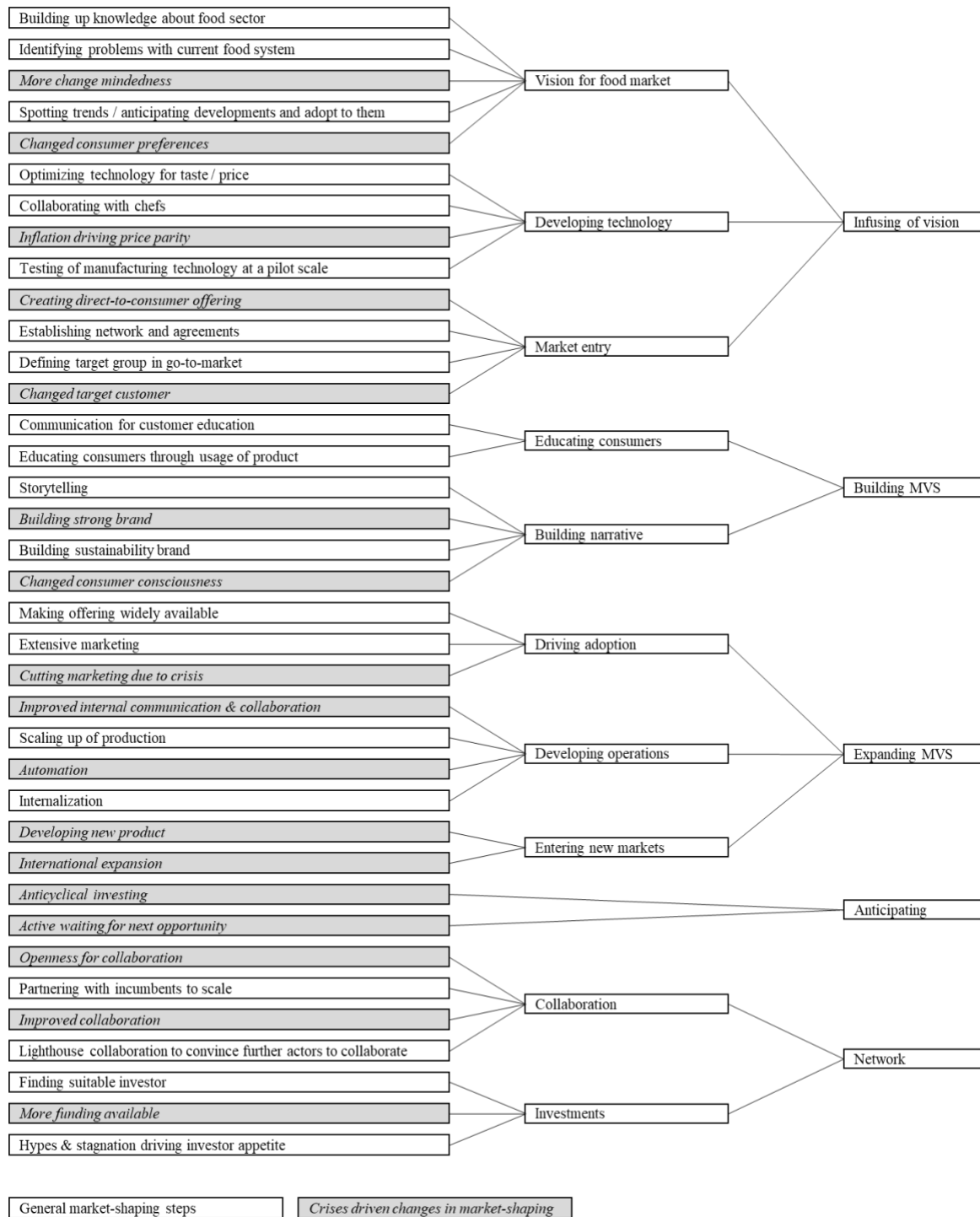
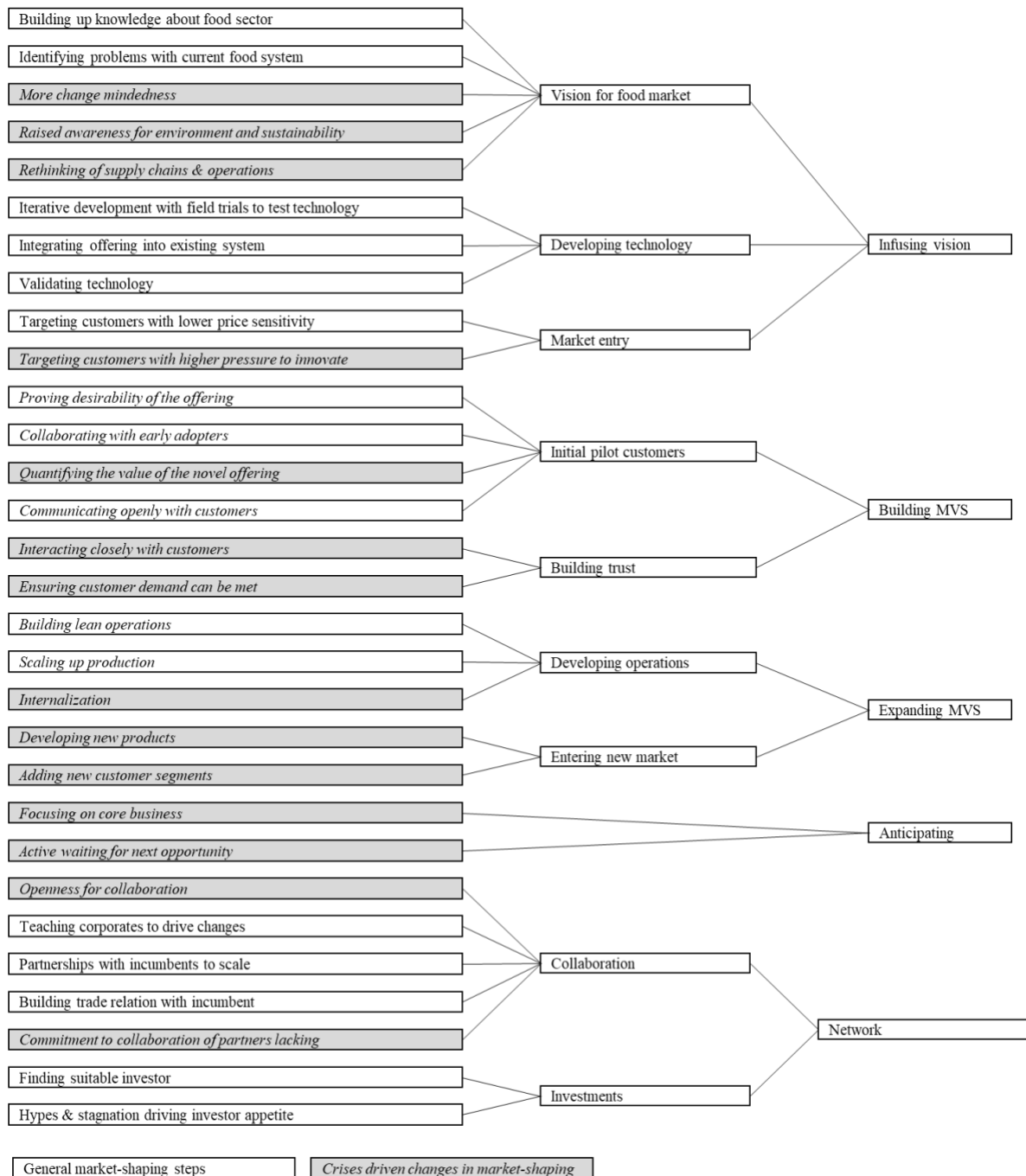


Figure 3: Codes of B2C Case**Figure 4: Codes of B2B Case**

3.3.3 Ethical Considerations

Various ethical considerations guided our qualitative research process to protect the integrity of our study and the study's participants, as well as the reputation of the Stockholm School of

Economics (Saunders et al., 2012). Before taking part in our study, participants were informed about the voluntary nature of their participation, the purpose and scope of our study, and the data processing guidelines. Furthermore, before conducting an interview, we asked the participants for their explicit consent to record and automatically transcribe the interview using Microsoft Teams. We respected the participants' requests if they wished not to be recorded. We highlighted the participant's possibility of withdrawing from the study at any point in time. When participating in the study, we guaranteed full anonymity and confidentiality concerning personal and identifying data. We only publish generic information regarding the participants' roles and companies to provide context.

3.3.4 Quality of Data

The interviews have been recorded and transcribed to ensure a reliable and transparent database. This approach enabled us to defamiliarize ourselves with the empirics and revisit the data to reiterate and sanity-check the analysis (Timmermans & Tavory, 2012). The sample of interviewees in our research attempts to form a wide variety in terms of professional work experience, industry sub-sector knowledge, as well as expertise along the food value chain. The insights from the interviews are complemented by additional data sources, as outlined in section 3.2.1. Considering diverse perspectives and triangulating the findings is motivated by the aspiration to create valid contributions in terms of constructing validity and external validity (Yin, 2014).

3.4 Delimitations

Historically, the case study method has been considered to be more exposed to biases, and the ability to draw generalizations is restricted (Yin, 2014). Moreover, in the initial conceptualization of the research process, we aimed for a more deductive process. The resulting theory work inhibits the inductive potential of our research as we did not enter data collection and analysis fully unbiased (Eisenhardt, 1989). Even though the theoretical contributions on market-shaping were a helpful guide, they may have impeded the explorative potential of our research.

This study focuses on the context of start-ups in the *FoodTech* sector. Thus, the market-shaping process derived from this research project does not consider the perspective of incumbent food producers, farmers, retailers, or other actors in the agri-food system. Besides the delimitation in the context of start-ups, delimitations of this study can be categorized into

two groups. Firstly, a delimitation can be seen in the sample of the study. The temporal scope of the research project did limit the data collection process. Besides the temporal scope, the pool of potential firms is further reduced by the conditions outlined previously and the condition that the start-up was founded before the outbreak of Covid-19 in early 2020. On top of that, securing participation commitment posed a major challenge in the research process. Of the over 150 potential participants contacted, only a minority reacted to our request, and only 15 committed to an interview. To maximize the information derived from such a small sample, we attempted to interview various case firms. As the overview of case firms presented above indicates, it is fair to say that we have a diverse sample of *FoodTech* start-ups in our data (Flyvbjerg, 2006). Furthermore, having start-ups as focal subjects limited data availability, as these companies are usually very young and typically private, thus not obligated to the same publication requirements as listed companies. Secondly, investigating the effect of specific crises on a start-up is complex. Like many other market actors, start-ups are influenced by manifold market forces. Thus, defining the impact a particular factor has is not straightforward. This especially holds true for the impact of crises, as crises are interconnected, and isolating a particular crisis is complicated.

4 Results

4.1 Empirical Findings

This section presents the empirical findings concerning the grounded model of the market-shaping processes rooted in crises. The presentation of those is structured according to the five themes of the grounded model – (1) *Infusing vision*, (2) *Building MVS*, (3) *Expanding MVS*, (4) *Anticipating*, and (5) *Network*. Within these themes, the findings follow the structure of the underlying market-shaping steps, covering both the B2C and B2B case where the steps coincide. Guided by the posed research question, the presentation of the analysis will focus on insights rooted in the impacts of crises. Illustrative quotes from the interviews are used to underline the findings.

4.1.1 Infusing Vision

Vision for food market

The vision of the focal start-up is the starting point and hence part of the market-shaping process. Creating a vision is rooted in possessing knowledge about the food market. Such knowledge enables founders to identify problems in the market and understand trends impacting it. This is especially relevant in times of crises. The pandemic raised consumer consciousness about environmental sustainability as well as personal health. As a result, consumer preferences changed, with an increased demand for healthy offerings. As presented in industry reports:

“The COVID-19 pandemic accelerated the adoption of alternative proteins, and health consciousness was the most common motivator” (Morach et al., 2022, p. 7).

“Consumer preferences have shifted towards healthier and more sustainable food over recent years. This trend accelerated during the pandemic” (Koch & Kamel, 2022, p. 29).

During the pandemic, these trends unfolded in conjunction with an increased change-mindedness among consumers and a higher disposable income for food. While the pandemic increased the willingness to try the offering of *FoodTech* start-ups, inflation, on the contrary, reversed this trend. As the following quotes illustrate, consumers were becoming more price sensitive and conservative.

“[Consumers are] going back to comfort food. You know what's safe, what they typically buy. So, they're not very explorative trying new things” (Interviewee 4).

“And with it decreases the desire to try out new things and spend money on what might not taste good eventually” (Interviewee 2).

“The willingness to try something out is usually rather low” (Interviewee 5).

Alike start-ups addressing consumers, during the pandemic, B2B start-ups benefitted from an increased desire by established players to change the existing system. The pandemic and the war in Ukraine unveiled various shortcomings in the food value chain. Thus, an increased demand for a local, transparent, sustainable, and independent value chain emerged. Such changes within the market constitute the starting point for start-ups to advance their own vision of the market. A common vision among the interviewed start-ups is making the food market more sustainable. Infusing such a vision into a market that has undergone described changes is likely to find favor with more consumers and business customers.

Developing Technology

Taking internal actions on the vision for the food market, start-ups develop the technology necessary to infuse the vision into the market. In the consumer business, creating a novel offering that reaches parity with conventional food on the dimensions of taste and texture as well as price is of utmost importance. The following quotes highlight that start-ups could capitalize on inflationary pressures to reach price parity. Building on these findings, it can be inferred that the imperative for *FoodTech* start-ups is to develop technology resistant to cost increases to benefit from the inflationary effects of crises.

“Labor is the most expensive thing in the meal. And for us, this is good because as a restaurant’s pricing becomes more expensive, the value proposition of [case firm 2] becomes even stronger because we can maintain [our] price point” (Interviewee 3).

“Rising food prices have the potential to narrow the gap between traditional foods and alt-proteins, but only to the extent that alt-protein providers can maintain prices” (Frederick & Nacionales, 2022, p. 2).

Compared to private consumers, professional customers have higher expectations in terms of the reliability of the offering. Further, many start-ups lack the resources for extensive research and development. Thus, co-developing the technology with an experienced partner in the industry might be an effective approach for B2B firms.

Market entry

Another crucial consideration of how a start-up can infuse its vision through the novel offering is how the offering itself is infused in the market. Important components are the distribution channels and the target group. Within the B2C case, the pandemic led to a stark shift towards directly addressing the consumer. A common approach regarding the definition of the initial target group is starting the market entry in a niche market and subsequently expanding. Adopting this strategy, the start-ups targeted different customer groups, depending on changed consumer preferences driven by the prevailing crisis. During the pandemic, the focus laid on consumers seeking sustainable offerings, while inflation shifted the focus to consumers looking for cost-effective offerings. Overall, the pandemic led to a smaller target customer group, according to interviewee 13.

“Companies have been living in the hopes of having affluent inner-city dwellers buy their products. And now that market is [...] definitely smaller than it used to be. So that means that you have a problem with reaching out with products to the end consumer”

(Interviewee 13).

Looking at the B2B case, the regulatory pressure on many actors in the agri-food market has increased in recent years. Thus, the pressure to innovate increased, and actors in the market are increasingly searching for new solutions to be compliant. Start-ups actively target the affected sectors and try to anticipate regulatory changes to be at the forefront of the market when legislation is in place. For instance, case firm 9 anticipates policy changes, as the demand for their product is largely driven by transparency laws.

“There are [regulatory demands], and it's coming more and more. [...] So that is a really good thing for us. This is very much driven by authorities and by law actually”

(Interviewee 10).

However, our study has revealed that start-ups prefer focusing on building their company and are not willing to allocate resources to proactively influence policy changes, as the founder of case firm 10 indicates:

“I think I don't want it [lobbying for policy changes] to be our role” (Interviewee 6).

Executing the market entry strategy and launching the offering constitutes a critical event. It represents the infusion of the start-up's vision materialized as its offering into the market. As it forms the foundation to build an MVS, it is considered a key milestone among case firms 3, 4, and 5.

4.1.2 Building Minimum viable system

Educating Consumers

In a B2C context, *building an MVS* depends on consumer education, especially if the start-up develops a radical innovation.

“[Radical innovations are] not really understood yet” (Interviewee 12).

The education of consumers is advanced through two levers, (1) communication by the start-up and (2) the usage of the offering. Communication by the start-up can take the form of information on the product packaging, as done by case firm 7 with its consumer product. Case firm 3 builds on the second approach for consumer education.

“[Consumers] will get educated once they have that option that they enjoy. We want to convince more with the product than with information” (Interviewee 4).

Building narrative

To build the narrative for their offering, B2C start-ups use storytelling combined with sustainability branding. Through the focus on sustainability, start-ups positioned themselves in line with the raised consumer consciousness about the environment during the pandemic. However, inflation and the war in Ukraine have taken away the attention from sustainability, making respective branding less appealing. In line with the changed target customers in the market entry, start-ups must build a different narrative. Irrespective of the positioning, start-ups focus on building strong brands during crises to become more resilient.

“We build a consumer brand around [the offering] to really drive the transition from animal seafood to plant-based seafood (Interviewee 4)”.

“This uncertain time is forcing us to focus on creating content to support and strengthen our community (nibs etc, a start-up making sustainable snacks out of ingredients that would normally be thrown away)” (Adapting to COVID-19: 10 Food Tech Companies Coping with Coronavirus, 2020).

By educating consumers and building a narrative around their offerings, start-ups strive to create a customer base that promotes the offering. Having a recurring customer base is an important milestone, as illustrated by the following quote.

“You don't have to convince the consumer to buy the product once. With a product like a vegan egg, you have to completely change his behavior and his eating habits”
(Interviewee 5).

Creating such a group of ambassadors completes the MVS of B2C start-ups, which can subsequently be expanded into the wider market.

Initial pilot customers

Running pilot projects with customers at a small scale is a common theme for initiating the creation of an MVS in a B2B context. In this study, case firms 7, 8, 9, and 10 either have worked or are currently working with pilot customers to prove the feasibility and desirability of the offering. Working with clients that share the vision of the start-up is an effective approach, as they tend to be open towards innovation:

“You need to move forward with pilot customers, and those are the early adopters. Those are the ones that can foresee what is going to happen [...] Those are the ones that start the innovation, and once you have them, they are, of course, the ambassadors for many others” (Interviewee 7).

Crucial in this step is to communicate the desirability of the offering to potential clients effectively. The interviews have revealed that, especially in times of crisis, quantifying the value of the offering is a powerful tool to convince customers of it. According to the interviews, professional customers are usually very informed about the economics of their operations. Thus, case companies 7, 9, and 10 believe that quantifying the monetary benefits is crucial to convince customers about their offering.

“The best thing is to show that this will improve your company and you will make more money. You will be more profitable, and maybe also you will save time [...]. I think this is one of the most important selling points” (Interviewee 10).

Besides communicating the financial benefits, start-ups also convince clients through compelling storytelling. For example, in light of the supply-chain disruptions and raised awareness for sustainability, highlighting local production and low emissions in the storytelling is effective in persuading clients of a solution.

“I think that the key to success is to be transparent. To say to the farmer: OK, this product is not ready yet, but we really want to try it out” (Interviewee 7).

Building Trust

For professional customers, reliability is said to be of utmost importance. Thus, proving that customers can fully rely on the novel offering is a key objective of a pilot project.

“Once you are able to prove that this technology is something that you can rely on [...], it’s a lot about trust. The farmer needs to trust this technology because [technology] changed the logic” (Interviewee 9).

Besides building trust in day-to-day operations, crises enabled start-ups to enhance collaboration and communication through new channels. For instance, case firm 8 used the downtime of their clients during the pandemic to improve the customer relationship.

“For example, [Michelin starred restaurant in Stockholm] took the whole team, and then we could talk. [...] We got a really good collaboration. They could see how we work and [...] how the process works from seed to table. That’s what something good with Covid that people had more time [...]” (Interviewee 9).

As outlined above, the recent crises have raised the importance of reliable supply chains. Thus, ensuring that customer demand, both in terms of quantity and quality, can be satisfied, particularly within the scope of a pilot project, is crucial. Especially when working with professional clients, guaranteeing supply and fulfilling expectations is of utmost importance, as dissatisfaction can have severe consequences for business relationships.

“If you're looking at Michelin-starred restaurants, you have customers that have booked many months before, and they have very high expectations. And so in that way, you can really trust us, know that we will deliver” (Interviewee 9).

The successful completion of pilot projects is crucial to move on to the next phase of the process framework for B2B start-ups. Consequently, the technology is proven in a real-world environment, and an ambassador customer base is established.

4.1.3 Expanding Minimum viable system

Driving adoption

The expansion of the MVS is driven by the expansion of the customer base. B2C start-ups invest in extensive marketing and ensure the offering is widely accessible to consumers. In times of crises, however, marketing efforts can be minimized to cut costs. One could expect that the raised environmental consciousness among consumers nevertheless benefited the start-ups that branded themselves as sustainable. Interestingly, case firm 1 could not record any such effect.

*“Brand awareness is an important topic, there we have not benefitted from the crisis”
(Interviewee 1).*

This reveals that the changed consumer consciousness because of the pandemic could not replace marketing efforts.

Developing operations

Driving the adoption of the offering requires start-ups to scale up the underlying operations. This step is marked by a chicken-egg problem. Start-ups need partners to scale, but to become interesting for partners, start-ups must have reached a certain scale already. This challenge is presented in more detail in the collaboration section. Building on the previously described importance of meeting the demand for B2B start-ups, the operational backbone of the respective start-up plays an integral role in the market-shaping process. In this notion, the case firms focus on building lean operations by eliminating waste and reaching industrial scale. Case firm 8 faced production as a key bottleneck due to the pandemic-driven demand. However, it has to be noted that even though the start-up cooperates with actors outside the food sector, it is not collaborating in terms of production. This again highlights the importance of

collaborations. Another key step towards operational excellence for B2B start-ups is doing parts of the business model internally. In both cases, this seemingly is an important step. Only for case firm 8, the push for building the technology internally was caused by the pandemic, however. Hence, it cannot be generalized based on the empirical evidence that crises advance internalization. Irrespective, internalization contributes to the ensured supply of the offering. As the founder of case firm 8 anecdotally depicts it:

“We know every part of the [technology]. For example, this night, we got an alarm. We needed to solve some problems with the pump at 1:00 o'clock at night. [...] It's much easier when you have developed this technique by yourself” (Interviewee 9).

Not only scaling but also improving the operations, case firm 1 used the pandemic to improve internal collaboration and communication.

“Before [the pandemic], we already worked out more in silos, and it was spoken less at the spoken at the overall company level” (Interviewee 1).

An additional milestone for case firm 1 in this phase was the automation of its operations. During the pandemic, the start-up experienced the impact of employees becoming sick on its operations and emerged from the crises with reduced dependence on human labor. Further, the start-up operates more profitably because of automation.

“[Because of the automation], we can scale better. That was a giant step because without automation, we would be burning a lot more money, and then we wouldn't be interested in the current market” (Interviewee 1).

Overall, it seems that the focus on improvements within the start-up, such as improving operations or communication, is relevant, especially for B2C start-ups in the shipping and selling stage of the food value chain. While scaling up the production is considered important among case firms 1, 2, 3, and 5, as well as secondary data of the B2B case, the automation may only be valuable for case firm 1.

Entering new markets

Besides the expansion of the MVS within a given market, start-ups expand the MVS into new markets driven by the prevailing crises. The start-ups either entered new product or customer segments or entered new geography with existing offerings during crises. Case firm 7

developed a new consumer offering as a response to inflationary pressures. The learnings that have been drawn in case firm 5 from the crises further add to this notion, as the quote of interviewee 6 illustrates.

“The drinks we are having that you've seen are coming in 250ml glass bottles. We need to order bottles. [...] Prices for those have gone up, like, pretty much 50%. [...] So what we did was we concentrated them from 250 to 20 milliliter, and we put them in small packaging. Not energy intense. Easy to transport, better for the environment, and then it's cheaper” (Interviewee 8).

“Recognizing opportunities and then exploiting them quickly and not somehow thinking about it for another one or two years - Do we do that now? What are the advantages and disadvantages? Instead, simply try out what works and then improve it and move on. That's definitely what we're taking away from the pandemic” (Interviewee 6).

A common motivation for entering new markets among B2B start-ups is the increased focus on generating revenue in times of crisis. As interviewee 14, founder and former CEO of a B2B start-up, describes it:

“In the crisis, what you do is simply very much sales-driven and not necessarily strategically driven” (Interviewee 14).

Based on this rationale, the start-up pivoted its offerings from a branded to a white-label offering to turn demand more effectively into revenue. Another example is case firm 9, which adapted parts of the offering. By making it digital, the start-up could benefit from greater scalability and increased brand awareness. Beyond developing the offered product portfolio, start-ups added new customer segments. In particular, case firm 9 added a consumer business during the pandemic to counteract losses in its B2B business.

“What we learned when COVID came, and all restaurants closed over one night, it's good to have your eggs in different baskets, so to speak. And that was when we started to make these subscription deals to families. So it's really good to spread the risk out” (Interviewee 9).

As the quote illustrates, expansion can be an effective lever to mitigate the start-ups' risks. Contradictory, it can also result in inconsistent growth and uncertainty about the future prospects of the start-up.

“[The pandemic] was a super difficult time for venture development, and even with rising revenue, it was still difficult to develop the company further” (Interviewee 14).

“[German agricultural management start-up] has certainly achieved good traction [during the pandemic], which is still unbroken. But [...] they don't yet have a clear outlook on how they can build up their business model [...] in the future, because there are so many uncertainties” (Interviewee 12).

Looking at start-ups that entered new geographies, case firm 1 expanded to Germany during the pandemic. Case firm 3 was planning its international expansion to Germany at the time of the interview, and crises have not been stated as being decisive for this step. Hence, it cannot be generalized that international expansions are rooted in crises.

The expansion of the MVS in the wider market and beyond into additional markets is presented as the last step of the process framework. It should not be considered as terminal with the market-shaping process ending but rather as a phase of continuous expansion.

4.1.4 Anticipating

The following quote illustrates that the pandemic raised the awareness among start-ups that they need to be better prepared for crises.

“Covid-19 [...] brought the perception and the importance of crises to the minds of everyone. Suddenly from one day to the next, just everything can go down” (Interviewee 12).

As outlined above, the major impacts of crises are the changed behaviors that start-ups identified as opportunities or challenges to act on. To be able to do so, B2C case firms engage in steps that are hereinafter called active waiting for the next opportunity and anticyclical investing. In essence, these steps comprise that companies need to improve internally to be able to invest during crises. This goes hand in hand with an increased focus on profitability. As such, active waiting, particularly by improving profitability, gives start-ups the financial capacity to invest once crises arise. The importance of these *anticipating* steps is fostered by the finding

that timing is crucial to capitalize on trends. As the founder and CEO of case firm 3 describes it:

“I see it almost like surfing a wave. You need to be in place before the high comes or sort of be able to identify a certain trend before everyone else would have done it. And then be there when the hype comes and enjoy the benefits” (Interviewee 4).

Such active waiting may be executed by diversifying the offering into new channels. Case firm 5 has done so in response to the crises. The pandemic served as an eye-opener that the start-up's revenue should not solely depend on one channel.

“It certainly helped us to broaden our base. [...] there was a time when e-commerce grew very strongly, and then there was a time when things didn't work out at all. [...] Not making ourselves dependent on just the e-commerce or just the food service area [...] because you never know which channel is developing well” (Interviewee 6).

Moving to the second case, such diversification has been an important lever for B2B start-ups to reduce risk and generate revenue as well. However, to be truly prepared for crises, B2B start-ups must balance the trade-off between reduced risk and reduced focus. The reduced focus might materialize in uncertainty about the start-ups' prospects outlined in the entering new market section. According to Interviewee 14, the bankruptcy of her previous start-up can be attributed to a lack of focus on the food business. From this, it can be derived that start-ups should expand into opportunities adjacent to the core business when *expanding the MVS*.

“I think it will be easier to find both people that could help us and also [cheaper] material. [...] That's something we could utilize. [...] Since we have a positive cash flow in the company [...], we have been able to finance us” (Interviewee 9).

It can be summarized that, as for B2C start-ups, active waiting through focusing on profitability is an integral part of *anticipating* upcoming crises in the B2B case. Deviating from the B2C case, this is complemented by an orientation on the core business of B2B start-ups. The importance of *anticipating* has been emphasized by the recent crises evolving shortly after another. In this environment, it is questionable whether the opportunities of a crisis persist.

“And Corona was one of those things [that] impacted a lot of people. [...] I think it brought a lot of consciousness to the environmental problems, which are sort of now disappearing a bit” (Interviewee 4).

“I’m very, very skeptical about whether that has brought about a sustainable change in consumption. I see that customers have reverted extremely quickly to the very old classic purchasing patterns” (Interviewee 2).

4.1.5 Network

Collaboration

Looking into the data, it becomes apparent that creating a network plays a central role in the entire market-shaping process start-ups adopt. It is presented as a separate part of the market-shaping process because of its importance. Nevertheless, it has to be considered as an integral part of the above-presented phases. Particularly when *infusing the vision* and *expanding the MVS*, collaborations with incumbent actors in the food ecosystems are considered crucial. As such, start-ups work with external partners to develop their technology. Most importantly, start-ups partner with incumbents to scale production in both cases.

“We have co-manufacturers in Netherlands and Germany currently [...] that produce [our product] for us” (Interviewee 4).

“Then you invite [incumbent breweries], anyone who has production capacities that could somehow be reallocated in the future, and then [incumbent breweries] can provide the bioreactors for [start-up creating fermentation-based food]” (Interviewee 12).

At first sight, this seems especially relevant for start-ups in the transformation stage of the value chain. But the founder and CEO of case firm 2, a start-up in the shipping and selling stage, highlights such cooperation as relevant too.

“At the moment, all the production is happening internally by us, but at a certain level of scale, certain pieces of production can be moved to an external partner” (Interviewee 3).

Start-ups along the entire food value chain, in both cases, could benefit from an increased openness of incumbents to collaborate. This openness is driven by the pandemic, which made these actors realize that the current offering is not future-proof.

“They simply have financial pressure to change [the current offering] because they simply don't see the prospects there. Is that because of Covid? Yes, because of Changes in consumer preferences certainly made another considerable push on it”
(Interviewee 12).

Not only was it easier to start collaborations with incumbents, but B2C start-ups could also improve the ongoing collaborations. Among B2B start-ups, however, the pandemic did not improve existing collaborations. Interviewee 14's previous start-up recorded lower commitment of partners during the crisis. This, in turn, impeded the quality of the start-up's offering. As the quote highlights, the start-up faced the aforementioned supply chain challenges instead of solving them.

“Supply chains have become more prone to operational problems that we actually already had under control. Somehow farmers delivered wrong, packed wrong, on a wrong day, whatever. All of a sudden, the error rates shot up again” (Interviewee 14).

Investments

Another important dimension is building a network with suitable investors. Attracting funding from investors is of utmost importance to finance the market-shaping endeavors of start-ups. Start-ups benefited from more funding during the pandemic. However, investors' appetite for *FoodTech* start-ups dropped in the aftermath of the pandemic.

“Investors may be feeling dismayed due to disappointing retail sales performance as reported by Beyond Meat and Kellogg's plant-based brand Morningstar Farms”
(Frederick & Nacionales, 2022, p. 14).

The investor sentiment shifted towards a focus on profitability. This is, in turn, said to be challenging to reach for start-ups that invested during the pandemic, contradicting the importance of anticyclical investing. Exemplarily, case firm 9 stated that the funding became more complex during the pandemic.

“[The pandemic] impacted us in the possibility of getting funds. Because everything slowed down in that period. We really struggled to raise money for the project”
(Interviewee 10).

“Profitability is suddenly important. Which in the food online sector is extremely difficult, especially for scale-ups, if they have invested hard in this crisis phase”
(Interviewee 1).

The trade-off between investing during crises and increasing profitability raises the question of whether anticyclical investing is advancing the market-shaping process of start-ups. Based on the collected data, it is fair to say such investments should be made with a clear path to profitability.

4.2 Cross-case Comparison

This section will compare the B2C and B2B cases to evaluate how start-ups approach the market-shaping process in crises. This comparison section will explore the similarities and differences between the two cases. Figure 5 portrays the grounded model derived from our empirical data. It constitutes the process structure in which crises-driven market-shaping takes place. Since collaboration should be considered integrated within the other themes, it is not illustrated separately.

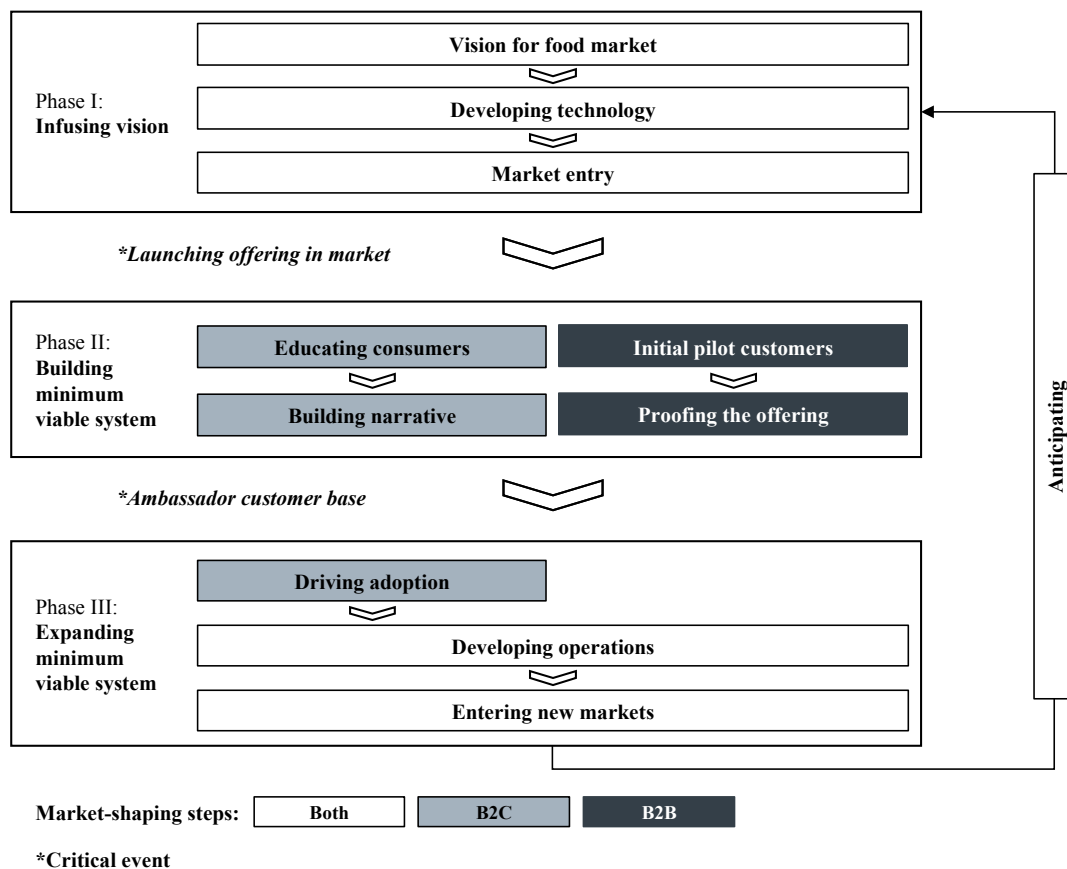


Figure 5: Grounded market-shaping process

From a holistic perspective, the phases of market-shaping in light of crises – (1) *Infusing vision*, (2) *Building MVS*, and (3) *Expanding MVS* – are identical for both cases. Zooming in on the distinctive steps taken within the phases, differences become apparent. Figure 5 illustrates that the key distinction can be found in *building the MVS*. Subsequently, *expanding the MVS* involves one additional step of driving adoption in the B2C case compared to the B2B setting. However, looking at the level of market-shaping steps is not conveying the complete picture. Considering the underlying concepts within the market-shaping steps, further differences become apparent. Those are outlined in the following passages.

Infusing vision

Infusing the start-ups' vision into the market, both B2C and B2B start-ups could address changed preferences among the respective customer groups. Such preferences fluctuated more extensively among consumers than business customers, making the environment of B2C start-ups more dynamic, with hypes constituting an important force. Stemming from this, B2C start-ups are seemingly more focused on identifying transitory opportunities, while B2B start-ups adhere to solving a distinctive problem in the food market. In both cases, crises define the target customer for start-ups. In the B2C case, the start-ups change the targeted customer group as the prevailing crises alter the viability of addressing different customers. For instance, inflation and the resulting demise of consumers' concern for sustainability made the sustainability niche too small to be financially attractive. At the same time, the target customers for B2B start-ups did not significantly deviate. However, the crises intensified the pressure to innovate for potential customers, favoring the desirability of the start-up's offering.

Building MVS

The steps of *building the MVS* differ, with B2C start-ups building resonance among consumers and B2B start-ups proving the technology to pilot customers. As such, B2C start-ups operate more reactively, building a narrative appealing to the prevailing consumer sentiment. B2B start-ups take a more active role by closely working with initial customers. The apparent differences materialize in two ways. First, B2C start-ups have a strong focus on building a narrative around the offering, while B2B start-ups have the offering itself as a focal instrument for market-shaping. Second, the communication of B2C start-ups can be characterized as one-directional communication. B2B start-ups opposingly engage in two-directional interaction. For all start-ups, except those directly addressing consumers, ensuring that the demand can be met is of utmost importance.

Expanding MVS

The importance of ensuring supply for market-shaping in crises is reflected in the comparison of the expansion of the MVS. In both cases, a common pattern is the focus on scaling up the operations. In terms of improving operations, the B2C case firms could take advantage of the crises to a greater extent. However, this finding is mainly driven by case firm 1. Likewise, case firm 9 is a single precedent for crisis-driven internalization in the B2B setting. Building on the importance of a strong narrative for B2C start-ups, driving the adoption through, e.g., extensive marketing is a distinctive step in the market-shaping process of respective case firms. Further, among B2C and B2B start-ups, similar steps to expand the business are apparent. Excluding the international expansion of case firm 1 as a potential individual case, diversifying the offering is a common step to expand the MVS among both cases.

Anticipating

In terms of *anticipating* successive crises, active waiting for the next crisis is relevant in both cases. Among B2C and B2B start-ups, this entails focusing on profitability. Besides this, in the B2B case focusing on the core business based on the initial vision is crucial to shaping the market in the long run. Noteworthy is the former start-up of Interviewee 14 that went bankrupt in the aftermath of the pandemic. While B2C start-ups faced unfavorable changes in consumer preferences and investor sentiment as well, a lack of focus has not been named as challenging in this context. These *anticipating* steps appear to be generally necessary to make use of new opportunities unveiled by *infusing the vision*. Thus, this step connects to the first stage in the process, resulting in a circular market-shaping process.

Network

In both contexts, an increased openness for collaboration with actors in the food market can be observed during times of crisis. In the execution of such, B2C start-ups enjoyed improved collaborations, whereas, among B2B start-ups, issues caused by the lower commitment of partners have been stated. Analyzing the network of investors, in both cases, investors' appetite is driven by hypes, which can be rooted in and vanish with crises.

Concluding thoughts

Summarizing the key elements of the findings, Table 4 provides an overview of the impact of crises on the market-shaping process. The italic elements highlight the market-shaping steps that foremost advance changes within the focal firm and not in the external market network.

	Both cases	B2C	B2B
Infusing vision	<ul style="list-style-type: none"> ▪ Pandemic increased the change-mindedness of consumers and business customers ▪ Pandemic increased awareness of sustainability among consumers and business customers ▪ <i>Inflation increased pressure to develop an offering that reaches price-parity</i> 	<ul style="list-style-type: none"> ▪ Crises influenced start-ups to develop new offerings that address altered consumer preferences ▪ The pandemic influenced start-ups to target consumers directly (D2C) ▪ Crises influenced start-ups to adjust their target customer group 	<ul style="list-style-type: none"> ▪ Start-ups targeted customers with increased pressure to innovate ▪ Crises triggered rethinking of food supply chains
Building MVS	<ul style="list-style-type: none"> ▪ Crises-driven changes in customer preferences dictated the narrative start-ups built 	<ul style="list-style-type: none"> ▪ Pandemic-driven change-mindedness made consumers open to innovations, while inflation made consumers more conservative 	<ul style="list-style-type: none"> ▪ Start-ups increasingly quantify the value of a solution ▪ Pandemic enabled new communication channels and platforms ▪ Crises increased customer demand for reliable solutions
Expanding MVS	<ul style="list-style-type: none"> ▪ <i>Scaled operations to satisfy crises driven demand</i> ▪ <i>Pandemic improved internal collaboration and communication</i> 	<ul style="list-style-type: none"> ▪ <i>Pandemic influenced companies to automate operations</i> 	<ul style="list-style-type: none"> ▪ Diversification of business model
Anticipating	<ul style="list-style-type: none"> ▪ <i>Active waiting for successive crises</i> ▪ <i>Crises raised awareness for profitability</i> 	<ul style="list-style-type: none"> ▪ <i>Crises influenced start-ups to invest during crises</i> 	<ul style="list-style-type: none"> ▪ <i>Crises raised awareness to focus on core business</i>
Network	<ul style="list-style-type: none"> ▪ Pandemic increased the openness of incumbents to collaborate ▪ After the pandemic, investors became more critical and set higher profitability requirements 	<ul style="list-style-type: none"> ▪ Crises improved collaborations with existing partners 	<ul style="list-style-type: none"> ▪ Crises decreased the commitment of partners to collaborate

Table 4: Effects of crises on market-shaping

Adding general thoughts on the presented analysis, the phases of the illustrated market-shaping processes are not necessarily sequential. The clustering of the observed activities in the steps that are aggregated into the main three phases – (1) *Infusing vision*, (2) *Building MVS*, and (3) *Expanding MVS* – plus *Anticipating* does not claim to be rigid. In other words, an alternative modeling of the phases can be argued for. While the critical events set decisive distinctions between the three main phases of market-shaping, the steps within those phases may have more fluid barriers. Further, the *anticipating* phase may not be mutually exclusive with the other three phases. For instance, measures developing the operations (i.e., automation) may also improve profitability, making the start-up better prepared for successive crises. As such, the presented process illustrates the focus areas of start-ups along the market-shaping process in crises based on our sense-making of collected data. Further, it shall be noted that the start-ups did not engage in the whole process during one crisis. Rather they adopted parts of the process depending on the maturity of the firm. For instance, case firm 1 – a start-up that already established an MVS before the pandemic – leveraged this crisis to diffuse the offering through means considered in the *expansion of the MVS*.

5 Discussion

In this section, the presented findings are discussed in light of the previously presented literature to highlight the empirics' contribution to developing the existing market-shaping theory. To arrive at a holistic understanding of the market-shaping processes rooted in crises, the grounded process model derived from our findings (Figure 5) is discussed in light of the reviewed literature. Based on this discussion, a conceptual process model (Figure 6) is established. Subsequently, the phases of the conceptual model are discussed in more detail.

This first abstract explains the identified deviations from existent theory in our findings, which motivate the creation of the conceptual process model presented afterward. In the literature review, it has been outlined that the primary distinction of the market-shaping process in crises compared to the general process is deliberately starting it. The findings of this research reveal that a major part of market-shaping in crises is capitalizing on changed market properties. Particularly *anticipating* crises, giving the process its circularity, illustrates this deviation from the market-shaping process in its general form. Hence, it is indeed an essential part of the respective process but not the sole difference that unfolds in crises when it comes to market-shaping. This study shows the importance of considering firms' internal processes that affect market-shaping. Thus, the focus shifts from an external to an internal perspective compared to the conventional market-shaping process. In particular, the start-ups focused less on orchestrating external actors and more on actively building the pathway to realize the vision. Referring to the literature section, it has been established that the general market-shaping process comprises the orchestration of market actors by the focal firm. For instance, a firm might create an environment that makes it attractive for others to support the market-shaping efforts (Hawa et al., 2020; Kjellberg et al., 2015). However, the findings do not offer evidence that the start-ups attempted to do so. Despite the importance of working together with other actors, the start-ups did not actively prompt and coordinate those.

While not orchestrating the network, accessing its resources can be defined as a crucial part of the market-shaping process rooted in crises. Substantiating a *bricolage* approach to market-shaping, start-ups combined these external resources with a focus on internal actions to build pathways advancing the market-shaping efforts (T. Baker & Nelson, 2005; Kuckertz et al., 2020; Patvardhan & Ramachandran, 2020). The added notion of building a pathway to realize the posed vision, e.g., through the development of technology, opens the door for contributions of other research streams. Noteworthy, the relevance of innovation management literature occurred to us in the course of the data analysis. As such, the conjunction of market-shaping

and innovation management could potentially add more depth to the understanding of how start-ups can commercially benefit from a shaped market. The future research section of this study outlines more extensively where we see promising avenues to combine market-shaping with innovation management. Exemplarily, the collaborative market-shaping process, even more so during crises, can be reflected in innovation management literature. Kavadias et al. (2016) name collaboration with supply chain partners and sharing of assets, such as production facilities, as levers to shape a market.

Further elaborating on collaboration, our study confirms that collaboration is an integral part of the market-shaping process in the context of *FoodTech* start-ups. However, our research indicates that engaging with other actors occurs throughout the process. Opposing the process framework Nenonen and Storbacka (2020) developed, we argue that collaboration is not a separate step in the process. Securing the engagement of actors is considered the second to last step in the conceptual process, whereas our findings emphasize the importance of engaging with actors to access their resources early on. A reason could be that collaboration is crucial for developing new technologies in the food sector. Most notably, start-ups have to foster relationships with a diverse range of other actors to master new product development (Khan et al., 2013). Furthermore, the literature indicates that in the early stages of the process, market-shaping activities are only apparent within the organization itself. However, our research revealed that many *FoodTech* start-ups collaborate with external partners early on. Based on our findings, it can be stated particularly incumbents become such partners. This validates emerging literature challenging the conception of incumbents as blockers of innovation (Berggren et al., 2015; Dijk et al., 2016). Our case study has revealed that incumbents constitute allies for *FoodTech* start-ups in their market-shaping activities. As previously elaborated, the most important asset incumbents bring to the table is the production facility that helps *FoodTech* start-ups to scale their operations.

Besides the unique characteristics of the crisis-specific market-shaping process, the way it applies to empirical reality demands explanation. Contrary to the previous contributions by literature, the interviewed start-ups did not start over the market-shaping process upon the emergence of a crisis. Instead, the start-ups adapted within the market-shaping phase and adjusted their actions going forward based on the altered environment. Exemplarily, case firm 1 just used the crises to further expand the MVS. However, this may be explained by the focus on start-ups in this study. Incumbent firms that are not engaging in market-shaping may start the respective process upon the emergence of a crisis (Flaig et al., 2021a). Adding to the phases,

the critical events distinguishing the phases of the market-shaping framework in our findings foster the temporal nature of the process. Based on this, start-ups can be placed in the process less ambiguously. Conceptualizing the hitherto discussion of our findings, Figure 6 illustrates the market-shaping process rooted in crises. The shaded parts of the process portray the deviations from the existent theory.

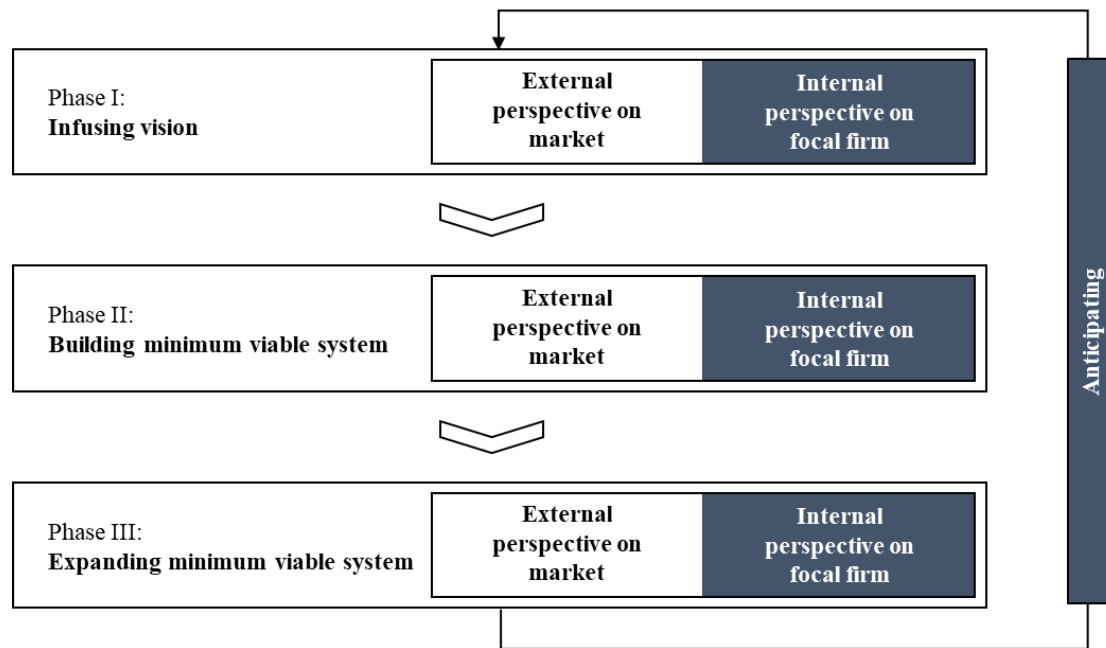


Figure 6: Conceptual market-shaping process rooted in crises

In the following abstracts, it is discussed how the reviewed literature connects to the findings that fall within the phases the process entails – (1) *Infusing vision*, (2) *Building MVS*, (3) *Expanding MVS*, (4) *Anticipating*.

(1) Infusing vision

Given that the market-shaping process is said to be started once opportunities of crises present themselves, it follows that the vision is developed as a response to the prevailing crisis. Accordingly, developing a vision for the market is stated as the origin of the market-shaping process (Flaig et al., 2021b; Nenonen & Storbacka, 2020). The findings of this study give rise to the presumption that the case firms acted on preexisting visions during the observed crises.

Congruent to the reviewed literature, the observed crises comprised opportunities for market-shaping due to an increased malleability of the market (Kindström et al., 2018; Kuckertz et al., 2019; Nenonen & Storbacka, 2020; Newig et al., 2019; Nijhof et al., 2022; Reisch, 2021). Notably, this is reflected in the increased openness of other market actors to collaborate during the pandemic. Most importantly, incumbent food producers were more open

to supporting the scaling of production. Further, the potential to alter customers' expectations for exchanges (Harrison & Kjellberg, 2016) became apparent among the prevailing crises. As supported by the contributions of Salnikova et al. (2019), the highlighted changes in consumer preferences constitute an opportunity to launch new products for food companies. In both the literature and our findings, increased demand for healthy food has been stated as an opportunity to launch accordant offerings (Salnikova et al., 2019). In this notion, crises enhanced existing trends among consumers (e.g., sustainability during the pandemic) and commercial customers (e.g., the rising demand for resilient and transparent food supply chains). This can partly be explained based on the literature stating that crises invigorate existing trends, especially in the food sector context (van der Gaast et al., 2022b). Congruent to the literature, this makes building knowledge of the food market and identifying crises-driven trends the initial step of the market-shaping process (Nenonen & Storbacka, 2020). Based on the market analysis, a focal market-shaping firm must identify the right time to engage in market-shaping (Nenonen & Storbacka, 2020). Such active waiting and deciding to engage, preceding the market-shaping process, corresponds with preparing for the next crisis in the process derived from our findings. The discussion about *anticipating* crises will elaborate on this cohesion in more detail.

Besides the analysis of the market, which entails the vision for the food market step of our findings, developing the technology appears to be a crucial step in *infusing the vision* into the market. Entailing components of creating tangible progress, the process stemming from our findings addresses the highlighted shortcoming of the existing theory that it does not include actively building pathways to realize the vision. Zooming in on the developing technology step, the three factors defining a novel technologies' market-shaping potential, (1) customer desirability, (2) business viability, and (3) technological feasibility, have to be recited (Furr et al., 2014; Kindström et al., 2018). Our study has shown that these factors are also valid in the context of *FoodTech* start-ups. While all three factors are present in the market-shaping process, their relative importance changed over the course of crises. While (1) customer desirability and (3) technological feasibility always remained important, the importance of (2) business viability has varied. Our interviews and secondary data showed that companies sacrificed profitability for growth before the pandemic. This changed drastically with the shifting sentiment among investors towards financially sound start-ups. Thus, the role of profitability for start-ups increased in order to finance operations and seek new financing.

Completing the *infusion of the vision* in the market, the market entry is considered a critical market-shaping step in our findings. Entering the market by forming an MVS in niche markets is commonly referred to among B2C and B2B case firms, which is underpinned by the reviewed literature (Geels, 2005; Markard & Truffer, 2008a; Nenonen & Storbacka, 2020).

(2) Building minimum viable system

Building the MVS is a fundamental component of the market-shaping process in both our findings as well as the literature (Nenonen & Storbacka, 2020). The case study has confirmed the research of Planko et al. (2016) that demonstrating an offering's advantages is a common practice in *building the MVS*. Especially in the context of B2B start-ups, demonstrating the technology and its benefits in the scope of pilot projects is a prominent theme among *FoodTech* start-ups. This fosters the importance of proving the system, according to Ottosson et al. (2020). Especially demonstrating the value of the technology is vital. In other words, quantifying the offering's value is essential to enabling the exchange of the offering within the MVS (Ottosson et al., 2020). Similarly, in the crisis-specific market-shaping conceptualizations of Nenonen & Storbacka (2020), quantifying the value of participating in the MVS is part of the process. The findings reveal that in the B2B case, this is also considered an integral building block to an MVS. This might be explained by the changes pilot customers have to make to their business model to adopt the novel offering. For instance, case firm 8 convinced its pilot customers to adapt their operating model to source the firm's offering. Adjusting the business model in the agrifood market goes hand in hand with high costs (van der Gaast et al., 2022a). Quantifying that the added value of adopting the offering offsets the associated costs consequently is crucial to persuade business customers, characterized by rational decision-making. In the B2C case, however, quantifying the offerings' value to the consumer was not stated as a deliberate part of *building the MVS*. It can be noted, however, that the pricing – particularly compared to conventional offerings – has been considered by start-ups in the transformation step of the value chain in earlier steps. As B2C case firms built the MVS through consumer education and narratives, it could be argued that these are means to communicate the value of the offering beyond monetary terms. Highlighting the importance of building a narrative, the findings emphasize that markets are shaped by them (Boon, Edler, et al., 2022; Boon, Magnusson, et al., 2022; Werner et al., 2022). According to Ottosson et al. (2020), constructing narratives is essential for raising awareness, shaping expectations, and the consequent mobilization of resources. Especially in the context of B2C start-ups, building a narrative is crucial in market-shaping endeavors. As presented in the literature, the narrative is crucial for driving demand

for the product (Vaskelainen et al., 2022). In this step, start-ups have to consider the consumer sentiment driven by the prevailing crisis. As outlined, this sentiment can starkly shift from crisis to crisis, and still, the narrative has to appeal to it.

(3) Expanding minimum viable system

In line with the guiding literature, market-shaping start-ups have to scale the MVS onto the wider market (Nenonen & Storbacka, 2020). In this expansion, spurring demand for the offering and developing the respective supply is crucial (Foxon & Pearson, 2008; Markard & Truffer, 2008b; Planko et al., 2016). While spurring demand is seemingly relevant for B2C start-ups, scaling up the supply of the offering is relevant in both cases, arguably even more so in a B2B setting. Referring to the findings, ensuring that demand is met has been crucial for B2B start-ups to build customer trust. As such, the findings can be explained by the literature stating that exchange practices are shaped by user demands and supplier capabilities (Boon, Magnusson, et al., 2022). In the context of the latter, collaboration – mainly with incumbent actors – comes into play. Referring to the market-shaping literature, it is supported that reconfiguring the supply network is crucial to enable the expansion of the MVS (Nenonen, Storbacka, & Windahl, 2019; Nenonen & Storbacka, 2020). The same literature further suggests that efforts to expand the MVS not only need to target the market network and exchanges but also institutions (Nenonen, Storbacka, & Windahl, 2019). According to existing literature, institutions and especially policies are powerful drivers for the adoption of novel technologies (Boon, Magnusson, et al., 2022; Planko et al., 2016). While our investigations did not reveal any apparent actions start-ups took to reform institutions, we are missing sufficient data to provide a justified statement about that. However, the interviews showed that some start-ups anticipate policy changes and adjust their strategy correspondingly.

(4) Anticipating

The importance of *anticipating* for the market-shaping process in crises highlighted in the findings reflects the theoretical contributions that using crises entails being prepared for them (Kuckertz et al., 2020). Not least, the observed focus on profitability aligns with the relevance of measures to become financially sound (Kuckertz et al., 2020). This is coherent with the reaction to crises of start-ups put forward by Giones et al. (2020). The authors name a focus on conserving resources as well as resource acquisition based on an economic rationale that accurately describes the findings of this research. The findings highlight the importance of being financially sound in attracting investments. In the aftermath of the pandemic, as

disillusion settled in due to unmet expectations, investors were less willing to finance *FoodTech* start-ups. This ties back to the increased relevance of *business viability*, outlined in the discussion about *infusing vision*. Thus, the focus on profitability, considered in the first phase and *anticipating*, emphasizes the circular nature of the market-shaping process rooted in crises. Based on the data analysis, we identified distinctive *anticipating* themes and hence decided to portray them as a separate part of the process, connecting the last phase to the first.

Positioning the start-up to make use of upcoming crises incorporates elements of the risk management domain. In particular, the concepts of responsiveness and resilience introduced in the literature section fall into this domain. *Anticipating* crises, start-ups adapted to crisis-driven changes while ensuring ongoing operations, which can be reflected in responsiveness and resilience (Pedersen & Ritter, 2022). Adding the dimension of *anticipating* upcoming crises alters the crisis-specific market-shaping process into a more circular form. Hence, an understanding that *after the crisis is before the crisis* needs to be established. Accordingly, start-ups should use the acute crisis awareness to motivate preparations for successive crises. The decision to engage in market-shaping, preceding the process rooted in crises according to existing literature (Nenonen & Storbacka, 2020), has to be enabled through prior market-shaping efforts. The context of the food sector may partly explain this. For respective firms, the continuous development of novel technologies is of utmost importance (Salnikova et al., 2019).

6 Conclusion

6.1 Theoretical Contributions

Main findings

How are FoodTech start-ups using crises to diffuse their offering in the market?

This study sought to answer the posed research question. The major crises that unfolded successively in the recent past emphasize the importance of understanding how start-ups plant the seed of change in such disruptive times. The fact that crises are considered fertile ground for change (Kuckertz et al., 2020; Nenonen & Storbacka, 2020) makes respective research even more promising. Building on the reviewed literature, finding answers to this question requires a holistic understanding of how *FoodTech* start-ups shape markets in crises. By advancing the understanding of such a market-shaping process, we could develop the existing theory in this domain. The core idea of the existing process model, starting with a *vision*, *building an MVS* around the vision, and subsequently *expanding the MVS*, could be empirically substantiated through our research. However, as the discussion of our findings highlights, this process has to be complemented. Firstly, it has to be added how the focal market-shaping firm is building a pathway to realize the vision. This comprises developing the technology the market is shaped for as well as developing the underlying operations. Hence, market-shaping not only entails planting the seed of change in the fertile ground, changed customer preferences and change-mindedness bring. It also demands actively growing the change through actions taken within the firm. Secondly, what we call *anticipating* has to be added to the process, emphasizing the notion that start-ups need to prepare for crises. This preparation is marked by active waiting, complemented with anticyclical investing and focusing on the core business by B2C and B2B start-ups, respectively. These steps can be reinforced by prioritizing profitability. These additions to the process include the angle on the market-shaping steps internal to the focal firm, which also constitutes the main deviation from the conventional market-shaping process predominantly focused on the external market.

Contributions to reduce the knowledge gap

By developing the existent theory on market-shaping in crises, this research addresses its shortcoming of not being comprehensive enough to incorporate the thorough impact of crises. Unlike the given market-shaping process in crises, the theoretical contributions of this research are grounded in empirical evidence. As such, they further substantiate the body of knowledge

for market-shaping in crises. Extending on these contributions, we satisfy the stated objective of this research to address the posed research gap. Even though this study does not attempt to close this gap fully, it contributes to an improved understanding of how start-ups plant the seed for shaping a market during crises.

6.2 Managerial Implications

Besides contributions to academia, this study provides practical implications for *FoodTech* start-ups beyond the implications of existing market-shaping literature. By investigating *FoodTech* start-ups during crises, those contributions are rooted in empirical evidence. Therefore, the presented market-shaping process rooted in crises can be considered a playbook for crises. Based on milestones and critical events of the start-up, managers need to locate the start-up's stage in the market-shaping process. By doing this, *FoodTech* start-up managers can identify the subsequent actions in their market-shaping activities during a crisis. An integral part of the action items is building a pathway to realize their vision. Hence, to diffuse their offering in the market during crises, start-ups need to consider the internal perspective, e.g., developing technology and operations, depending on the start-up's phase. A practical implication for developing a technology with market-shaping potential would be to develop it not only for customer desirability and technological feasibility but also for business viability. In this notion, start-ups should capitalize on crises to advance the price-parity of their offering with conventional alternatives. For consecutively developing the underlying operations, this study offers the implication of scaling up the operation in collaboration with incumbents. Here start-ups can capitalize on the increased openness of respective actors observed in this study. Executing these market-shaping steps demands preparation. The findings provide tangible recommendations for *anticipating* and preparing for the next crisis. Embracing the finding that *after the crisis is before the crisis*, start-ups are well advised to focus on profitability and their core business and engage in anti-cyclical investing.

Additionally, the study can support other actors in the food system to understand start-ups' market-shaping process, thereby enhancing collaborations with start-ups.

6.3 Limitations

The research approach used in this study resulted in an array of delimitations. Besides the delimitations of the methodology discussed in section 3.4, further empirical delimitations of our study have to be mentioned. As previously discussed, the amount of data collected through

interviews can be considered a significant limitation of this research. Despite the data being sufficient to reveal multiple patterns in B2C and B2B contexts, data saturation may not have been reached. Therefore, further research with a larger sample size is required to validate our findings. Furthermore, the data sample limited the explorative potential of the research. Thus, using a larger data sample could uncover additional findings.

In addition, it shall be noted that even though we aimed for a diverse case sample, a concentration on certain steps of the food value chain among the case firms is not neglectable. The start-ups considered in the B2C business predominantly operate in the transforming and shipping and selling stage. In the B2B case, start-ups are primarily to be found in the agriculture, transforming, as well as shipping and selling stages. Potentially, this sample is representative of *FoodTech* start-ups as not many start-ups are cultivated in the remaining stages of the value chain. However, since this cannot be affirmed, a potential bias on the studied start-ups' peculiarities must be noted. Further, the interconnectedness of crises has to be referred to again. In this research, it is often written about times of crisis. The reason is that in some instances, it is difficult to pinpoint whether disruptions in the market that form the foundation of market-shaping originate in the pandemic, the war, inflation, or another factor. This gives rise to ambiguity about the origin of market-shaping efforts. Hence, the findings of this research could be challenged concerning the cause-effect relationship being rooted in crises.

It further has to be discussed whether the findings also apply to market-shaping in crises in other contexts. It can be argued that the findings have limited applicability in other (1) market regimes, (2) sectors, or (3) crises. (1) The comparison of the market-shaping process based on the business model seemingly results in more significant differences than the comparison based on the location of the start-up, as we could not identify findings specific to Sweden or Germany. This fosters our choice in the research design, not comparing Swedish and German start-ups. Despite that, the findings are likely deviating in other market contexts for two reasons. The first consideration, potentially limiting the applicability of the findings on other markets, is the influence the market context has on the market-shaping process. In other words, the diffusion of technologies is influenced by the socio-economic context, for instance, the type of economy. The case study presented by Magnusson et al. (2022) reveals that in coordinated market economies (CME), the diffusion is based on network structures connecting the private and public sector. Given that the empirical foundation of this research stems from Sweden and Germany, two CMEs, findings might deviate in a market with a different regime. Second,

current eating habits may also affect the diffusion of novel technologies – in particular alternative proteins. In developed nations, as which Sweden and Germany can be classified as well, consumers have to be motivated to change their diet from traditional to alternative proteins. In less developed countries, the challenge is to prevent the adoption of conventional alternatives in the first place and diffuse the novel technologies instead (Morach et al., 2022).

(2) As outlined, market-shaping can be considered a highly sector-specific endeavor (Keränen et al., 2023). This being said, the implications derived from the research in the food sector are potentially less valid in other sectors.

(3) The pandemic is considered a black swan event – an unexpected, unforeseeable crisis of immense importance and substantial repercussions that substantially alter the market (Kuckertz et al., 2020; Winston, 2020). The pandemic constitutes the model crisis this study is based on. The findings revealed that the pandemic had a different impact on start-ups than exemplarily the war in Ukraine. Hence, it has to be challenged whether the contributions of this research can be universally applied to all crises.

6.4 Future Research

Addressing the stated limitations regarding the transferability of this study's findings, future research could study the market-shaping processes in other markets or sectors. Referring to the uniqueness of each crisis, a study of market-shaping rooted in crises other than the pandemic, the war in Ukraine, and inflation could yield additional findings. Further, the market-shaping process rooted in crises might differ between start-ups and incumbents. As mentioned above, this constitutes a further extension of this study.

Further emphasizing the relevance the context has for market-shaping, building a better understanding of the interplay between the focal firm and institutions has to be better understood. While market-shaping literature emphasizes the role of institutions (Nenonen, Storbacka, & Windahl, 2019), previous literature is often based on a different empirical context, such as the energy or mobility sector (Köhler et al., 2019; Ottosson et al., 2020). In the scope of this study, we did not explicitly investigate the role of government intervention and policies in the empirical context of *FoodTech* start-ups. We, therefore, believe that investigating the relevance and effectiveness of influencing institutions in the empirical context of *FoodTech* poses an interesting field for future research.

The main contribution of this study, revealing the conjunction of market-shaping theory with the innovation management domain, represents another avenue of future research. The market-shaping process rooted in crises derived from our data can be tied to hypothesis-driven entrepreneurship. In essence, this concept encompasses translating the start-ups' visions into falsifiable business model hypotheses and then testing those hypotheses using a series of minimum viable products (MVP) – representing the smallest set of activities needed to disprove a hypothesis (Eisenmann et al., 2011). While hypothesis-driven entrepreneurship applies to product development, several parallels to the presented market-shaping process are apparent. Akin to market-shaping, the hypothesis-driven entrepreneurship process starts with developing a vision. This vision is subsequently translated into hypotheses that are tested using MVPs. On a more micro level, with the scope being solely the product, the MPV fulfills the same purpose as the MVS in a market-shaping context. This entails iteratively developing the focal offering based on customer interaction in both processes. Noteworthy are the pilot projects some of this study's B2B case firms engaged in. Depending on whether the hypotheses are validated or rejected, the decision has to be made to preserve, pivot or perish the offering in development. In this context, it can be noted that pivoting into new markets has been common among the case firms. The last step of the hypothesis-driven entrepreneurship process is scaling and optimizing the business model. As extensively illustrated in the findings and the above discussion, this corresponds to our findings. As the step-by-step comparison portrays, various aspects of hypothesis-driven entrepreneurship can be manifested in the market-shaping process rooted in crises. Given that the objective of this approach is building a sustainable business instead of achieving extensive growth, it further aligns with the focus on profitability in *anticipating* (Eisenmann et al., 2011).

Beyond the scope of this research, the interviews revealed that the start-ups' visions for the food market are often tied to advancing sustainability. The motivation behind this drive can be found in climate change, which undoubtedly is one of humanity's most critical challenges. As the global food system is estimated to be responsible for a significant share of total greenhouse gas emissions (Crippa et al., 2021), the challenges stemming from this crisis require a significant transformation of the system towards more sustainability in the production and the consumption of food (Hornsey & Fielding, 2020; Vaskelainen et al., 2022). Innovation and technologies are critical in the sustainable transformation of the food sector (Herrero et al., 2020). Reciprocally, environmental challenges can be an effective trigger for adopting sustainable technologies (Magnusson et al., 2022). To promote the transition towards a

sustainable food system, start-ups can be essential to commercialize innovative solutions and bring new and more sustainable solutions to the market (Sadeghi et al., 2019). Considering the diffusion of such innovations, the contributions of this research can be applied. Taking this thought one step further, an interesting avenue for future research could be how market-shaping can be integrated into the context of sustainable transitions. In particular, it could yield valuable research contributions on how firms can advance a sustainable transition through market-shaping. As demonstrated by the manifold avenues for future research, this study offers rich food for thought for market-shaping rooted in crises.

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Appendices

Appendix A – Overview of secondary data

Source	Type
Berthling, J., & Escanilla, A. (2022). <i>The future of food in Stockholm</i> . Retrieved from https://press.investstockholm.com/media/220144/stockholm-foodtech	Report
Dongoski, R. (2021). <i>When might the term 'alternative protein' be obsolete?</i> Retrieved from https://www.ey.com/en_us/agribusiness/when-might-the-term-alternative-protein-be-obsolete#:~:text=As%20the%20underlying%20cultivated%20protein	Report
Draganov, I. (2022). <i>Food Tech Invest Report 2021</i> . Retrieved from https://www.hungry-ventures.com/wp-content/uploads/2021/03/2021_Food-Tech-Invest-Report_English.pdf	Report
Frederick, A., & Nacionales, M. (2022). <i>Alt-Protein Industry Advances Despite Costs and Red Tape</i> . Retrieved from https://files.pitchbook.com/website/files/pdf/Q3_2022_PitchBook_Analyst_Note_Alt_Protein_Industry_Advances_Despite_Costs_and_Red_Tape-C02DT8KWMD6R.pdf	Report
<i>Global Insect Feed Market Sample</i> . (2021). Retrieved from https://samples.mordorintelligence.com/54413/Sample+-+Global+Insect+Feed+Market+(2022+-+2027)+-+Mordor+Intelligence1660641692716.pdf	Report
Koch, O., & Kamel, M.-A. (2022). <i>Food Tech - Turning promise into opportunity</i> . Retrieved from https://zintinus.com/wp-content/uploads/2022/06/FOOD-TECH-TURNING-PROMISE-INTO-OPPORTUNITY.pdf	Report
Morach, B., Clausen, M., Rogg, J., Brigl, M., Schulze, U., Dehnert, N., ... Stolt-Nielsen Meinel, O. (2022). <i>The Untapped Climate Opportunity in Alternative Proteins</i> . Retrieved from https://web-assets.bcg.com/6f/f1/087a0cc74221ac3fe6332a2ac765/the-untapped-climate-opportunity-in-alternative-proteins-july-2022.pdf	Report
Varma, D., & Dutta, P. (2022). Getting Start-ups Back on Feet Post COVID-19: A Case Study of a Food-tech Start-up that Reshaped Its Business Model. <i>Global Business Review</i> , 097215092210740. https://doi.org/10.1177/09721509221074096	Research Paper

Obloj, P., Grosse-Holz, F., Bergmann, S., Davies, D., & Conforto, A. (2023). <i>To make the bioeconomy real, develop for scalability and creditworthiness</i> . Retrieved from https://bluehorizon.com/wp-content/uploads/2023/04/Olon-BH-Bioeconomy-Whitepaper-April-2023.pdf	White-paper
Bröcker, F. (2022). Can mushrooms be used to establish a new food system? Retrieved May 7, 2023, from Milk-Food website: https://www.milk-food.de/en/2022/food-lab-meets-cathy-hutz-from-mushlabs/	Interview
Harvey, S. (2022). Mega challenges uproot vertical-farming push from niche to mainstream – Infarm CEO Erez Galonska. Retrieved May 7, 2023, from JustFood website: https://www.just-food.com/interviews/mega-challenges-uproot-vertical-farming-push-from-niche-to-mainstream-infarm-ceo-erez-galonska/	Interview
Königsfeld, J. (2021). Inventing and scaling the world's largest urban vertical farming network. Retrieved May 7, 2023, from McKinsey Digital website: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/inventing-and-scaling-the-worlds-largest-urban-vertical-farming-network#/	Interview
Pärson, P.-J. (2020). A Fika with: Sorosh Tavakoli and Anja Leissner, founders of Stockeld Dreamery. Retrieved May 7, 2023, from Northzone website: https://northzone.com/2020/07/16/a-fika-with-sorosh-tavakoli-and-anja-leissner-founders-of-noquofoods/	Interview
Åkerman, F. (2019, July 4). <i>Volta Greentech presented by Fredrik Åkerman [Video]</i> . Youtube. Retrieved from https://www.youtube.com/watch?v=77KozPbACI0	Interview
SOSV. (2022, February 26). <i>Founder Story: Isabella Iglesias-Musachio of Bosque Foods [Video]</i> . Youtube. Retrieved from https://www.youtube.com/watch?v=tAuEXa8HBXo	Interview
Ynsect, the first company in the world to obtain market approval for an insect-based fertilizer. (2020). Retrieved May 7, 2023, from Ynsect website: https://www.ynsect.com/2020/07/01/ynsect-the-first-company-in-the-world-to-obtain-market-approval-for-an-insect-based-fertilizer/#:~:text=Ynsect%20thus%20becomes%20the%20first,factory%20in%20Dole%20(France).	Press Release
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Appendix B – Interview guide

Background

Personal

1. Could you describe your role at [firm], please?

Firm

2. What is the offering of the firm?
3. Is the offering already in the market?
4. Can you briefly describe your firm's business model?
5. What is the vision of the firm?
6. *Was the firm founded as a response to a crisis?*
 - i. What was the main motivation/drive to found [firm]?
 - ii. How would you describe the environment/market in which [firm] was founded?
What is the vision of [firm]?

Theory

Market – context

7. Could you briefly describe the market [firm] is targeting?
8. How did Covid-19 impact [market]?

Market-shaping

9. What changes would you like to see in this market?
10. How did the pandemic impact [firm's] progress to drive this change?
11. Could you outline the process [firm] has undergone to drive those changes since the beginning of the pandemic?
12. What are the key milestones in this process?

Learnings / Patterns

13. How did the conflict in Ukraine impact [firm's] approach to drive this change?
14. How do [firm's] reactions to the pandemic and the conflict compare?
15. Has another crisis impacted [firm's] business?

Appendix C – Overview of interviews (extended)

Case	Interviewee	Role	Firm	Stage in value chain	Subsector of FoodTech	Location	Date	Duration
	Interviewee 1	Chief Strategy Officer	Firm 1	Shipping and selling	Delivery & Consumption	Sweden	24.03.23	39 min
	Interviewee 2	Chief Commercial Officer	Firm 1	Shipping and selling	Delivery & Consumption	Sweden	05.04.23	54 min
	Interviewee 3	Founder & CEO	Firm 2	Shipping and selling	Delivery & Consumption	Germany	24.03.23	27 min
	Interviewee 4	Founder & CEO	Firm 3	Transforming	Innovative food	Sweden	24.03.23	31 min
	Interviewee 5	Senior Marketing Manager	Firm 4	Transforming	Innovative food	Germany	31.03.23	53 min
	Interviewee 6	Chief Retail Officer	Firm 5	Shipping and selling	Innovative food	Germany	16.04.23	40 min
B2C	Interviewee 7	CEO	Firm 6	Agriculture	Agricultural management	Sweden	24.03.23	39 min
	Interviewee 8	Founder & CEO	Firm 7	Transforming	Food processing	Sweden	24.03.23	40 min
	Interviewee 9	Founder	Firm 8	Agriculture	Innovative farming systems	Sweden	03.04.23	44 min
	Interviewee 10	CEO	Firm 9	All	Agricultural management	Sweden	11.04.23	21 min
B2B	Interviewee 11	Founder & CEO	Firm 10	Agriculture	Farming improvements	Sweden	19.04.23	23 min
	Interviewee 12	Investment Manager	Investor 1			Germany	23.03.23	42 min
	Interviewee 13	Founder & partner	Institution 1			Sweden	06.04.23	57 min
	Interviewee 14	Chairwomen	Institution 2			Germany	14.04.23	25 min
	Interviewee 15	Member of food think tank	Institution 3			Sweden	20.04.23	23 min

Appendix D – Quotes from primary and secondary data

Note: The tables below contain selected quotes, tying the codes to primary and secondary data. The quotes are not adjusted and thus reflect the semi-verbatim version. Therefore, the quotes might contain grammatical mistakes, repetitions, or filler words. Quotes from interviews conducted in German are translated into English, aided by DeepL, to mitigate biases in the translation. However, this might result in lower quality of the quotes.

B2C:

Quotes from primary & secondary data	Market shaping concepts (1 st order concept)
<i>“I said, wouldn't it be cool if a chef can cook for me? I knew how much a chef cost because I hosted the poker game once a week at my house” (Interviewee 3).</i>	Building up knowledge about food sector
<i>“[One of the co-founders] had an ICA supermarket at the time, still had it now larger, but he had always had his life supermarket” (Interviewee 1).</i>	
<i>“And I think we as a company, we really early in the founding days identified the huge problems with the seafood industry. So we really asked very basic questions like why would we eat something else than seafood” (Interviewee 4).</i>	Identifying problems with current food system
<i>“Founded by 3 guys in a supermarket space who understood what they throw away every day and that we can still do something with it” (Interviewee 2).</i>	
<i>“This is also a story that has been observable since Corona, since Ukraine: the customer today is much more willing - it's no longer like that, that's my store, that's where I buy, that's where it's most convenient, and he's also willing to split his personal shopping baskets. Yes, no more problem to buy there a part, to buy there and to do without the third one” (Interviewee 2).</i>	More change mindedness
<i>“And there is a realization that we need to find new ways of sourcing, food resourcing, nutrition, which means that way more efforts are going into things such as resilience. And that affects everything from storage, the capabilities to new ways of growing food that could be in vertical greenhouses, of course, but it could also be, you know, things like how can we convert wood to mushrooms, that type of how can we, how can we grow food in, in the in wastes slurries. So how can we really produce new types of food? And that has received a huge interest and that includes also how do you how do you put fish farming on shore, for instance, can you farm fish or shrimp in giant tanks instead of harvesting them from the sea? Microproteins, how can you use solar protein from CO2 gases. How can how can you build new</i>	

*things with the help of deep science and to me, I think that's a really interesting development where you realize that food isn't just something that needs to come from a field out there with the farmer, with dirt under his nails in order to in order to produce something for us to eat, we can actually do that. We can synthesize the **** out of like we've done in so many other instances, everything from pharmaceuticals to rubber and other things we once used nature to harvest” (Interviewee 13).*

*“He was one of the first in Sweden, and I would even say worldwide, to see this issue of food waste as a supermarket owner and to see that it is *****. There has always been this dumpster diving etc., but a supermarket owner who says what is this nonsense? And that is then again to commercialize, so to say I want to do something about it. He was one of the first” (Interviewee 1).*

“And this niche, of course, also results from the fact that the development in the milk alternative market has exploded in recent years. Also just as well in the meat alternative market and the trend continues and that the egg comes is of course in some way simply a logical conclusion” (Interviewee 5).

Spotting trends /
anticipating developments
and adopt to them

“Consumer preferences have shifted towards healthier and more sustainable food over recent years. This trend accelerated during the pandemic. In a recent Bain & Company survey, consumers set health as priority No. 2 and sustainability as priority No. 4 in their purchasing decisions. The fact that quality (i.e. taste and performance) remained priority No. 1 suggests that consumers will probably not tend to make compromises in the long term when it comes to taste. Food must be tasty, and it must be easy to process and prepare to be successful in the long term. [...] Chances for insurgents are improving, while the pandemic has further accelerated consumer demand, particularly among millennials and Gen Z, who are now the largest segment of the adult population. In a European consumer survey conducted in June 2021, roughly 40% of millennials and Gen Z stated that they are eating healthier food since the start of the pandemic, and roughly 75% stated that they spend more on food products to buy sustainable” (Koch & Kamel, 2022).

“Customer come today very much more because of the price. He says that whether something is organic is all the same to me. Sustainability yes, we'll do it again later? I just need cheap pasta for now” (Interviewee 2).

Changed consumer
preferences

“In the food area: Yes, you always have the optimization in the MVP of Taste Texture, Price, first so to speak” (Interviewee 12).

“But you also need to iterate quite fast, so that's the challenge right now. To really find that product market fit, so we feel like this is really the product that people want for the right price with the right nutrition, with the right ingredients that can be scaled with a scalable technology and so on. So that's where we are. Like tweaking a little bit now and then. You know, finding that product market fit the 100%, because we have something that's in the market that's being bought. But then like just finding something that really fits what the consumer wants essential” (Interviewee 4).

Optimizing technology for taste / price

“We work a lot with Top Chef all over, where we work a lot with taste related issues and you would be surprised at how many entrepreneurs out there don't understand taste or take it serious enough” (Interviewee 13).

“But the other one has been done by one Michelin star vegan restaurant that I know and I worked with them before and I trust them and they design that for us. So it has a very sensory, and flavoring with the after taste and things like that. All the all these fancy pancy work” (Interviewee 7).

Collaborating with chefs

“Inflation also represents a sizable growth headwind. Plant-based meat is sold at a significant premium across many countries. [...] Affordability is already a barrier to 20% of potential plant-based meat-eaters. As food prices surge, we are already seeing evidence of consumers trading down to private label and low-cost food products. To some extent, rising food prices have the potential to narrow the gap between traditional foods and alt-proteins, but only to the extent that alt-protein providers can maintain prices” (Frederick & Nacionales, 2022.)

“So this food price inflation which has been communicated in the media to a large degree our business is about as we get more and more subscribers. The way that we remain affordable is that we have this labor arbitrage that you continue to choose the labor cost per meal as you're cooking for more and more people and so on. Labor is the most expensive thing in the meal. And so for us this is good because then as sort of say a restaurants, pricing becomes more expensive than the than the value prop of [case firm 2] becomes even stronger because we can maintain that price point” (Interviewee 3).

Inflation driving price parity

“Then then we do that, and then we go to the production. So that's the kitchen or that's a lab testing. And then we scale it up to the public production level and that's how the process works basically” (Interviewee 8).

“Bosque Foods will use the funding to produce its mycelium alt-meat on a small scale to check that the process actually works

Testing of manufacturing technology at a pilot scale

(it's currently only grown in very small quantities in a lab)" (Lewin, 2022).

"And what do a lot of people who are now somehow innovating in the food sector do? positioned themselves, they have built up a D2C model" (Interviewee 12).

"This uncertain time is forcing us to focus on our online shop, develop new revenue streams and create content to support and strengthen our community" ("Adapting to COVID 19: 10 Food Tech Companies Coping with Coronavirus," 2020).

Creating direct-to-consumer offering

"In preparation for commercialization, BlueNalu has partnered with retailers, restaurants, and input suppliers to establish a market and sales channel for its products. In January 2022, the company partnered with Food & Life Companies, the largest sushi operator in Japan, to develop a supply chain of cultivated bluefin tuna and other sushi-grade fish for consumption in Asia. In 2021, BlueNalu partnered with Nomad Foods, one of Europe's largest frozen food companies. The partnership is important, given the high seafood consumption in Europe" (Frederick & Nacionales, 2022).

"When are Mushlabs products available in the supermarket?" "That depends on Novel Food approval, which is pending. As soon as we have a release, we are also on the market. We are already in contact with the relevant partners for this. They are very interested in our product." (Bröcker, 2022).

Establishing network and agreements

"I have a compromise assortment from the beginning but must convert, so I have only one choice. Then I need a niche that forgive me these two things if possible. In our case this is a very sustainable customer group. People who say like yeah, assortment is not so good either. But hey, the mission is so cool, I want to support that and so you build yourself a bit of traction, get a bit of volume to the warehouse, can then approach the manufacturers with the volume and say look, we are already moving a little bit trust us a bit, in half a year we will be moving completely different volumes. move completely different volumes. This way you build up a better assortment and the better the better the assortment becomes, the more mainstream I can become in customer approach" (Interviewee 2).

"But you start with those kinds of niches and you add one to the other and that impacts also the branding and marketing. If you look at the cartons and the packaging from those early days, it was a very medical, clinical look. There's no point in talking to a mass market because there wasn't a mass market for that kind of product then. And gradually, it started adding more and more consumers. And as we grew bigger and bigger, then we needed

Define target group in go-to-market

to change the positioning to become a mass market, mass consumer product.”- Björn Öste (Winther, 2021).

“That's why we have to change the target group again. That's why now in the UK this sustainability issue that's not our offering, but now it's about the people who don't we don't go for the very low incomes, because they go straight so on private label ketchup or don't take ketchup at all. Right now eating the fries bare. So we need the customers, those in the middle Household income. Who still like to buy their well-known brands [...] they would like to keep buying Heinz ketchup because that's what they've always bought, but at the moment it's more of a challenge that actually doesn't fit the budget fits and we're tackling that now. That is actually, the exact same go to market plan, but the early niche is selected a little bit differently and that's clearly a result of the crisis, so this is basically a Ukraine issue right now. right now” (Interviewee 2).

“The German market launch was much easier than the British one. because I'm just missing this sustainability issue in the British market. The sustainability levels in the online-affine environment, a bit of an e-commerce hype environment, as triggered by Corona, was of course a perfect breeding ground to get in early. That worked right away” (Interviewee 2).

Changed target customer

“We are trying to educate the public that what is sustainability, what is upcycled drink, what is a new product made of? What are the nutritions and things like that. [...] So that's why we have it on our bottles. If you see it, there is a little small logo we created it, called upcycle drink. That's the part of the communication, because people, they don't know what upcycling is” (Interviewee 8).

“Education is essential to change consumer behavior: pricing is not enough” (“The Four Stages of the (Food) D2C Startup,” 2023).

Communication for customer education

“So I think we have shifted a little bit like last year or so like before we said like, OK, we wanna educate everyone and like everyone would know the problem then everyone will go and say I'm gonna buy plant based seafood. But then I think what we wanna push harder now going forward is that we think that the actual product will make that happen before. Being out in the stores and convince people with the product and then they say, OK, this is an alternative I actually like. Then they know OK, I should eat this because mercury, microplastics, overfishing, bycatch, et cetera. So then they will get educated once they have that option that they, you know, they enjoy. So we want to convince more with product than with information. So we think that's the way to go going forward” (Interviewee 4).

Educating consumers through usage of product

“Especially the storytelling and your work in the marketing area. The way you work together, the form in which you present and sell yourself there then you have of course completely different margins, if it then also still directly sold through the online store” (Interviewee 5).

“In the end you just have to say the more niche you are, the more important is behind, of course, quality has to be right anyway, but then afterwards above all the storytelling and your work in the marketing area” (Interviewee 5).

Storytelling

“Usually when there's a financial crisis, the brands that survive are either really the cheap ones like they really low priced brands” (Interviewee 9).

“This uncertain time is forcing us to focus on our online shop, develop new revenue streams and create content to support and strengthen our community” (“Adapting to COVID 19: 10 Food Tech Companies Coping with Coronavirus,” 2020)..

Building strong brand

“We have perhaps also created a brand with it, where the customer also sometimes is a little lenient from time to time. So we send out something and then a bag of chips bursts. bag of chips bursts but then we are just the friendly, Swedish start up and haha is also sustainability and you do what's good and so we already have an extremely pleasant extremely pleasant group of customers who come to us with a very exciting, but very positive mindset, I think that helps us. We are a likeable brand, in the context” (Interviewee 2).

“Positively occupied charming brand. You do not have to be ashamed you can offer your products still with -50%, is still high quality, does not look like Rudi's remnant ramp, but is just a sustainable store concept” (Interviewee 2).

Building sustainability brand

“I think there's a bit of a problem, of course, that started with the Ukraine crisis in particular, and continues with the inflation crisis, and that these issues [sustainability] - and we don't need to sugarcoat it - have lost a massive amount of relevance, and it's simply the case at the moment. That's bitter, and maybe that's a bad reason, and maybe that's too easy an excuse, but in the end, yes, we only have one budget, and we have to allocate it. It is a difficult breeding ground to somehow proactively drive these issues, because today the customer comes much more strongly because of the price” (Interviewee 2).

“Food, because that is simply in the focus on a daily basis and therefore that is of course one of the drivers of various problems, so to speak, both socially and ecologically, somehow

Changed consumer consciousness

such a topic and I believe that Covid has certainly made people more aware of the fact that this is a major driver or there must be many innovations that must somehow now be launched” (Interviewee 12).

“And if you don't find it in the supermarket, then you don't buy it. So I mean, that sounds so simple for [...] I think, for example, if you are constantly asked here now: do you want you want your coffee with oat milk or pea milk or whatever, then of course you always have of course always the possibility to decide, but if you always have to beg for it have to beg for it, yes, do you also have oat milk? The easier the access is and the better” (Interviewee 5).

“And I think it's when you take a look at this historically, information never changes anything or consumer information that. We love to say it does. But it's an urban legend. The truth is that you eat what the food system wants you to eat. Uh, what the food environment around you push us in your direction. And that means when you go into the supermarket, the supermarket owners know exactly what you're going to buy, or at least they can affect what your choices are with how things are placed in the store, what type of boxes, extra prices and buy, you know, three for the price of two, blah blah, blah blah blah. So, so then they can steer you towards your food choices. Same thing goes from marketing. Very powerful tool to steer you towards your food choices. The environment around you. Can you access food in a good way” (Interviewee 13).

Making offering widely available

“In order to change such a behavior, if that also with not with luxury or benefit product to make want, if you want to make that with standard products as for example vegan egg, in my opinion need then before all things correctly fat marketing influence. So you have to get the people in some way to then” (Interviewee 5).

“In the D2C area, things are different. Meta, Facebook, and Google Search offer completely different ways of directly addressing and clustering people. And ideally, to transfer them into the first customer journey, which then leads to a purchase” (Interviewee 6).

Extensive marketing

“At the end of last year, they finally had their first crisis, if you like. Or financing miscalculation and then had to lay off or fire a third of the people including the co-founder. Including myself person that was almost the entire marketing department” (Interviewee 5).

Cutting marketing due to crisis

“We've been able to scale our products, you know, not being actually in the production side and you know, you know videos

and pictures and that's not typical. You typically just go there, stay there for a week and then go home" (Interviewee 4).

"Before, we worked more in silos and it was spoken less at the overall company level" (Interviewee 1).

Improved internal communication & collaboration

"I mean we've been able to scale our products, you know, not being actually in the production side and you know, you know videos and pictures and that's not typical. You typically just go there, stay there for a week and then go home, which will now started doing so it's not like something" (Interviewee 4).

"Because sooner or later you need to have some sort of a scale in producing food or food product in order to reach the scale efficiencies that you need to" (Interviewee 13).

Scaling up of production

"We realized that we need to automate more. Because a robot simply can't get Corona" (Interviewee 1).

"Where we have noticed, we have now one day to the next at once huge sickness rate, which is super expensive with testing and spacing and whatever and we have just a camp, where 120 people run around and is difficult, yes, and there we have pandemic, we decided relatively quickly, ok, we want to fully automate and have then taken around 15.000.000€ and built a robot warehouse" (Interviewee 1).

Automation

"However, at some levels of scale, you can go further and further down that procurement supply chain and buy it from closer and closer to the source. In that regard, there is on one hand side the this intensity of remaining as close to the customer but on the opposite side as at scale increases you need to be opportunistic about where can you partner" (Interviewee 3).

"You know there's a farmer and there's a distributor and then there's a whole seller and then count to the restaurant. So going from Spain, I think it could be like 5 or 6 middle man before it ends up in the restaurant or in in the grocery store. And we are cutting away all of that. And then we both improve quality" (Interviewee 9).

Internalization

"The drinks we are having that you've seen it, they are coming in 250ml glass bottles. We need to order bottles. [...] Prices for those has gone up, like pretty much 50%. [...] So what we did was we concentrate them from 250 to 20 milliliter and we put them in small packaging. Not energy intense. Easy to transport, better for environment and then it's cheaper" (Interviewee 8).

“And at that time we really had such a small problem said, What sell we are going to do now. We then worked with the duty free stores, Heinemann, etc, because they had huge overstocks. But then we tried in principle tried in the crisis where everyone bought toilet paper and hand sanitizer said hey wanted to buy a big Toblerone bar, there are typical airport products has worked well, but it was not so that we suddenly increased our sales tenfold” (Interviewee 1).

Developing new product

“And the internationalization during the crisis was great. When all of a sudden everyone was remote, that is, it didn't matter at all whether you were in Berlin or in Stockholm, because everyone was on the same board, so we were able to on-board our local teams more efficiently and that was really a super onboarding experience for everyone, because we were all sitting in front of us in our private desks and that was why it was a huge success for us. Our launch in Germany was and is a huge success and that's definitely a lot due to that” (Interviewee 1).

“We're very excited about entering Germany now because there are a few brands there already” (Interviewee 4).

International expansion

“This principle that you should invest in the crisis and save in the boom years, that makes absolute sense and there I sometimes think so, we should have listened to it even more, that you don't grow your fat in the boom years, so that you don't constantly herd some people, just because you think they are good and the money has rather put in, so that you can then invest in the crisis, where others can't invest. I think that's extremely relevant. So for example this is not pandemic related but now Cost of Living crisis extremely many startups have to lay off people and scale ups. But we are celebrating because now we can hire basically the same developer who cost us double a year ago and didn't want to work with us and if only for 3 months so about we can hire now. that's why this this principle works to invest in crisis” (Interviewee 1).

“I think that's a really good possibility, because I think it would be much easier compared to last time when we built our container. It was like really hard to find raw materials and so on. It was like problems with like everything. And now when like the complete you know the real estate sectors like really less is being built. And I think there will be easier to find like both like people that could help us and also find material. That's cheaper, of course. That's something we could utilize” (Interviewee 9).

Anticyclical investing

“Covid-19 [...] brought the perception and the importance of crises in the minds of everyone. Suddenly from one day to the next just everything can go down” (Interviewee 12).

“But we were extremely successful and hit a nerve and were at the right time at the right time with a good idea at the start” (Interviewee 2).

Active waiting for next opportunity

“They are completely open. So of course they must not say somehow meat is crap and no idea, because a large part of their customers are just still or also well running products are of course also there also Rügenwalder what don't they still do with meat? Even if they now make more Turnover with Veggie? Nevertheless is just the point. They have simply a total financial pressure on it, because they simply do not see the future perspective there. is that because of Covid? yes, because of changing consumer preferences, that is certainly a part that has made another considerable push on it. Also supply chains that they have simply all noticed. I can now I also have to make myself a bit more independent and somehow there is a greater interest for products from my country” (Interviewee 12).

“So I have been in several meetings with many of them together with other food tech companies. So they had this reverse pitch. It means that they pitch for us. To tell us their problem. So what we could work with” (Interviewee 8).

Openness for collaboration

“But if you look now for example in the plant based area, don't know now now not where [start-up offering plant-based fish] produces their vegan tuna, but the producing of course not themselves. That is produced for them on machines, that have probably been around forever. They are standard machines and according to their recipe is then produced this tuna and they have then probably nothing at all in any way. But without them it would not be possible at all possible, because otherwise [start-up offering plant-based fish] would have to completely build up” (Interviewee 5).

“After that you really need a good, big partner who produces with you and then brings that to the market” (Interviewee 12).

Partnering with incumbents to scale

“Stakeholder management is so much simpler, where you can simply can simply go back to back” (Interviewee 1).

“[...] not the least cooperating across borders. Suddenly people realize that the world was smaller than they thought and that we really learned how to do these types of interviews over Zoom or teams. And actually these tools so also improved massively over the course of COVID. And I think we benefit from that now that's a major. It's a major technological breakthrough” (Interviewee 13).

Improved collaboration

“None of the big ones wants to be the first to somehow start with an experimental partner. That means it was very, very

important for us to somehow close the first partnerships somehow. That's where the Swedish Legacy helped us a lot, simply because if you are already like that with Unilever in Sweden. Well, then the bridge to Germany is no longer so difficult. Then Unilever was practically our launch partner and opened doors for us directly. opened doors for us. Because when Unilever fits the loop, Coca Cola also has the well, if they do it, then it can't be all wrong" (Interviewee 2).

"Consequently, alternative protein companies need resources and services that can help them find keystone early customers who serve as anchor accounts for expanding distributor relationships, such as sales brokers who can work simultaneously with distributors and anchor accounts to build up needed sales volumes" ("Advancing Solutions for Alternative Proteins," 2023).

Lighthouse collaboration
to convince further actors
to collaborate

"Access to investment is just one of the challenges to support the capital-intensive nature of urban farming and the initial set up and running costs" (Harvey, 2022).

"Buy-in from the large corporations along the value chain is key for startups. "Just being the disruptor in the industry is not sufficient. Corporations should be clients or partners or investors if you really want to achieve scale in alternative proteins" (Morach et al., 2022).

Finding suitable investor

"The drive towards a quick shift of the food system has furthermore been increased because of the pandemic, with a rapidly increasing focus on food waste, food supply chains and food security. This has also been reflected in the stark increase in the amount of funding for the startups" (Berthling & Escanilla, 2022).

"Digitalization in the foodtech sector has been underway for some years, which meant that the coronavirus pandemic had a less dramatic effect on start-ups with mature business models. This robustness has helped attract new venture capital to the thriving sector" (Kövener, 2022).

More funding available

"I think it helped us quite a lot because we were really like with, the company we were really like riding the wave of plant based and Oatly got their IPO for like €10 billion, I think at \$10 billion. Ohh which is now down to only one but like that's of course like was a big hype for from the investor side that helped us quite a lot and of course more money" (Interviewee 4).

"And there are yes the whole gorillas and Co, but also the Hello Fresh, whatever through the ceiling. And what I think would be exciting for you, if you in principle from public peers, so for example Hello Fresh simply looks at how the valuation of

Hypes & stagnation
driving investor appetite

the top has gone, but now also again plummeted. Many FoodTechs were dropped after Q1 2022 because the pandemic was then officially over. was over. So exactly a year ago and then there was basically a second drop, so after Q3 2022” (Interviewee 1).

B2B:

Quotes from primary & secondary data	Market shaping concepts (1 st order concept)
<i>“I have been working with Food and Agriculture for almost all my life because I am grown up on a farm” (Interviewee 10).</i>	
<i>“I had a very good understanding because I've worked with the with the food chain for like 18 years. So I've been in a position where I had to negotiate with the suppliers or I have to establish a strategy. We have to develop the product, we have to develop menus and then putting it out there for public. And then from organization from 10 to 20 people all the way to 160 people staffing. So I had to establish all this. So I had a very good understanding about how the food chain and food system works” (Interviewee 7).</i>	Building up knowledge about food sector
<i>“I started at the 2018 as a result of all my experience from working in Food and Agriculture, business and the problems connected to traceability and trustable food” (Interviewee 10).</i>	
<i>“So I had a very good understanding about how the food chain and food system works. But digging into that, reaching out to different people, we realized that the problem is way bigger than what we thought” (Interviewee 8).</i>	Identifying problems with current food system
<i>“I think both the Ukraine War and Covid has mentally affected many people, so you know increased our change mindedness. I think that's important. Uh, you can actually put in parallel with that. The climate change which goes in parallel” (Interviewee 13).</i>	
<i>“They simply have a total financial pressure on it, because they simply don't see the future prospects there. Is that now because of Covid? Yes, through changed consumer preferences, certainly a part that has then made another considerable push on it” (Interviewee 12).</i>	More change mindedness
<i>“We work with a few companies that are understanding that these things will happen eventually. And they also see a value of being first of lowering emissions from their product to differentiate their products from their competitors. Because they</i>	

can work a lot with branding and marketing around that they have products that are better” (Interviewee 11).

“Consumer preferences have shifted towards healthier and more sustainable food over recent years. This trend accelerated during the pandemic. In a recent Bain & Company survey, consumers set health as priority No. 2 and sustainability as priority No. 4 in their purchasing decisions. The fact that quality (i.e. taste and performance) remained priority No. 1 suggests that consumers will probably not tend to make compromises in the long term when it comes to taste. Food must be tasty, and it must be easy to process and prepare to be successful in the long term. Chances for insurgents are improving, while the pandemic has further accelerated consumer demand, particularly among millennials and Gen Z, who are now the largest segment of the adult population. In a European consumer survey conducted in June 2021, roughly 40% of millennials and Gen Z stated that they are eating healthier food since the start of the pandemic, and roughly 75% stated that they spend more on food products to buy sustainable” (Koch & Kamel, 2022).

Raised awareness for environment and sustainability

“It actually been good in our case. It's it sounds horrible, but it is because if you're an organic farmer, you and let's say that you have 100 hectares, you have approximately 70 seasonal workers to just to just fight the weeds. And with COVID, there was a very big uncertainty whether you could rely on the seasonal laborers staying there. And we've met Farmer that said, yeah, with half of the season was left I suddenly only had 30% of the workforce in place. So it's actually been helping us because farmers, they want to to rely less on manual labor for for for this purpose” (Interviewee 8).

“But regarding the war in Ukraine, I think more and more people think about our supply chains and how vulnerable we are and so on. And even before the war in Ukraine during the pandemic, we had quite a big discussion in Sweden. We're like importing 85% of all Greens that we actually are eating. So we only produce 15% of all the Greens in Sweden. And of course we're very dependent on transportation and farming far away from Sweden and then we had a debate about how can we make Sweden more self-sufficient and green. With the war in Ukraine, I think people have been thinking about this even more because if something happens in Europe, we are quite dependent on imports and that could be quite problematic if the war in Ukraine escalates. So I I would say partly” (Interviewee 9).

Rethinking of supply chains and operations

“It's like in every other industry. You can't stay in the workshop try to build a perfect product. You need to come out early on and try to get a bit of farmer (Interviewee 7).

Of course, we do tests. We are doing field tests right now, that takes place on our own field, which we are lucky to have” (Interviewee 14).

Iterative development with field trials to test technology

“The [technology] cannot be an isolated. It cannot be an isolated part, it needs to be integrated in the whole chain of producing food. That means that it needs to fit in the cultivation system, that the farmer operates in” (Interviewee 7).

Integrating offering into existing system

“And then we try to convince them and giving them some different perspective. So the only way to do that is just go to them and tell them this is what we are doing. We have developed these drinks. To show them, hey, this is actually possible to do that” (Interviewee 8).

“We have a verification process. So when we are feeding on the farms We are measuring the emissions and then writing a climate report where we gather all the data from the measurements. And then we have a third party verifying our measurements” (Interviewee 11).

Validating technology

“But we have been focusing on the sector where you grow open field crops like onion, carrots, sugar beets, et cetera. So it's it's called the row crops. Or cash crops. Those types of crops has a certain demand on the soil types and climate, etcetera. But if you have good conditions, there are in general more profitable than cereals. And that's the reason why we've been focusing on this sector because the customer, in our case is a farmer, they have a larger capacity to invest in in these types of technologies” (Interviewee 7).

“I think our positioning now with the Michelin starred restaurants is quite good to go forward because there will always be people that eating in these restaurants and have money” (Interviewee 9).

Targeting customers with lower price sensitivity

“And those are the ones that can foresee what is going to happen. That type of customer can foresee that “OK, if I don't do the changes now, I will be out of business within five years” (Interviewee 7).

“So this is very much driven from authorities and by law actually” (Interviewee 10).

Targeting customers with higher pressure to innovate

“Well. We we need to prove that product actually works under hard commercial conditions. So you do that with the help of field trials, demo days or pilot installations because its not like building a Tesla because people, they have an idea about what a test lies and they can invest and they can buy it online because they they have a belief on on what what is, what is a car. But in this case, farmers doesn't. They know what they need to solve at,

but they cannot relate to robot really. So you need to be on site actually to actually show how it works and that it's performing well" (Interviewee 7).

"Show proof of concept and then turn out that this proof of concept actually has a desire in the market and then that's what we are selling a product" (Interviewee 8).

Proving desirability of the offering

"So you need to move forward with the what we call pilot customers and those are the early adopters as in any other industry. And those are the ones that can foresee what is going to happen. That type of customer can foresee that: "OK, if I don't do the changes now, I will be out of business within five years". And those are the ones that start the innovation bell curve in our case. And once you have them, they are of course the ambassadors for many others" (Interviewee 7).

"We are aiming at those companies who want to show what they are doing" (Interviewee 10).

Collaborating with early adopters

"If you're a farmer you very much know what your alternative cost is to do the same type of work that the robots can do. So first of all you need to come up with a product that meets the the the alternative cost" (Interviewee 7).

"I think the best thing is when you can really show that this will improve your company and you will make more money. You will be more profitable and maybe also you will save time in some very boring tasks that you have to do. Our solution is making this paperwork so much simpler and the the paperwork is something that they hate. It takes very much time and it's very boring and they don't see why they have to do it actually so. I think this is one of our most important important selling points" (Interviewee 10).

Quantifying the value of the novel offering

"And I think that in general the key to success is to be quite transparent. To say to the farmer, OK, this product is not ready yet, but we really want to try it out on sort of a commercial standpoint" (Interviewee 7).

"Its always a struggle also when you're not really can meet demand because people can become quite upset that they don't can get their product. So now we are putting a lot of efforts in like phoning the chefs: could you take this instead? And so on, in order that everyone should at least get something" (Interviewee 9).

Communicating openly with customers

"They also invest quite a lot of time in order to get that quality and so then they can really put in there some time in here and during the Covid with a lot of the restaurants were closed. But then actually we have the ability to be welcome them to our

farms. So for example, all [Michelin starred restaurant in Stockholm] took the whole teams and then we could talk because the restaurant was closed and they didn't have anything to do. And so they need to do something. And then we got a really good collaboration and they could see how we work and how we go on with harvesting and how the process works” (Interviewee 9).

“You will actually convince them that they can trust the product you need to be on site” (Interviewee 7).

Interacting closely with customers

“And on top of that, because the raw material material that we're dealing with is natural, the output isn't like perfect perfectly the same every time it comes out, which is one reason why it's really difficult for us to provide fertilizer for large scale or mid scale farmers because they need to know the appropriate amounts of nitrogen, potassium and phosphorus. And we can't guarantee exact amount of those at the moment” (Interviewee 15).

“We should at least increase our production capacity in order to meet the demand. Its always a struggle also when you're not really can meet demand because people can become quite upset that they don't can get their product” (Interviewee 9).

Ensuring customer demand can be met

“In terms of any B2B business that we manage, operational excellence is really important” (Interviewee 15).

“Our farmers harvest everything and then tomorrow we going to deliver it and that makes us that we have no waste at all” (Interviewee 9).

Building lean operations

“The biggest challenge to scale up this solution is on developing the market and creating value for the customer” (Interviewee 10).

“The market winners will be those companies that not only develop the best products but also successfully master the industrial scale up of their technology - Affordability & Availability are key” (Pratty, 2022).

Scaling up production

“So we bought an empty shipping container from Hamburg and then we developed or constructed all the water and the electricity and and the lamps and everything. And that turned out really well. Going forward, we are going to always build our own shipping containers” (Interviewee 9).

“We do the whole production itself in-house of the product and most of the developments of both the engineering blueprint and cultivation recipe have been done in house by by our team” (Interviewee 11).

Internalization

“And then we started to sell our software as white label solutions - that was one of the first things we did, and it was very successful. We generated good sales with it. Then we started to use the software for other areas as well” (Interviewee 14).

“But we have like a lot of really really exotic and unheard-of herbs and that you never have seen and now we have before COVID we had like herb tastings with private people like. But the during the pandemic, actually we created a digital herb testing. So, when companies have like big zoom meetings we delivered beforehand small herb kits with the herbs in them and then we could like actually join their zoom meetings from our farm” (Interviewee 9).

Developing new products

“When Covid came all our restaurants disappeared over one night and we're like: OK shit, what should we do? So we rented this small electric car and then we were like, OK, but then we should probably open up for subscriptions or open up for selling to private consumers” (Interviewee 9).

“Strategically, we didn't actually plan to sell office furniture via our platform. But we did” (Interviewee 14).

Adding new customer segments

“I think we shifted to the original plan after the crisis was over and the reasoning for that was that it financially made more sense and also it made it easier to scale than acting as a waste collection system. If we continue to operate how we operated during the pandemic, we would be a small business.” (Interviewee 15).

“Defocusing is actually always bad for a start-up. Speaking as an investor now, because you simply destroy the value that you build up beforehand” (Interviewee 14).

Focusing on core business

“Yeah of course. I think that's a really good possibility, because I think it would be much easier compared to last time when we built our [product]. It was like really hard to find raw materials and so on. It was like problems with like everything. And now when like the complete you know the the real estate sectors like really less is being built. And I think there will be easier to find like both like people that could help us and and also find material. That's cheaper, of course. That's something we could utilize” (Interviewee 9).

“This simply brought the perception and importance of crises into everyone's minds” (Interviewee 13).

Active waiting for next opportunity

“They have identified the problem that there is a food waste. They have identified the problem. There's a lack of nutrition. They have identified the problem that it is not sustainable. So I have been in several meetings with many of them together with

other food tech companies. So they had this reverse pitch. It means that they pitch for us. To tell us their problem” (Interviewee 8).

“They simply have a total financial pressure on it, because they simply don't see the future perspective there. is that now because of Covid? yes through changed consumer preferences certainly a part that has then again made considerable push on it. Supply chains, too, simply that they have all noticed. I can now also make myself a bit more independent and somehow there is now greater interest, so to speak, in my country for these products. If I can somehow source them locally and get a good margin on them, it is of course an attractive product for me” (Interviewee 12).

Openness for collaboration

“It's the traditional way of doing the business. And we are not familiar with it. They are familiar with it, they don't understand our business model” (Interviewee 8).

Teaching corporates to drive changes

“A large buyer would not say: yes here in the kg range interests me very little. Just deliver this and that to me every month, otherwise you're just not relevant to me. That means you first have to find that one production partner who can supply you on that scale with reasonably manageable costs” (Interviewee 12).

“But Christian Guba, an investor at FoodLabs, isn't phased: “There is a lot of capacity for fermentation, but it is not yet optimised for food production,” he says. “It is a matter of investing in improved technologies, retrofitting existing capacities and partnerships between industrial players and startups. We are convinced that these needs will be met” (Lewin, 2022).

Partnerships with incumbents to scale

“So at the moment, corporates always think that startups are really nice, a bit like monkeys in a cage: look, and there we also have the startups, and they're all really pretty and totally innovative, and they're all kind of agile and dynamic and I don't know what. But we subsidize their bananas, we would really like to trade with the bananas and that means that you have to cooperate with them completely and you have to establish a quick economic relationship either as a supplier or as a customer” (Interviewee 14).

Building trade relation with incumbent

“Almost finished sales contracts have simply not come about, because no decisions have been made by the people. So at some point, I had the feeling that I was really just talking to a wall” (Interviewee 14).

“For the pandemic, difficult to say. But I would say that when when our customers feel that things are scary in the world, if there are events like the invasion of Ukraine or the pandemic, I think the customers are less likely to prioritize reducing emissions if they have other risks. For example, loss of business or loss of profitability. So, I think they would always choose sales and profitability over reducing emissions if there is a crisis. And that's of course affecting us since then it's more struggling for us to make sales of our product” (Interviewee 11).

Commitment to collaboration of partners lacking

“Today, there is still a venture capital gap of just under 3,000,000 in the early-stage area for German startups. I don't know what the situation looks like in Europe, but I suspect that it's not much different and that, especially when it comes to food tech innovation, it's very hardware-heavy and fast. You can't do digital carbon capture, but you have to move material flows and huge volumes, and so on. That just costs money. That makes operations very expensive and that makes it unattractive for venture capital to go in. This is actually always a deep-tech topic” (Interviewee 14).

“Longer time horizons increase the need to provide post-investment value to portfolio companies to help realize returns—for example, by building networks and providing hands-on help with topics such as quantifying and communicating impact” (Morach et al., 2022).

Finding suitable investor

“Investors may be feeling somewhat dismayed due to disappointing retail sales performance as reported by Beyond Meat and Kellogg's plant-based brand Morningstar Farms. Public market volatility may also have contributed to a VC investment slowdown” (Frederick & Nacionales, 2022).

“The products are getting better, but so far basically everything is inferior to the ones that trying to replace, and that is an issue. So now we have a backlash when it comes to investments in these types of companies, so investors feel burnt and mostly because unknowing VCs were caught up in this FOMO. Uh and uh and invested top dollars. Lots of top dollars at high valuations in companies that really are nothing else than traditional, so to say Consumer Packaged Goods or CPG companies which are valued substantially lower than tech companies, so a lot of these companies have come up, tried to build new products, try to value themselves and operate like tech companies, which they really aren't” (Interviewee 12).

Hypes & stagnation driving investor appetite