

Exploring the role of investors in the alternative 'meat' transition

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Abstract

One of society's greatest challenges for future sustainable development is how to feed nearly 10 billion people by 2050 while simultaneously achieving the Sustainable Development Goals and staying within the planetary boundaries. This requires an urgent transformation of current global food systems. Livestock production makes up a significant amount of current environmental, health and animal welfare impacts, and its transformation offers important sustainability gains. Alternative 'meat' products offer an innovation path with the potential to disrupt the current meat industry and transition it to a sustainable state. Investments are important to finance such a transition, and thus investors can play an important role in enabling or disabling the transition through their position as a dominant regime actor interacting with niche innovations in the transition. This thesis combines the multi-level perspective on sustainability transitions, power and transition intermediary theory to explore the power and role of investors in the alternative 'meat' transition, focusing on the case of the German alternative 'meat' investment space.

Through investor interviews and document analysis, the results reveal that early-stage investors invest in alternative 'meat' to achieve environmental and social goals, while later-stage investors aim for economic and financial goals. Further, all investors not only mobilise financial capital, but also mental and human resources, with some mobilising artifactual resources. Regarding power exercise of investors, the thesis finds that different types of investors exercise different types of power along the alternative 'meat' niche's financing cycle. Investors in earlier stages of the transition exercise innovative and transformative power, while investors in later stages exercise transformative and reinforcing power. Most of this power exercise by investors is passively done through enabling start-ups to create new resources and infrastructure. It is also found that investors exhibit some intermediary functions, most importantly networking and knowledge and learning in connecting niche and regime actors in the alternative 'meat' space.

To support the alternative 'meat' transition, investors can utilise their resources as investors as strengths as well as create investors networks and alliances to strengthen their power position in the alternative 'meat' market and policymaking space. Legislation that crafts a comprehensive policy framework for supporting alternative 'meat' as well as establishes guidelines for environmental and social investment guidelines will support an inflow of investment in sustainable investments such as alternative 'meat'.

Keywords: alternative meat, sustainable investment, multi-level perspective, power in transition, transition intermediary

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Introduction

Feeding the future world population, projected to reach 9.7 billion by 2050 according to the United Nations (2019) World Population Prospects report, is one of the most pressing challenges ahead (KC et al., 2018), with overall food demand expected to rise by over 50% until 2050 (Belderok, Broersen, & Zerktouni, 2021). This is especially urgent in the light of Agenda 2030, a plan signed by 193 UN members, aimed at achieving 17 global Sustainable Development Goals (SDGs) by 2030. Achieving food security (SDG 2) while reducing pressures on environmental resources (SDG 13) calls for strong change in global industrialised food systems (Aiking & de Boer, 2020). A sector with high social, environmental and health costs is the livestock sector, underlined in recent reports by the IPCC and the FAO (FAO, UNICEF, WFP, & WHO, 2020; IPCC, 2019).

The livestock sector makes up a significant amount of environmental impact in the food system, accounting for around 18% of GHG emissions and over 80% of land use globally (Stehfest et al., 2009). It further pollutes other resources such as water, biodiversity, and the atmosphere. Rockström et al.'s "planetary boundaries" suggest that livestock production already breaches three planetary boundaries and is intimately linked to all 17 SDGs (Rockström et al., 2009; Rockström & Sukhdev, 2016; Tilman & Clark, 2014). Further, meat, especially of ruminants, has negative animal welfare impacts as well as human health impacts such as through antibiotics use and zoonotic diseases (De Boer & Aiking, 2011; Stehfest et al., 2009; Wild et al., 2014). The scale and intensity of the livestock sector's impacts on the environment, humans and animals cannot be sustained if levels of meat consumption shall be nearly doubled with increasing world population and consumption while staying within sustainable limits (De Boer & Aiking, 2011). The sustainable development of the future food system urgently requires a transition of the livestock sector towards more diverse and sustainable sources of 'meat' to safeguard the environment and food security. However, changing consumer behaviour towards eating less meat is increasingly difficult with routinised structures of meat consumption and higher incomes related to higher meat consumption.

A promising approach is the alternative 'meat' transition, which means replacing animal meat with alternative 'meat' products, mimicking animal meat but providing a more sustainable protein source. Alternative 'meat' includes plant-based, cell-based and fermentation-based meat alternative products. This transition offers considerable resource efficiency gains, using considerably less water, land and energy while also reducing CO₂ emissions (Aiking & de Boer, 2020; Nijdam, Rood, & Westhoek, 2012; Smetana, Mathys, Knoch, & Heinz, 2015; Wirsam, Biber, & Bahlmann, 2020). Further, it also has some improved health outcomes such as no cholesterol (Curtain & Grafenauer, 2019; Westhoek et al., 2014), and eliminates most animal welfare concerns (Aiking & de Boer, 2020). International institutions such as the Food and Agricultural Organisation and the Intergovernmental Panel on Climate Change have increasingly recognised this triple burden of livestock consumption and recommend transitioning diets away from animals towards alternative protein (FAO et al., 2020; IPCC, 2019; Jetzke, 2019; Kampers & Fresco, 2017; Secretary-General, 2019; Willett et al., 2019). Consumers' growing environmental and health awareness towards their diet has accelerated this transition, especially in Western countries (OECD/FAO, 2020; Wild et al., 2014). A focus is on creating 'meat' alternatives that can substitute animal meat and offer a wider choice to consumers (Wild et al., 2014). Sustainability and food systems scholars argue that a transition

from animal to alternative 'meat' should be accelerated as it offers a sustainable alternative to the dominant animal meat system while delivering healthy protein (Apostolidis & McLeay, 2016; Geijer, 2017; Pimentel & Pimentel, 2003; Santo et al., 2020). For a transition from animal to alternative 'meat' to occur, the alternative 'meat' sector needs to move out of its niche and capture a major share in the global meat market.

Although the global market for alternative 'meat' has achieved unprecedented growth in previous years, with expected annual growth rates of 15-30% (Bechtold & Sommer, 2020; Gaan et al., 2021), it still remains a niche, making up less than 1% of the global meat industry (Geijer & Gammoudy, 2020; Raven & St. Clere Smithe, 2020). While market experts at consulting firm AT Kearney forecast alternative 'meat' to occupy 60% of the global meat market by 2040 (Gerhardt, Ziemßen, Warschun, Donnan, & Kühnle, 2019), vested interests by the animal meat industry create barriers for the alternative 'meat' sector to reach such a mainstream share of the market (Geijer, 2017; van der Weele, Feindt, van der Goot, van Mierlo, & van Boekel, 2019). Bridging alternative 'meat' and meat to facilitate the transition is an important challenge for the sustainability of the future food system.

International organisations are underlining the importance of finance for achieving sustainable development, such as the UNEP's 2015 report on "Aligning finance with sustainable development" or finance being one of the four key levers for transformations in the Global Sustainable Development Report "The future is now" (2019). A major sustainability transition from animal meat to alternative 'meat' requires fundamental re-direction of investment and financial capital, which makes investors an important enabler or disabler of such innovations (Geddes & Schmidt, 2020; UNEP, 2015). Investments in the alternative 'meat' sector have been growing as quickly as the sector itself, with investments in the first half of 2020 exceeding total investments in 2019 (Gaan et al., 2021; Raven & St. Clere Smithe, 2020). This aligns with an increased interest in sustainable investing, investments which include non-financial returns to investment, such as environmental and social impacts, in investor's portfolio decision-making (Giese, Lee, Melas, Nagy, & Nishikawa, 2019; Randjelovic, O'Rourke, & Orsato, 2003; Zhang, Zhang, & Managi, 2019). Investors have an important role to play in enabling or disabling the alternative 'meat' transition through their investment choices, which gives them a certain power. While they are embedded in the dominant system of the financial market, they can engage positively with the alternative 'meat' innovations in the niche and support them (de Lange, 2019). De Lange sees investors as bridging boundaries between niche innovations and the existing financial market, thus supporting transitions as transition intermediaries. Whether investors play such a role and what power they exercise through their investments in the alternative 'meat' sector is what this research explores.

Research on the alternative 'meat' and protein transition has explored a variety of angles, from consumer acceptance (Boukid, 2021; Hartmann & Siegrist, 2017; Weinrich, 2019), technology and research development (He, Evans, Liu, & Shao, 2020; Kumar et al., 2017; Lonkila & Kaljonen, 2021), and markets (Bechtold & Sommer, 2020; Curtain & Grafenauer, 2019). This research aims to add a new perspective on the alternative 'meat' transition by looking at the role of investors and their power.

Theoretically, this research combines sustainability transitions theory with power theory, while looking explicitly at the power of investors and their role as transition intermediaries in

the alternative 'meat' transition. Transitions research has thus far given little attention to food system transitions, and only a few researchers have explored the alternative 'meat' or protein transition (Mylan, Morris, Beech, & Geels, 2019; Tziva, Negro, Kalfagianni, & Hekkert, 2020). Even less attention has been given to power dynamics between actors in this transition (Mylan et al., 2019). The alternative 'meat' transition is subject to interactions between a very small, dynamic alternative 'meat' sector and a large, powerful dominant meat industry. This makes looking at power a very interesting theoretical contribution of this thesis. Rather than looking at overall power dynamics though, this research puts the focus on a specific actor in the financial regime, due to its potential intermediary position in the transition (Bocken, 2015; de Lange, 2019; Geddes & Schmidt, 2020) . This adds interesting insights in the enabling or disabling role of investors as actors in the alternative 'meat' transition. The research uses a case study of investors in the German alternative 'meat' investment space.

The thesis explores the question:

What is the role and power of investors engaged in the alternative 'meat' transition?

Sub-questions include:

1. What goals do investors want to achieve in the alternative 'meat' transition?
2. What resources are investors mobilising in the alternative 'meat' transition?
3. What types of power do investors use in the alternative 'meat' transition?
4. Are investors transition intermediaries in the alternative 'meat' transition?

The thesis continues in the following order. The theory section explains the concepts of the theories used in the research. This is followed by the methods section, which details data collection and analysis. Afterwards, the background chapter establishes investor types and investment developments of the global and German alternative 'meat' investment space. The following result section explores the role and power of investors through answering the four sub-questions. This leads to the discussion of the findings and its limitations. Conclusions are drawn accordingly, and future research and recommendations are given.

Theory

To answer the research question, the researcher uses a qualitative case study analysis of the power and role of investors in the alternative 'meat' investment space in Germany. It combines several theoretical concepts related to socio-technical sustainability transitions, the multi-level perspective by Geels (2002), power in transition theory by Avelino (2011) and theory on transition intermediaries by Sovacool, Turnheim, Martiskainen, Brown, and Kivimaa (2020). The multi-level perspective serves as the basic theory that explains the dynamics of a sustainability transition and sets the spatial position of actors within the alternative 'meat' transition. Power in transition theory enhances the multi-level perspective by offering a lens through which the agency of investors in the alternative 'meat' transition is explored. Finally, transition intermediary theory complements the previous theories by conceptualising the investor's role and function within the alternative 'meat' transition. The following theory sections explain the theories and their concepts used in the thesis.

Multi-level perspective

Sustainability transitions research has emerged as an important and large research field within the last decades. The underlying rationale is that many environmental challenges today are also societal challenges which require radical shifts from unsustainable production and consumption patterns to new forms of socio-technical systems. These are called sustainability transitions (Köhler et al., 2019). Sustainability transitions research examines how radical shifts in socio-technical systems occur, emphasising that transitions are non-linear, multi-level, multi-phase and multi-actor processes which exhibit dynamics of stability and change over time and space (Lachman, 2013).

Four of the most prominent theoretical frameworks used are the multi-level perspective (MLP), technological innovation systems (TIS), strategic niche management (SNM) and transition management (TM). TIS and SNM have a strong focus on the niche and the emergence of novel innovations from a bottom-up view, while TM takes a more policy-oriented top-down approach (Köhler et al., 2019; Lachman, 2013). The MLP is appealing because it is universally applicable to understand and observe complex transition processes and emphasises interactions between multiple levels as well as stability and change dynamics within sustainability transitions.

The MLP by Geels (2002) argues for transitions as dynamic processes of interactions between three analytical levels: 1) the niche, where radical innovations are created in safe spaces; 2) the socio-technical regime, the dominant configuration of actors, practices and structures of society that are relatively stable; and 3) the landscape, the slow-changing macro-economic trends that provide the background for niche and regime actions (Geels, 2004). The regime has a stabilising mechanism, while landscape pressures and radical niche innovations act as destabilising pressures on the regime (Geels, 2002). The breakthrough of a niche such as alternative 'meat' into the meat industry regime is a process of multiple interactions between regime, landscape, and niches itself. Geels (2004) emphasises that actors in the regime create stability by reproducing elements in the system through their activities, and it is these dependencies and networks that create the stability within the regime. Niches are radical innovation spaces where actors create alternative networks and structures that aim to break

and transform the regime, however actors in the dominant regime inhibit these niche actors from entering the regime. Thus, stability and change within the alternative ‘meat’ transition can be seen as the result of actions and interactions between different actor groups such as meat producing firms in the existing regime and innovative alternative ‘meat’ producers in the niche. El Bilali (2019a) agrees, adding that for dominant agro-food systems, such as the meat sector, regimes remain in place despite innovations mainly because of path dependencies and having established routines and relationships that are hard for niches to break. The overarching landscape can put pressure on the regime, which enables “windows of opportunity” that break the boundary of the regime to the niche and allow niche innovation to enter the mainstream (Geels, 2002).

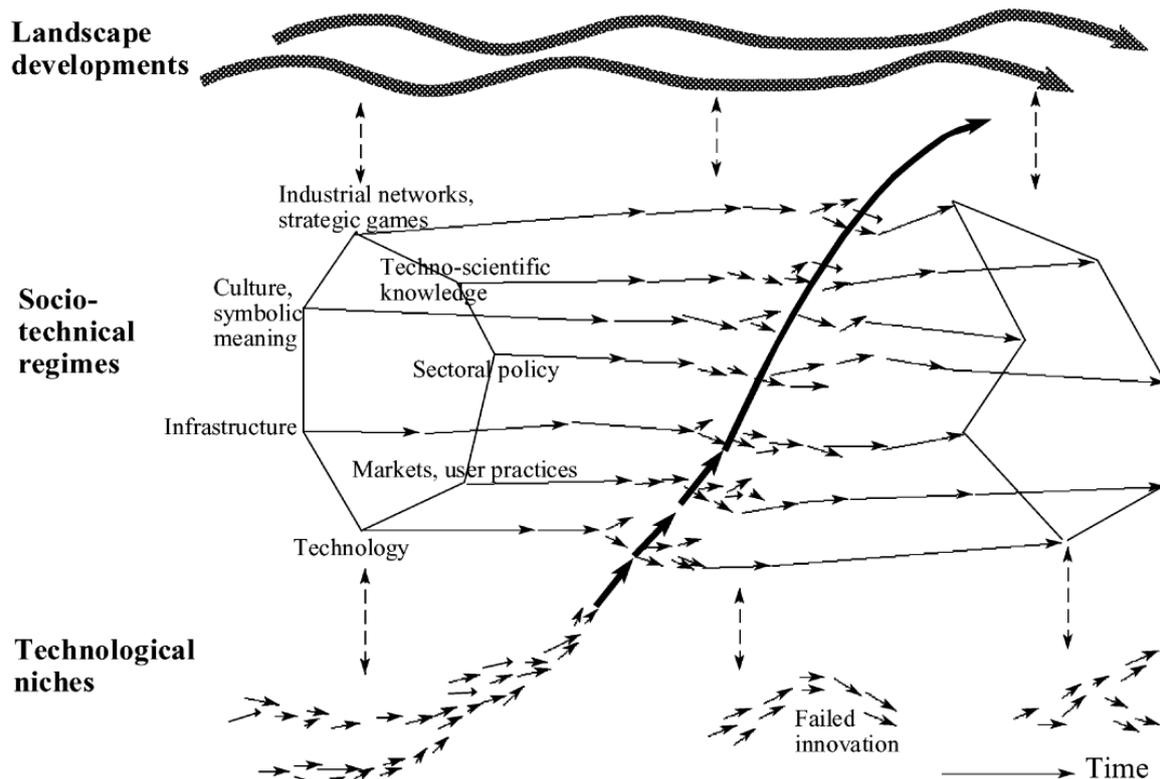


Figure 1. The dynamic multi-level perspective. Adapted from Geels (2002)

Sustainability transitions consist of many elements, among which are infrastructure, policy, technology, markets and actors. This research is actor-focused; thus, the multi-level perspective is used here to situate actors within the alternative ‘meat’ transition. Actors in the niche include start-ups and researchers who develop alternative ‘meat’ ingredients, products, and companies. The regime includes actors in the animal meat industry such as investors and food corporates which reinforce the current system. The landscape includes all actors and maintains overarching macro-economic trends, including social, environmental and health topics such as the rise of flexitarianism, the impacts of the CoVid-19 pandemic and the young generation’s increased environmental awareness.

MLP is a useful generalisable heuristic for sustainability transitions, yet researchers have long underlined important weaknesses of the framework and expanded upon it in many directions. Geels (2019) himself as well as the sustainability transitions research network (2019) address these in a review of the field and its literature. The authors identify several key themes of research, one of which considers power and politics within transitions (Lawhon & Murphy,

2012; Meadowcroft, 2009; Shove & Walker, 2007). They are seen as crucial additions to the theory because interactions around stability and change within the levels of the MLP inevitably are struggles around power, dominance and vested interests (Avelino, 2017). which has been neglected but in recent years experienced an increase of research inflow. Another extension of MLP explored more in recent years is the bidirectional dynamic between niche innovations and existing regimes. It moves away from the dichotomy of positioning actors in the regime or niche and seeing niches as disrupting and regimes as stabilising (Berggren, Magnusson, & Sushandoyo, 2015). This includes observing the different roles actors are playing in transition dynamics (Wittmayer, Avelino, van Steenberg, & Loorbach, 2017) with special importance on intermediary actors who bridge niche and regime, with an example of incumbent regime actors who engage with niche actors (Köhler et al., 2019; Mylan et al, 2013). These two theories are explained in the following sections.

Power in transition framework

Many elements of the MLP have power-laden concepts, such as regimes being defined as dominant constellations, or the constellation with 'most power' (Avelino & Rotmans, 2011). Further, any interaction of niches and regimes towards change or stability is inevitably a political process and a power struggle (Avelino & Rotmans, 2011; Köhler et al., 2019). The main exploration of this research is the power of investors in the alternative 'meat' transition. Thus, a power conceptualisation is required that takes an actor-focused approach and offers different conceptualisations of power for different levels within the multi-level perspective. Among many power theories that see power as structure-based, Avelino's power in transition theory (2011) offers an actor-based power conceptualisation specifically adapted for exploring dynamics in transition processes. This thesis applies her framework to explore power of investors.

Generally, debates about power are diverse and contested, with different strands defining power as either actor-specific, structure-specific or discursive (Avelino & Rotmans, 2009). Some authors within transitions research also offer definitions for power, such as Geels and Schot (2007) who define it as "actors and social groups having conflicting goals and interests" (p. 16), which leads to conflicts and power struggles, among others. Geels later reiterates power in a neo-Gramscian light, framing it as a hegemonic resistance notion of dominant regime actors against change from niche actors (Geels, 2014) . This definition however only sees power in the hands of the dominant regime, while Avelino's framework accounts for the power of all actors in the system (Avelino, 2011). Her framework is meant to conceptualise and study power in transitions research while being sensitive to all possible dimensions of power in the debate. The framework sees niches and regimes as conceptual spaces where different types of power can be exercised, which does not need one specific definition for power as in other approaches. This makes the framework most suitable for the research, as investors as a previously unstudied actor in power in transition might bring a new insight.

The research uses Avelino's framework to explore how investors use their power to engage in the alternative 'meat' transition. Avelino (2011) defines power as "the ability of actors to mobilise resources to achieve a certain goal" (p. 69), conceptualising power as a capacity that every actor in a transition can exercise. Three sub-questions explore power in more detail,

looking at what resources are mobilised and how they are mobilised through the types of power exercise.

To observe what is mobilised, Avelino (2011) offers a typology of resources. She defines resources as “persons, assets, materials or capital, including human, mental, monetary, artifactual and natural resources” (p. 69), keeping the definition generic to avoid theory-based discussions. She sees resources as generally power neutral, becoming only power-laden once they are mobilised by actors for a certain goal. Distinguishing between human, mental, monetary, artifactual and natural resources allows to adapt their order of influence according to the individual context of one’s research and does not enforce a hierarchy of relevance between them. Power in transition theory posits that actors may exercise power through the mobilisation of a multitude of resources, thus, it will be examined whether investors exercise power through more than financial resource mobilisation. She further emphasises that all resources are interconnected and that the mobilisation of one may require the mobilisation of another.

Type of Resources	Resources
Human	Human leverage: personnel, members, voters, clients, supporters
Mental	Information, concepts, ideas, and beliefs
Monetary	Funds, cash, and financial stock
Artifactual	Apparatuses, products, construction, and infrastructure
Natural	Raw materials, physical space

Table 1. Typology of power resources. Adapted from Avelino (2011)

Regarding types of power, she develops a methodology to apply to the three levels of the multi-level perspective based on case studies in the Dutch mobility sector. According to her findings, niche actors mainly exercise *innovative power*, which means they have the capacity to create and find new resources. Making actors less dependent on existing resources, she sees this also as a form of power in itself. Regime actors exercise *reinforcive power*, or the capacity to reproduce existing institutions and structures, deciding how current resources are distributed and valued. This gives them power to create path-dependencies and lock-ins in the dominant regime. In the landscape, *systemic power* is the combined capacity by all actors to keep the societal system, such as a nation or industry, running. Adding a new insight to the niche-regime interaction debate in transitions, she introduces niche-regimes, which in Avelino and Rotmans (2009) are defined as actors that mainly exercise *transformative power*, the capacity to develop new institutions and structures that change the distribution of resources through redirecting or replacing resources. Avelino (2011) underlines however that the distinction is not absolute, and that situated actors can exercise more than one type of power.

Type of Power Exercise	Capacity of actors to...
Innovative power	...invent and create new resources
Reinforcive power	...reinforce and reproduce existing structures & institutions
Transformative power	...invent and develop new structures & institutions
Systemic power	...enable and safeguard the survival of a societal system

Table 2. Typology of power exercise. Adapted from Avelino (2011)

Avelino (2011) also refines her power typology by making a distinction between the *passive* and *active* exercise of power. While active means that actors exercise power and mobilise resources themselves, passive means that actors enable other actors to exercise power and mobilise resources. She underlines that active power exercise explicitly includes the mobilisation of physical resources such as artifacts and natural resources which materialise the new structures. Investors are conceptualised as mainly using financial resources and not physical resources; thus, this distinction is included to explore whether investors engage in active or passive power exercise.

Geels (2013) situates financial markets and their actors as part of the regime level. Geddes and Schmidt (2020) agree, emphasising that the financial market is a selection environment with its own actors, rules, institutions, and routines, while de Lange (2019) positions the financial market as a mature field where actors interact frequently in established routines which create a system of collective rules and meaning for behaviour. These characteristics all notably position investors as regime actors in the multi-level perspective. Thus, according to Avelino (2011)'s findings, investors would exercise reinforcing power through mobilising resources within a transition, using their power to uphold the current distribution of resources through existing structures and institutions and opposing innovative niche innovations. However, theory on transition intermediaries offers another perspective on actor's power exercise and is examined in the following section.

Investors as transition intermediaries

Increasingly, transitions researchers have underlined that there is an overemphasis of the framing whereby niche actors inevitably disrupt and bring change to the incumbent regime and its actors who in turn are portrayed as 'villains' who resist or prevent transition efforts (Turnheim & Sovacool, 2020). While many of these assumptions are funded in empirical observations, there are also cases where incumbent regime actors actively engage with niche innovations and positively support the transition. This has been largely overlooked by transitions research so far and led to a lack of consideration of the possible role by incumbent actors in facilitating and accelerating transitions (Ampe, Paredis, Asveld, Osseweijer, & Block, 2021; Sovacool et al., 2020), which would give them an intermediary and bridging role.

The literature on intermediaries is vast, and so are their names. In different contexts, they are called boundary spanners (Smink, Negro, Niesten, & Hekkert, 2015; Williams, 2002), hybrid actors (Smink et al., 2015), or innovation intermediaries (Gliedt, Hoicka, & Jackson, 2018; Hargreaves, Hielscher, Seyfang, & Smith, 2013; Kivimaa, Boon, Hyysalo, & Klerkx, 2019; Kivimaa, Hyysalo, et al., 2019). While intermediaries can range from individuals to organisations and platforms, commonalities of intermediaries are that they use strategies "to connect different worlds" (Smink et al., 2015, p. 2) or "act as an agent or broker in the innovation process between parties" (Sovacool et al., 2020, p. 3). This leads them to have similar overarching characteristics, including a variety of bridging functions between resources, activities, and skills of actors to facilitate transition processes.

Transition intermediaries are examined in a variety of research contexts, from sustainability transitions to organisational theory (van Mossel, van Rijnsoever, & Hekkert, 2018). Kivimaa, Boon, et al. (2019) establish a typology of transition intermediaries, which includes the

regime-based transition intermediary. These actors are defined as “an intermediary that is tied through, for example, institutional arrangements or interests to the prevailing socio-technical regime but has a specific mandate or goal to promote transition and, thus, interacts (often) with a range of niches or the whole system” (p. 7). Sovacool et al. (2020) add that this position of intermediaries not only leads to them holding back niche actors but also enabling and supporting them. As an example, they cite Van Mossel et al. (2018), who examine incumbent firms’ behaviour in transitions and find that they can play an enabling as well as disabling role with niches. Regime-based transition intermediary theory captures the possible position of investors as situated in the regime but engaging with niche innovations actors. Thus, this research conceptualises investors as an intermediary actor that sits within the incumbent regime and may engage positively or negatively with alternative ‘meat’ niche innovations.

Sovacool et al. (2020) identify six categories of intermediation functions by transition intermediaries, which encapsulate the characteristics identified by most researchers in the field (Fischer & Newig, 2016; Kivimaa, Boon, et al., 2019; Moss, 2009; Smink et al., 2015; Sternlieb, Bixler, & Huber-Stearns, 2013; Williams, 2002). These characteristics serves as guide for identifying whether investors in the alternative ‘meat’ transition are transitions intermediaries and thus bridge and engage with niche actors.

Varied functions of intermediaries in sustainability transitions	Examples of functions
Knowledge and learning	Knowledge gathering and sharing, facilitating experimentation, provide advice and support
Networking	Creating and managing networks, translating, trust building and mediation, organising events
Brokering	Representing organisations, negotiation, financial brokering, facilitate between actors and interests
Innovation and diffusion	Connecting new technology and users
Visioning	Articulate expectations and visions
Institutional	Political advocacy and lobbying, policy implementation, develop standards

Table 3. The varied functions of transition intermediaries. Adapted from Sovacool et al. (2020)

De Lange (2019) conducts research on financial actors investing in sustainable start-ups and finds evidence that investors have boundary-bridging characteristics and exercise different powers. For her, investors are ‘change agents’ when they come from the regime of finance but despite the prescribed routines of the regime invest in the niche, in her case sustainable start-ups. The investors “use resources and engage in activities that further their interests to create new related institutions or to correspondingly transform existing ones” (de Lange, 2019, p. 1). This very much aligns with descriptions of regime-based transition intermediary actors engaging with niche actors and captures notions of transformative power exercise, creating new institutions and transforming resource distribution. Thus, it is very much possible that while investors are situated in the regime, they can exercise transformative power or exercise several types of different powers to prevent or support the alternative ‘meat’ transition. Which powers investors exercise as well what role they assume in the alternative ‘meat’ transition is explored in this research.

Methods

To answer the research question and sub-questions, a qualitative research design is used. To increase the research's validity, a triangulation approach is used, combining a literature review, semi-structured interviews and document analysis (Bowen, 2009; Merriam & Tisdell, 2015). The following sections describe data collection and analysis processes. The whole process is shown in figure 2.

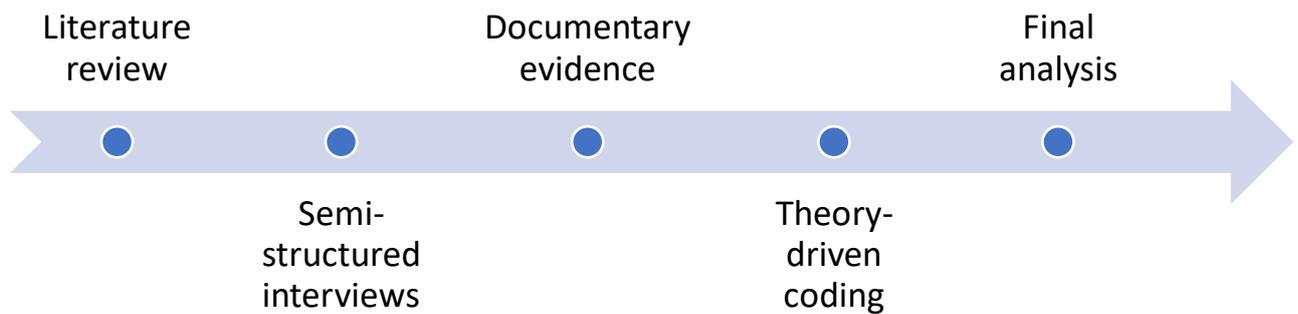


Figure 2. The methodological process.

Data collection

The process began by collecting documents in a literature review during the proposal process to understand topics and concepts and was continued throughout to add depth and refine the theory. This was done through database searches on Scopus, Web of Science and occasionally Google Scholar. The original four main concepts used, “multi-level perspective”, “power theory”, “sustainable finance” and “intermediary” and their synonyms were searched in combination with each other to find relevant literature and identify existing research as well as knowledge gaps. This was done throughout March and April, as preparation for the interviews began. Documents considered were the most cited and relevant from each field and ranging from 1980-2021. A full list of searched keywords can be found in appendix 1. This helped to develop interconnections between the theories and guide conceptualisation for the interview guide questions and subsequent codes for analysis.

The core element of the research is the collection of qualitative data in semi-structured interviews with investors in the alternative ‘meat’ investment space in Germany. The research focus is situated in Germany for several reasons. The German market for alternative ‘meat’ is thriving, being one of the global leaders of innovation (Gaan et al., 2021), having the highest alternative ‘meat’ product launch share globally in 2018 (Bechtold & Sommer, 2020), and showing annual growth of 15-20% (Tziva et al., 2020). Further, it offers a comprehensive space of investors within the alternative ‘meat’ sector which offers good opportunities for interviews and document analysis. Finally, the researcher speaks German and is familiar with the alternative ‘meat’ environment which facilitated data collection and analysis. The focus is on German actors investing in the alternative ‘meat’ sector. Research began with an online search of investors in the German market, using the “alternative ‘meat’ landscape map” by Balpro, the German association for alternative proteins as a starting point. It maps actors engaged in alternative protein in Germany and includes investors. Further investors were identified through online searches on LinkedIn. The researcher interviewed a total of nine

actors, eight through online video or phone calls and one in written form. These interviews took place between the 12th to the 24th of June 2021. Below, the list of interviewed actors can be observed with their respective codes used in the results section.

Type of organisation	Position of interviewee	Code
Family-owned Venture Capital	Founder	Int1
Consulting & Venture Building	Managing Partner	Int2
Venture Capital & Company Building	Venture Partner	Int3
Consulting & Venture Capital	CEO	Int4
Corporate Business Unit	CEO	Int5
Research	Innovation and sustainability researcher	Int6
Association for alternative proteins	Co-Founder	Int7
Finance Research Institute	Head of Sustainability Department	Exp1
Podcast	Alternative 'meat' expert	Exp2

Table 4. List of interviewed actors

The interviewees include different investor types, with most situated in the venture capital investment space. Also, actors investing in the alternative 'meat' space also often have business or services they offer next to their investment, such as consulting or company building. To gain more information on all types of investors in the transition, expert interviews were added which gave an outside perspective on investors. The conditions were that the interviewee either a) invested in alternative 'meat' or b) had experience with investors in the alternative 'meat' sector.

The interview guide is based mainly on Avelino's (2011) conceptualisation of power in transition, as well as qualitative interviewing guides by DiCicco-Bloom and Crabtree (2006) and Merriam and Tisdell (2015). As power can be something indirect, a difference needs to be made between what is power and what is not. Avelino (2011) gives a distinction, denoting power as the "capacity of actors to bring about or prevent acts and interactions in order to accomplish a certain goal" (p. 99) rather than the actions being an exercise of power in themselves. Thus, the focus will be on analysing actors' capability to exercise power rather than the acts of power exercise. To analyse this ability, she presents an analytical approach to using the power in transition framework, which was adapted for the interview guide. A detailed version of the interview guide can be seen in appendix 2.

To answer sub-questions 1 and 2 and investigate what goals and resources investors use in the alternative 'meat' transition, the researcher asked questions about the interviewee's investments, what aims they had with them and what resources they use to support those investments. To investigate sub-question 3 on the type of power investors exercise, interviewees were asked to elaborate on their role in the sector as well as whether they see themselves as having power or influence. To investigate sub-question 4 on whether investors have intermediary characteristics, answers from the previous questions as well as answers regarding their interaction with other actors in the alternative 'meat' sector were used. Finally, to collect potentially interesting data for future research and limitations, actors were asked to mention what opportunities and barriers they see for the transition. The sections of the interview and measured concepts can be seen below.

Section of interview guide	Concepts measured
Section 1: What investments do you conduct in the alternative 'meat' sector?	Goals and resources of investors
Section 2: What is your role and influence in the alternative 'meat' transition?	Power type of investors, intermediary characteristics
Section 3: What opportunities and barriers do you see for the future of the alternative 'meat' transition?	Policy recommendations, limitations, future research

Table 5. Overview of questions and measured concepts in interview guide

Finally, to complement the data, two separate document analyses were conducted. First, a media analysis was conducted to chronicle developments in the alternative 'meat' investment market in Germany and international, using German-language and English-language newspaper articles. This was conducted with the data mining platform LexisNexis by going through nearly 700 German-language news articles with the keywords "Fleischersatz" (meat substitute) AND "Invest*" and deductively crafting a timeline of major actors and events in the transition from 2009 to 2021 in Germany. Additional English-language newspaper articles were collected through two searches of "Cultured meat"/ "Plant-based meat" AND "Invest*" for the international context. As there are currently no concrete numbers for the size of investments in the alternative 'meat' market in Germany, global alternative 'meat' investment developments and key actors and events were included to add orientation to the background chapter.

Second, to complement the investor and expert interviews, further investor materials were collected. These included websites and reports by interviewees as well as other investors in the German space not interviewed. Further, international reports regarding investments in alternative 'meat' from international research institutes, consumer organisation and consultancies were also included to enrich the database on investors worldwide. All the documents analysed can be found in appendix 3.

Data analysis

The analysis was conducted in the qualitative data analysis software MaxQDA, due to its ease of use for qualitative coding and familiarity to the researcher. All documents were coded following Gibbs (2007)' approach to qualitative coding. The theoretic literature was coded in a concept-driven manner, marking its most important concepts and their explanations, as well as interlinkages to the other theories used. This allowed for the theoretical framework to come together and inform the operationalisation of concepts for the interview guide. Later in the research, interviews were transcribed and coded alongside other investor materials and reports. This also followed a concept-driven coding approach. In the first round, documents and transcripts were coded along codes representing the four theories used. For the second round, this was revised, and codes directly represented the sub-questions to make pattern finding and analysis easier. Coded segments were exported to an Excel table where they were ordered and categorised according to themes following the defined inclusion criteria of the codes as well as the understanding of the deductions of the researcher. The full list of codes and their inclusion criteria can be found in appendix 4.

Ethical considerations

Three measures were taken to cover ethical issues in this research, including informed consent, anonymous information, and epidemic prevention measures. Firstly, to secure an informed decision for interviewees about whether to participate in this research, they were provided sufficient information about the research to decide beforehand whether to participate in this research. This included signing an informed consent form based on the General Data Protection Regulation (GDPR) principles of the EU. Secondly, to assure anonymity, the respondents interviewed are anonymised in the thesis. The data, such as recordings for transcription are safely documented and saved on a password-protected laptop as well as deleted after the thesis is completed. Finally, since research was conducted during the CoVid-19 pandemic, research methods obeyed the advice of the RIVM of the Netherlands and interviews were set up virtually over video or phone calls.

Background on investors and investments in alternative ‘meat’

This section chronicles the developments in the alternative ‘meat’ investment landscape so far, globally and in Germany. To situate the developments, an introduction to sustainable finance and the cycle of start-up financing is given.

Sustainable finance can be used as the overarching term for investments made with a triple bottom line in mind: “balancing economic health, social equity and economic resilience” (Bocken, 2015, p. 3). Similar concepts are those of environmental, social and governance (ESG) investing (Giese et al., 2019) and impact investing (Wettstein, Dey, Schaefers, & Bahlmann, 2019), both of which aim for investments that meet the triple bottom line, while other concepts such as green finance or social entrepreneurship invest for either the environmental or social benefits (Bulkeley & van Veelen, 2020; Zhang et al., 2019). Alternative ‘meat’ innovations are interesting because they have positive environmental, social and economic returns and thus fall within the category of sustainable investments. Start-up development follows along a financing cycle, and as alternative ‘meat’ innovations originate in the niche, investors investing in these innovations are situated along this financing cycle. Figure 3 shows this process and where financial actors are situated within it. It emphasises that there are financial actors who invest at different stages of the start-up niche development process.

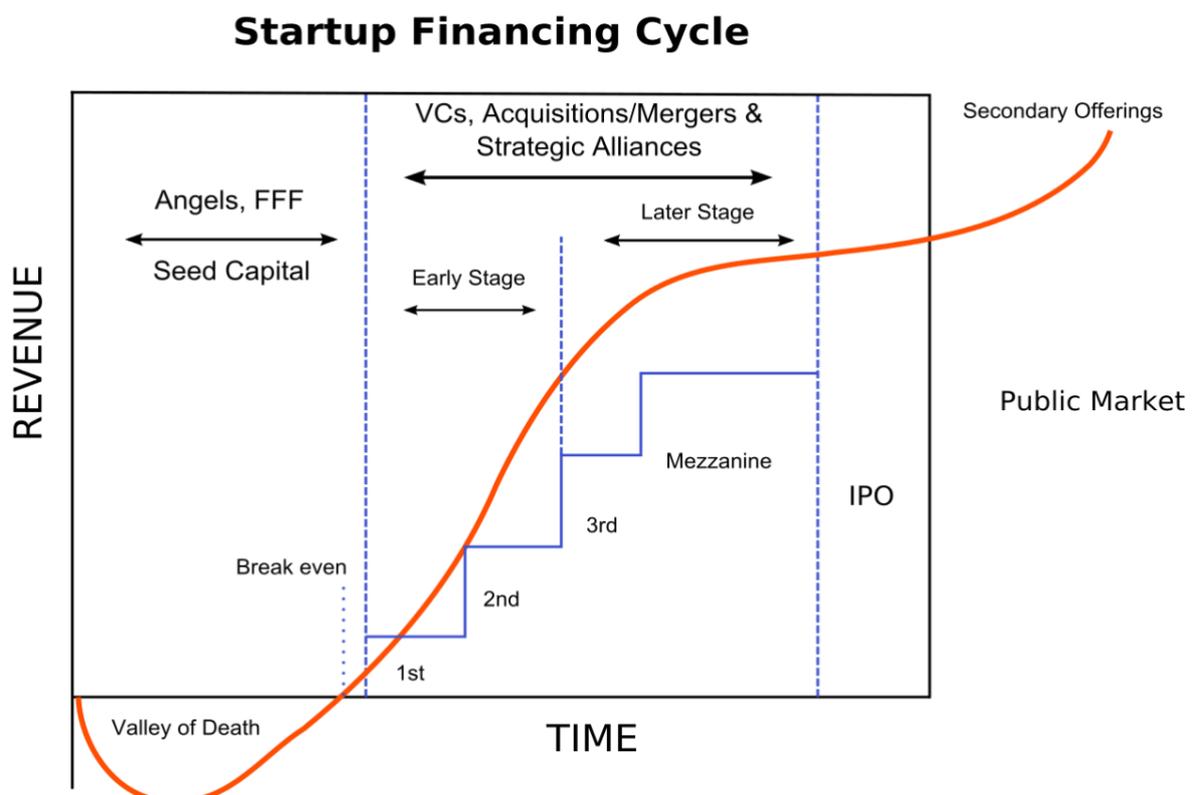


Figure 3. The start-up financing cycle and investors' positions. Source: Wikimedia Commons

Bocken (2015) lays out the general structure, positioning actors across start-up stages from first concept to early stages of commercialisation and diffusion to successful initial public offering (IPO) on the stock exchange and exit. The seed stage, where start-ups look for starting capital, is served by angel investors. Angel investors are individuals with a high net-worth who mostly invest their own funds in start-ups on their own account. They are usually former

executives and experts in the sector they invest in. When a start-up shows growth and commercialisation potential, venture capital and corporate venture capital come in. Venture capital firms make private equity investments into start-ups with managed funds of investor money, while corporate venture capital invests funds of their associated parent company. Once a start-up has a proven track record of growth & profit and has entered the public stock market, institutional investors such as banks, pension funds and insurance companies come in. In this way, investor types are distributed across the development chain of a start-up, which gives rise to the assumption that different actors may exercise different types of power and intermediary functions at different stages of the niche development process in a sustainability transition such as the alternative 'meat' transition. This is explored in the results section.

The global alternative 'meat' investment space

The Good Food Institute, a non-profit working internationally to accelerate alternative 'meat' innovation since 2016, classifies alternative 'meat' in three categories: Plant-based meat, cultivated meat and fermentation, with insect-based protein also seen as a category by other publications (Belderok et al., 2021; Gaan et al., 2021). Plant-based meat is a meat substitute based on plants, ranging from wheat and soy to peas or beans. There are a multitude of methods including high moisture extrusion, 3D printing, folding, and layering. A famous example is the Beyond Burger. Cultured meat is created in the process of taking animal muscle stem cells and feeding them with a growth serum in a petri dish and controlled environment to multiply and form muscle tissue which is processed into a cultured meat product. Cultured meat is not yet generally commercially available. Fermentation uses microorganisms to produce plant 'meat' or its ingredients, creating ingredients such as fats, flavouring, or enzymes. An example of fermentation is Impossible Food's 'heme', a genetically engineered soy derivate that mimics the "meaty" feel of a real burger (Aarti Ramachandran, Raven, & Hau, 2021).

Alternative 'meat' products such as tofu, tempeh and falafel, offering an alternative to animal meat, have been around for centuries and embedded in a variety of cultures. However, alternative 'meat' that closely mimics the feel and taste of animal meat and aims to replace it has been a very recent development. The current age of alternative 'meat' boom we are in started around the turn of the millennia in the United States. Two big pioneers of the plant-based meat niche are the 2009 founded Beyond Meat as well as the 2011 created Impossible Foods, the two US companies aimed at creating burgers made from plants that are "better than real burgers" and "meat made in a better way" (Yau, 2014). From the beginning, the two start-ups had strong financial backing, with early angel and pioneer investors including notable names such as Microsoft Founder Bill Gates, Twitter co-founder Biz Stone and McDonald's chief executive Don Thompson (Kort, 2018). A key event that pushed forward investments in cultured meat was when in 2013, Dr. Mark Post, professor at Maastricht University, presented the first taste test of a cultured meat burger made from cow cells in London. The cost of this first burger was estimated to be around 330,000 Euros. His cultured meat research was backed by former Google founder Sergey Brin (Keeve, 2016) as well as the Dutch government (Schadwinkel, 2013).

2015 and 2016 are years with varying investment activity for alternative meat. However, in that time two institutions are founded that have significant influence on alternative 'meat' development to this day. In fall of 2015, the Good Food Institute was founded, a non-profit organisation based in the US and working on accelerating the alternative 'meat' sector worldwide (Blumenfeld, 2016). Additionally, the Institute starts the venture capital fund New Crop Capital (now under Unovis Asset Management), backed with \$25 million to invest "exclusively in plant and culture-based alternatives to animal agriculture" (Blumenfeld, 2016). Their aim is to invest only in innovations that replace animal meat in the food sector, calling the animal meat sector "ripe for innovation and large-scale disruption" (BeyondBrands, 2017). Ever since its establishment, the Good Food Institute has become a strong presence in the alternative meat market, using its website to assemble information about the science, industry and policy space around alternative 'meat' and publishing state of the industry reports around plant-based meat, cultivated meat and fermentation since 2019.

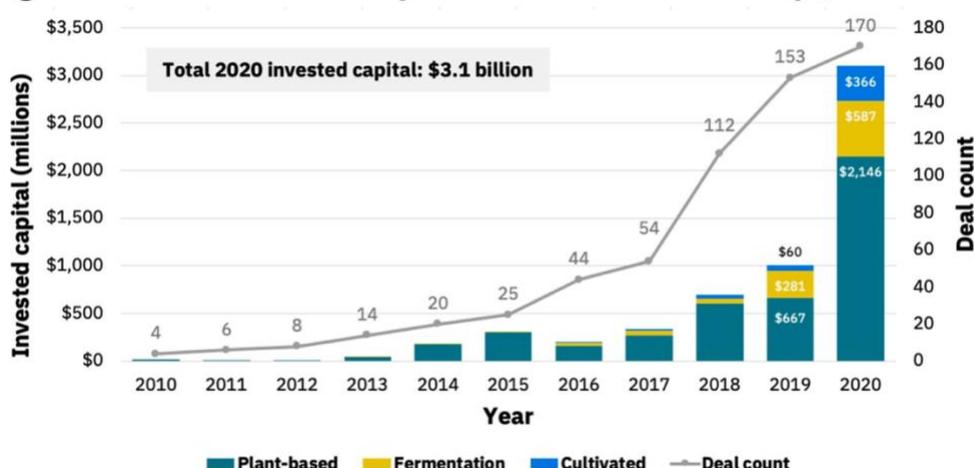
An investment initiative founded in 2016 is the FAIRR Initiative, short for Farm Animal Investment Risk and Return, which is a subsidiary of impact investor Jeremy Collier's foundation. It assembles a network of investors with a focus on highlighting environmental, social and governance (ESG) risks of investments in the food sector, with an emphasis on animal and alternative 'meat'. FAIRR quickly gains traction and has amassed a total of \$13.2 trillion by 88 investors in its assets under management in 2020 (Raven & St. Clere Smithe, 2020). FAIRR's aim is to engage global investors in developing "a global, evidence-based and board-endorsed approach to transition 'meat' portfolios away from an over-reliance on animal meats and towards diversified and sustainable alternative 'meat' sources" (p. 25).

Arguably the key event opening the space of alternative 'meat' up to larger and a more diverse scope of investors is Beyond Meat's initial public offering (IPO) on the New York stock exchange in May 2019. With a 163% increase of the stock's value in its first day, the event marks a historic day for IPOs generally and food tech start-ups specifically. It surpasses expectations and establishes the profitability and future of the niche of alternative 'meat' and makes it an interesting sector for investors. It is the third largest capital gain on the stock exchange in the decade, increasing the firm's market value in a span of two days from \$1.5 billion to \$4 billion (Dyck, 2019). From its IPO in May until August of the same year, Beyond Meat increased its revenue by 287% to \$60.4 million (Schröppel, 2019). News articles of the IPO underline the surprise by investors of this result and emphasise that this development has increased interest in alternative 'meat' for investors hoping to make profitable investments (Buschmann, 2020; Lange, 2020). Big food companies are quick to jump on this niche with enormous growth potential. International food companies such as Nestlé, Tyson Foods, Tesco, and Unilever develop own plant-based meat products or acquire start-ups from the sector, such as Unilever's 2018 purchase of the Dutch plant-based meat brand "The Vegetarian Butcher" (Gross, 2019), while fast food chains Burger King and McDonald's introduce plant-based burger patties into their restaurants (Kapalschinski, 2019).

Venture Capitalist Blue Horizon, based in Switzerland and focused exclusively on alternative 'meat' in their portfolio, sees alternative 'meat' as the new tech (Gross, 2019), emphasising that it is currently the largest investment opportunity with the most long-term value. Data collected by the Good Food Institute supports these assertions, showcasing that alternative 'meat' investments have been steadily growing since 2016, with the largest jump happening

from 2019 to 2020. 2020 was a record year for investments in alternative ‘meat’ with \$3.1 billion, more than half of total investments in the sector since 2010, which are around \$5.9 billion (Gaan et al., 2021). The majority of \$2.15 billion came from plant-based meat, dairy and egg investments, led by a \$700 million investment round F by Impossible Foods as well as \$335 million collected by the LiveKindly Collective (Gaan et al., 2021), which has a novel approach to accelerating investments in alternative ‘meat’. The Collective, founded in March 2020, aims to tackle the entire supply chain from an investment perspective, assembling five plant-based meat brands from across the globe in their portfolio (Krönert, 2020). It aims to be a “force for good”, gathering actors from across the value chain to make plant-based eating the “new normal” and create a vertically integrated plant-based supply chain (Krönert, 2020). In 2020 alone, the Collective succeeded in raising two funding rounds to push international market releases of their product portfolio, making it one of the fastest growing plant-based food companies worldwide (LZ, 2020)

Figure 6: Annual alternative protein investment backdrop (2010–2020)



Source: GFI analysis of PitchBook data. Note: Data has not been reviewed by PitchBook analysts.

Figure 4. History of investments in alternative protein 2010-2020. Source: Byrne & Murray (2021)

The German alternative ‘meat’ investment space

While much big innovative progress in alternative ‘meat’ has come from the United States, the German market has also experienced dynamism in its own way. Germany’s alternative ‘meat’ consumption and investment space is a small yet dynamic and interesting case to look at. Sales value for plant-based food grew by 97% from 2018 to 2020, with plant-based meat experiencing a 127% increase of sales value from 2019 to 2020 alone, amounting to 181 million Euros (ProVeg-International & Copenhagen, 2021). However, the market still represents a small niche, with the German meat industry producing products worth over \$40 billion in 2019 (Vegconomist, 2020). As of this date, there are no precise numbers for investments in alternative ‘meat’ in Germany, but it is likely to assume that the trend is in line with global growth percentages.

Just as globally, there are also examples of pioneers in the German alternative ‘meat’ space and increasing interest over time as pioneers prove to be profitable and sustainable business cases, as detailed in the following sections. An early project of alternative ‘meat’ in Germany

is the EU research project “LikeMeat” by German researchers at the Fraunhofer Institute in Bavaria, lasting from 2010-2013 (Frey, 2012). The project explores how different meat substitute products, such as soy, peas and wheat, can be turned into products that taste similar to meat (Dutt, 2012). The resulting findings inform product development of plant-based meat products which can be found in supermarket chains now.

The foremost example of a pioneer in alternative meat production is the meat processing company Rügenwalder Mühle, which has been specialised in sausage specialties since 1834. Since 2014, the company has offered plant-based meat substitutes in German supermarkets. The new products unexpectedly garnered huge market success and grew to make up 30% of Rügenwalder Mühle’s profits, making it the market leader in plant-based meat in Germany by 2019 (Schröppel, 2019).

After Rügenwalder’s enormous success, other big German meat-processing companies were quick to follow, with Meica having their own Veggie sausage product line, and other big meat companies such as Vion and PHW Group, mother company of Wiesenhof, announcing the conversion of one of their production facilities to produce plant-based meat (Düthmann, 2020b). PHW Group further establishes an alternative ‘meat’ business unit and appoints Markus Keitzer as its chairman. The Group produces their own plant-based meat product line, goes into several strategic investments and partnerships with international plant-based meat and seafood companies such as distributing Beyond Meat in the European market. Further, PHW Group co-founds Foods United Inc. together with venture capitalist Blue Horizon, the company that establishes the LiveKindly Collective previously mentioned (Düthmann, 2020a).

The German retail sector follows, with supermarket giants Aldi, Lidl, Edeka and Rewe among others, introducing plant-based meat sectors to their stores as well as own brand products. In response to the success of the Beyond Burger in German markets in 2019, Lidl offers the Next Level Burger, Aldi introduces the Wunder Burger, and Norma presents the Incredible Burger (Schröppel, 2019).

Investors are also not idle. More and more venture capitalist firms emerge that focus on alternative ‘meat’, including Atlantic Food Labs or Good Seed Ventures. On a corporate level, KatjesGreenfood and Bitburger Holding invest in alternative ‘meat’ (Terpitz, 2019), showing that corporate venture capitalists are also eyeing the innovative growth potential of the sector.

2021 sees the start of the “New Food Invest” in Berlin, the first conference entirely dedicated to investment opportunities in the alternative protein space. It is hosted by ProVeg International and Beyond Animal, two animal rights organisations focussing on taking animals out of the supply chain. For the first time ever in 2022, the IFFA, the world’s leading fair all around meat production, packaging, and processing, includes alternative ‘meat’ in its product nomenclature (Appel, 2021). With this broader base, the fair emphasises the importance of the future-oriented food system trend, recognising it as a booming sector that offers “a genuine boost to innovation” (IFFA, 2021).

Thus, while Germany has no concrete investment numbers, it is evident that a diversity of regime actors have opened themselves just as much to alternative ‘meat’ as they have

globally, and that those investments are only likely to increase further. The following results section explores the power and role of investors in this alternative 'meat' investment space in detail.

Results

What goals do investors want to achieve in the alternative 'meat' transition?

The first sub-question explores which goals investors aim to achieve within the alternative 'meat' transition. An analysis of investment reports for alternative 'meat' as well as investor materials such as websites allowed to find some common patterns for investors' aims globally. Additional documents from German investors and insights from the seven interviewed investors in the alternative 'meat' investment space in Germany shed light on whether those aims are also important in the German space.

Four common goals for investing in alternative 'meat' are identified among investors globally and in the German space. The first two encompass achieving social and environmental goals, while the last two aim to achieve economic and financial goals. They are examined in more detail below.

First, an important goal that investors aim to achieve through their investments in alternative 'meat' is achieving an environmentally sustainable food system. Animal meat production has strong negative impacts on the environment, human health, and animal welfare (Wirsam et al., 2020). Earth's resources are becoming more and more scarce, and animal meat production plays a significant role through its resource use. Alternative 'meat' on the other hand offers reduced CO₂ emissions, less land, water and energy use and less pressure on biodiversity (Witte et al., 2021). Globally, pioneer investors in the early stages of the alternative 'meat' space invested mainly due to their investment vision aligning with social and environmental goals of the alternative 'meat' sector. For them, supporting environmentally sustainable food systems is the main criterion and something they invest in because it aligns with their personal values (Int6).

Several interviewed German investors emphasise the importance of achieving an environmentally sustainable food system. Two investors identify themselves as being either "mission-driven" or "impact-led" (Int1, Int3). Such investment approaches are guided by achieving "measurable, beneficial social or environmental impacts while generating a financial return" (Wirsam et al., 2020, p. 66). In the case of alternative 'meat', this is often an environmental goal. Int3 sees his firm, a company builder and impact seed fund, as driven by a clear mission: "Let's take animals out of the food chain and end the reliance on factory farming." Another environmental goal tied to impact-driven investment in the sector relates to the inherent "impact" of alternative 'meat' itself, through being a very efficient and quick transition innovation to significantly reduce CO₂ emissions of the food system (Int1, Int3, Int6). Int1, co-founder of a family-owned venture capital firm, underlines this aim for his venture capital firm, saying "reducing CO₂ emissions is our top priority. Those are the start-ups we are interested in". Int6, a researcher on innovation and sustainability, agrees, underlining that "topics of sustainability, reducing CO₂ emissions and environmental topics were big reasons for investing (in alternative 'meat')". Int3, a managing partner in a company builder and venture capital firm, recognises that when looking at different aspects such as environment, health and animal welfare, factory farming is a big contributor to these elements, and thus reducing it has a continuous impact. These concepts of "mission-driven" and "impact-led"

investments for environmental goals gives investors a clearly communicable aim to work towards in the alternative 'meat' transition.

The second common goal underlines the social impact of alternative 'meat'. Feeding 10 billion people by 2050 and achieving global food security are aims that early-stage investors recognise as important, which leads them to invest in alternative 'meat'. This aim emphasises the need for a transformation of the current food system and the assurance for future food security. By 2050, around 10 billion people will likely live on this earth. To feed them, a massive amount of food is required (Gerhardt et al., 2019). However currently, nearly half of worldwide harvest is used to feed livestock population. If this harvest were to be used for human consumption, today's population could be fed twice with current levels of global harvest, following calculations of international investment and consulting firm AT Kearney (2019). Int6 adds that globally, the transition from animal to vegetable 'meat' offers large economic efficiency and scale advantages by using fewer resources and providing more food (Wirsam et al., 2020), which could lead to less hunger and more food stability in food insecure regions. He posits that pioneering investors who invested in alternative 'meat' in their early seed stages knew that an urgent transition towards alternative 'meat' was necessary, additionally to the economic inefficiency of feeding animals to eat them. As the alternative 'meat' sector has grown, this need for transitioning the meat sector also for social impacts is becoming more obvious and is disrupting business-as-usual scenarios in the animal meat industry (Wirsam et al., 2020).

For the German investment space, a recently published influential alternative protein investment report written by several investors in the field underlines that "for 10 billion people by 2050, agriculture and food production need to change fundamentally. (...) A central role for this is played by investments in alternative protein" (Rackow, Cordesmeyer, & Draganov, 2021). Another big German food company's venture capital unit asks on their website "How can we feed 10 billion people in 2050?" (KatjesGreenfood, 2021).

These insights are supported by interviewed actors. Int1 recognises that we are moving towards resource scarcity and that feeding 10 billion people by 2050 requires that something needs to change. By investing in alternative 'meat', he aims to support platform technologies that can drive a clear structural change in the food industry. The investor's website states that "we exclusively partner with teams that develop industry transforming food solutions which enable the sustainable supply of food for a growing population". Int5, CEO of a corporate sub-unit, also recognises the insufficiency of current resources and animal meat production for feeding 10 billion people by 2050 sustainably. Similar to Int1, he recognises that an extension of the meat market to include alternative 'meat' products is urgently necessary. Int4, an investor and consultant, recognises that the alternative 'meat' transition is ongoing and aims to enable and support food companies in tackling and advancing the alternative 'meat' transition in Germany. His firm aims to aid companies in opening themselves up to the transition and supporting them in their efforts to join the alternative 'meat' transition. Int7, co-founder of an alternative protein association, similarly mentions the urgency of the 'meat' transition. He sees potential in alternative 'meat' to change the food system in itself, and thus their aim is to use their resources to tackle and accelerate the 'meat' transition in the German space. Most interviewed actors agree that the alternative 'meat' transition is ongoing and

that to achieve food security for future population, a move from animal meat to a more diverse mix of alternative 'meat' is urgently necessary and desirable.

Third, the recent immense economic growth of the alternative 'meat' sector attracts investors and companies whose aim is to ensure good economic returns and growth on their investments and acquisitions. Supporting the growth of alternative 'meat' does not only have environmental and social impacts, but also economic benefits. The market for alternative 'meat' is growing and is only expected to continue booming. Animal meat sales have been growing slowly and even declined during the CoVid-19 pandemic due to news relating the pandemic to zoonotic diseases and meat scandals coming to light (Belderok et al., 2021; Wirsam et al., 2020). On the other hand, alternative 'meat' demand has soared through increased consumer demand, environmental awareness and more health awareness through CoVid-19. Global sales of plant-based meat grew 24% in 2020 to \$4.2 billion (Gaan et al., 2021). In line with this, global investments in the three pillars of alternative 'meat' have been booming in 2020 (Gaan et al., 2021).

In Germany, the market has also been growing steadily over recent years (ProVeg-International & Copenhagen, 2021). Future expectations for the sector are high, with expected yearly growth rates of 12% and predictions of plant-based and culture meat capturing 55% of the global meat market by 2040 as consumers, companies and investors push for more environmental investment and price parity is reached (Gerhardt et al., 2019; Witte et al., 2021). All this gives investors plenty of incentives to invest in such a blossoming and promising sector. As Wirsam et al. (2020) put it: "In the area of conflict between population growth, changes in meat demand, fundamental transformation of the food value chain and numerous innovations in alternative 'meat', numerous new investment opportunities arise" (p. 46).

This aim is less prevalent among seed investors such as angels and some venture capitalists because of their focus on social and environmental impacts when investing. Meanwhile, large venture capital firms, corporate venture capital and food corporates correspond to this aim due to their focus on growing their own business and capturing economic growth returns. Among interviewed investors, only Int5 works for a corporate venture capital and business sub-unit of a large meat company. However, his position mirrors the economic goal quite well. While he recognises that the social goal of feeding 10 billion by 2050 is crucial as well, his focus is to continue growing the company through the alternative 'meat' sub-unit, offering consumers convincing plant-based meat alternatives on the market and being open to new technologies and actively promote them. Int6 underlines that this shift from investing for environmental and social goals to economic goals is natural in start-up transitions. He states that as market success comes, the sector becomes more attractive to larger investors for the sake of its promising growth statistics and the ease of product imitation to capture sales. This is underlined by a market report of consulting firm Roland Berger (2021), predicting that "we expect larger food corporations and food ingredient processors to continue their investments in alternative 'meat' to remain close to innovations" (p.19). Thus, investment aims of later-stage investors in alternative 'meat' are more strategically aimed at supporting their own economic growth and receiving economic returns on their investments. While this aim is less related to the social and environmental goals of the alternative 'meat' transition, it is

nonetheless an aim that investors want to achieve through their investments, and which moves the alternative 'meat' transition along towards the mainstream.

The fourth goal some investors underline is the aim to achieve a more diversified and resilient financial investment portfolio. CoVid-19 has exposed the underlying risks, inequalities and weaknesses of our current food system, especially the animal meat industry (Raven & St. Clere Smithe, 2020). The pandemic shows that the non-financial investment risks of animal meat production regarding environment and health need to be reassessed and that diversifying investments towards alternative 'meat' is an important growth driver as well as a climate risk-mitigation tool for companies and investors. Alternative 'meat' can make investment portfolios and supply chains more resilient and adaptable to future external shocks (ibid). Alternative 'meat' offers economic efficiency gains and scaling opportunities while simultaneously reducing resource use and emissions (Rackow et al., 2021; Aarti Ramachandran, Raven, & Wardle, 2019; Wirsam et al., 2020).

This increased awareness of the risks of animal meat through the Covid-19 pandemic has led many investors to re-consider and diversify their investments away from animal meat towards alternative 'meat' in an aim to make portfolios more resilient (Belderok et al., 2021; Wirsam et al., 2020). This is underlined by an investor in the FERI Institute's "Alternative Food" report, who states that "after CoVid-19, investors have to re-think their general long-term risk investment strategy. In terms of which asset class and companies offer most resilience and quick adaption within continuous instable situations" (Wirsam et al., 2021, p. 37). In anticipation of future external shocks, 'meat' investors aim to reassess their investments in animal meat and gain security from diversifying in alternative 'meat'. Wirsam et al. (2020) notes that investors in the alternative protein investment space are increasingly noting that environmental, social and governance investment criteria are becoming more important to companies and consumers, which influences their portfolio decision-making.

The alternative 'meat' sector in Germany is still growing and is not yet at a point where large institutional investors are diversifying their portfolios in the sector. None of the interviewed actors were institutional, and none of them mentioned this as something they aimed to achieve in the transition. No evidence for this goal in the German context could be found. However, evidence from international investment reports above shows that the first institutional investors are indeed engaging in the sector, driven by financial goals.

In summary, investors mention four main goals they aim to achieve through their investments. Noticeable is that early-stage investors, angels and venture capitalists, invest more because of their alignment with environmental and social goals. Later-stage investors such as corporate venture capital and institutional investors in turn invest to achieve economic and financial goals. This goes in line with different types of investors investing at different financing stages of the start-up cycle and shows that these investors have different motivations for their investments in the alternative 'meat' niche.

Int6 makes a similar argument, stating that when the alternative 'meat' sector was in its early seed stage, angel investors and early venture capital firms invested due to personal beliefs according to environmental and social goals, rather than economic and financial expectations. Now that alternative 'meat' shows its enormous growth potential as a sector, large later-stage

investors start investing, corporates start looking at possible partnerships and mergers & acquisitions, aiming to achieve good economic returns and growth (Wirsam et al., 2020). Institutional investors, who generally invest for stable long-term financial returns, are just starting to discover the benefits of this sector. Thus, the early stages of the alternative 'meat' transition are marked by investors aiming to achieve environmental and social impacts of alternative 'meat', while now more and more investors look at achieving good economic and financial impacts through investing in alternative 'meat'.

What resources are investors mobilising in the alternative 'meat' transition?

In this sub-question, resources that investors mobilise to achieve the previously established aims within the alternative 'meat' transition are explored. The nature of investments precludes that investors mobilise monetary resources as financial capital. In return, they receive a share or other financial return of the company they invest in. Investors in the alternative 'meat' space however mobilise not only monetary but also human and mental resources, going beyond only investing financial capital. They generally do not mobilise just one type of resource but rather a combination of them.

Five among seven interviewees in the German alternative 'meat' space mention financial capital as a main resource they mobilise through their investments. This ranges from pure financial capital investment until fundraising support, which attracts capital from other investors to the company. The financial capital involvement is independent of the type of investor in the German alternative 'meat' investment space but rather depends on the aim of the investor. Int1 invests directly in promising alternative 'meat' start-ups, such as cultured and plant-based meat innovations. They find start-ups with the most "impact" and include them in their investment portfolio. Int3 on the other hand, invests in and builds up their portfolio companies. As a venture capitalist and company builder, they not only invest own capital but also help the start-up to bring its innovation to market. Int3's firm fundraised from external investors for their portfolio company to attract more investment. In this sense, as Int3 also builds the company, they take care to bring other financial resources on top of their own to the company to assure its continued growth. Int4, a venture capitalist and consultant, invests in start-ups when his firm sees an enormous demand for a product in which they want to participate long-term, following an approach similar to Int1 when it comes to investing financial capital. Int5, who works for the sub-unit and corporate venture capital firm, invests financial capital strategically in promising alternative 'meat' companies in the plant-based meat and seafood sector, as well as invests in its own alternative business unit producing plant-based meat for the German and international consumer market. Int6, the finance researcher, calls this type of financial capital that is invested to start a company "hard money". An interesting exception is Int2, who, albeit engaged with creating ventures in food innovations, sees their firm as a venture builder and does not invest financial capital directly into projects, but uses its clients' financial resources while itself investing other resources such as personnel and ideas.

All interviewed investors mention that they mobilise other resources on top of financial capital. Int6, as a researcher, sees this as well, saying that these days, investors in alternative 'meat' also bring "smart money". In venture capital circles, this means "everything that concerns networks, bringing people together, matchmaking, knowledge, expertise (...). Those

are all important influencing factors, for start-ups as well as plant-based topics.” These are resources that go beyond financial capital and include, among others, the time, advice and know-how investors offer the businesses they invest in. To find patterns among those resources, Avelino’s typology of resources is used, which includes mental, human, financial, artifactual and natural (Avelino, 2011). Mental resources (“information, concepts, ideas and beliefs”) and human resources (“personnel, members, voters, clients, and supporters”) are most commonly mobilised. Among investors in the alternative ‘meat’ space in Germany, three types of mental and human resources are particularly common: 1) access to the investor’s network, 2) expertise and experience of the investor, and 3) their team.

First, a strong focus is laid by all interviewees on their network, which gives them an advantage compared to start-ups who want to enter the sector and thus consult them for this service. Networks can be categorised as mobilising a human resource as well as a mental resource, as the experts in the network provide important information and ideas that investors can mobilise for the benefit of their portfolio companies. Int6 accentuates that “if you have an investor who has the right contacts, takes the phone and says “Hey” (...). Those are small problems with a big impact for start-ups, and investors help tremendously. They know the ins and outs of the market and how you can move within it”. This use of the network as a resource by investors is also reflected in the German alternative ‘meat’ space.

Int1 mentions his venture capitalist firm’s network as a key resource as it is built on over 100 years of experience and interaction in the food industry through his family’s business. This has allowed the firm to build a strong network and understanding of the food industry. Through activities as a venture capitalist and family-owned business, he has a large network in the food industry which he offers as a resource for portfolio start-ups. This can range from “making introductions to other venture capitalists or potential partners in the food industry” to “giving them access to the network” (Int1). To keep this network, the firm is in constant interaction with many actors in the alternative ‘meat’ space, going from incubators and non-profits to universities and corporates. Through this, Int1 assures that their network resource stays up-to-date and can be mobilised effectively for his start-ups, which are always the priority for Int1. Int2 also emphasises his firm’s network as an important resource. On the website, the venture builder mentions their network of over 80 experts in food technology and venture building as a resource that is available to their clients. Int3 underlines that they have around 25-30 advisors and mentors of the international ‘meat’ space, which includes entrepreneurs, investors and technical experts that are partners of their holding and who are supporting their portfolio companies with knowledge and access. Int4, similarly, states that when they do not have the expertise, they use their network partners in the sector, including actors from many different parts of the supply chain. Int5 emphasises that “we use our profound know-how and large distribution network to make our own and our partners’ alternative ‘meat’ products available to the masses as quickly as possible”. The company has set up sales partnerships and strategic investments with alternative ‘meat’ companies from all over the world, with which they stay in constant exchange and build their network. Further, through their activities within an incubator and accelerator program, they are also in contact with start-ups of the growing alternative ‘meat’ community. Int5 possesses a large network in the meat industry as well as a growing network in the alternative ‘meat’ community, something they offer as a resource to their partners and portfolio companies.

Secondly, expertise and experience is a much-emphasised resource by investors. Investors who have been active in alternative 'meat' and the investment space for some time offer experience and expertise that start-ups as well as corporates seek out, as alternative 'meat' is a relatively new market. Most interviewed investors in the German space acknowledge this expertise as a mental resource they mobilise for their portfolio companies and clients. Int1 builds on the accumulated experience of a 100-year-old family business, emphasising that "we support our portfolio firms with capital, but also with sector-specific know-how and our technological insights". The investor offers expertise as a venture capitalist and family-owned business in the food industry to the start-ups they support, offering advice at all stages. These resources, Int1 underlines, are on top of the financial investment. If he believes in a company, he offers all resources at his disposal to the start-up. Int5's parent company has over 85 years of experience as a family business and over 20 years of experience as a large meat-producing company. The mental resources Int5's sub-unit offers are also based on the market expertise and sales know-how of the parent company, which "ensures that the products reach the masses" (Int5). Further, he offers consulting in the sector of strategic positioning on the European and German market and offers know-how and expertise regarding the market. Int3 mentions that working as a venture capitalist in the field of alternative 'meat', the company builder he works for has a good understanding of the industry. Int3 offers this a resource to his portfolio companies. Int2's firm has experience in venture building, creating over 10 companies from the ground up. This expertise and skills they have in creating and validating a project into a spin-off brand is the main mental resource they offer their clients. Int4 works similarly and boasts over 6 years of experience in bringing food start-ups to the German consumer market. They have expertise in how to build bridges between start-ups and established companies, which they offer as a resource to their clients.

Third, several interviewed actors mention that not only does an innovative start-up stand and fall with its founding team, but also with the team that develops and grows the idea, which includes investors. As investors who offer networks and expertise, most of the interviewed actors in the German space also offer their own curated team or aid in recruiting the best human resources to make the company succeed and reach the mainstream. Int1's venture capital firm is a small team of experts in the food industry. He and his team have had to become experts in the sector quickly, which he says has "worked pretty well so far". Int2, as a venture builder, assembles a new team on a case-by-case basis that helps the client realise the case the most effectively. This can mean "businesspeople, food technologists, lawyers, freelancers..." (Int2). There is a high variability of resources per project, but the main resource the firm mobilises is expert personnel for each case and the expertise and skills they bring to validating the project into a spin-off brand. Int3 offers a company-building team that has all departments and assets required to start a company, such as legal or accounting departments. The firm takes care of the whole company-building process for its portfolio companies, engaging lawyers and partners from their network. They make sure that the right people are recruited for the company and that it becomes self-sufficient, underlining that "we focus on creating value with recruiting" (Int3). As mental resources, they mobilise their knowledge in company building. Int3 highlights that "(...) we did all the development work. From company set-up, fundraising, company materials, financial planning, really everything". Considering human resources Int5 mobilises, the firm offers a whole operative management team within the sub-unit dedicated to alternative 'meat', as well as a chairman of the alternative 'meat'

unit incorporated in the parent company's executive level. Int7 agrees that he sees a clear trend in investors today investing more than monetary resources into their investments.

While mental and human resources are mobilised by all interviewed investors to more or less extent, artifactual resources are rarely mobilised. An exception to this pattern is Int5. Because they are not only an investor but also a big food company, they mobilise resources more directly for their own benefit and brand as well. Int5 emphasises that by underlining that they set up a new production area for plant-based 'meat' products exclusively in their newly acquired convenience production unit. This resource is mobilised for their partners and investments, but also to produce their own product line. Otherwise, no other investor talked about mobilising physical resources.

These three resources, network, expertise & experience, and the investor's team, are the most mobilised resources by investors on top of financial resources, showing that investors go beyond financial capital and mobilise several types of resources for their clients and portfolio companies.

What types of power do investors use in the alternative 'meat' transition?

After establishing resources and goals of investors investing in alternative 'meat', the research explores what types of power investors exercise. Investors have an interesting position in the multi-level perspective. On one hand, they are situated in the mature field of the financial world, which is part of the regime. On the other hand, they are always looking to engage into new investments in emerging fields with growth potential, especially early-stage investors such as venture capitalists and angel investors (de Lange, 2019). The different types of investors coming in at different stages of a niche's financial cycle leads to them exercising different types of powers in the transition. The following section showcases what type of power different investors exercise in the alternative 'meat' sector.

Innovative power: Angel investors and venture capitalists

When we look beyond the creation of material resources to include mental, human, and financial resources, investors in alternative 'meat' exercise innovative power. They do this passively, helping start-ups to exercise their power by giving them resources to develop and grow their innovations and enter the market. Alternative 'meat' start-ups create the innovations, such as plant-based meat, cultured seafood or fermentation products mimicking the taste and texture of real meat. This is also an exercise of power, as these start-ups create a new resource that disrupts or replaces the old, which in this case is meat, seafood, or animal-based 'meat'. Through this disruption, they are exercising innovative power actively. Investors support them in bringing these innovations to the market, thus also exercising innovative power, albeit passively.

Not all types of investor exercise passive innovative power. Through the document analysis and interviews, early-stage niche investors such as angel investors and venture capitalists are identified as the main types of investors that exercise passive innovative power. These actors mobilise monetary, human, and mental resources mostly for environmental and social aims of the alternative 'meat' transition and have a strong vision for investing in innovative

products that disrupt the current food system (see Q1 and Q2 answers). In an investment report regarding 'alternative food' by Wirsam et al. (2020), it is underlined that through picking which innovations investors support, they have a direct influence on which alternative 'meat' sources are preferred in the future and which grow on the market. Thus, while investors do not create the innovative products themselves, through their investments in innovations at early stages, where demand and growth are unclear, they place a bet on the future of this innovation (Rackow et al., 2021).

In the German space, several interviewed actors investing in alternative 'meat' exercise passive innovative power. They enable the creation of innovative alternative 'meat' products through their investments. Int6 has been in the market of alternative 'meat' since 2014 as a researcher as well as investor. He emphasises that in the early stages, there were many idealists and pioneer investors that entered this field because they really believed in the future of alternative 'meat' even though the objects to invest in were not ready for investing. The pioneering investors were daring in their investments and foresaw that an alternative 'meat' transition was coming, and that the economic inefficiency of animal meat production would become obvious. Int6 states that 5 to 6 years ago, topics such as finding leadership, developing products, and gaining market access were very difficult for alternative 'meat' start-ups. In those early stages, the influence of investors is large in giving start-up financing to build a company, to allow market access and do marketing. Int1, a venture capitalist, underlines the importance of investing in innovative products that really disrupt the industry and influence the market. They require innovations to be novel solutions that are white spaces in the market and can create platform technologies to move the 'meat' transition along. Int4's consulting and venture capital firm began as an innovation hub, a concept that captures the idea of using passive innovative power. As a sub-unit of a large food retail company, the innovation hub used its internal resources to support innovative start-ups in food tech, among which are also alternative 'meat' products. The firm saw itself as "the spider in the web", or an intermediary between investors, start-ups, corporates, and other institutions, bringing innovative products to markets quickly and effectively. In this way, as an investor choosing innovations, they have power to support specific innovations over others in the interest of fitting to their company, passively enabling some alternative 'meat' innovations over others.

Int2 and Int3 are two venture capital investors that exercise active innovative power. As a venture builder and company builder, respectively, these firms invest monetary, human, and mental resources to build companies and ventures that did not exist prior, thus creating a new resource such as a start-up, a venture, or a brand. Int3 emphasises that usually, investors can only invest into what is on the market. But with company building, the firm creates companies where they see a white space in the market and an opportunity. They do so by collaborating with willing scientists who research the innovations and who want to create a company. Int3 underlines "we don't want to be people who just write a check and say "Take the money and go do it" but we really want to build something up, we want to create. And the fact that you create something changes something. (...) That creates a lot of value because we are unlocking innovations out of the scientific field." Int2 has corporates as their partners instead of scientists. But they as well start by identifying opportunities and building ventures around them until they can be validated and turned into spin-offs. This also creates new companies as a resource that Int2 creates, making them exercise active innovative power.

Int4 aptly summarises the exercise of innovative power by investors: “Investors are first and foremost the enablers of this generation of alternative ‘meat’ products and suppliers. We wouldn’t have this hype around alternative ‘meat’ and the diversity of producers and suppliers if we didn’t have venture capital investors that are willing to support these solutions and to help them achieve market growth.” By enabling alternative ‘meat’ innovations to become commercially available, and by investing in certain alternative ‘meat’ over others, early-stage investors are using passive and sometimes active innovative power in the alternative ‘meat’ transition. In later stages of development of alternative ‘meat’, other types of power are exercised, which are analysed in the following sections.

Transformative power: Venture capital, corporate venture capitalists, and corporates

On the structural and institutional level of power exercise, according to the power in transition theory, niche-regime actors use transformative power. Avelino defines transformative power as “the capability of actors to invent and develop new structures and institutions”, where institutions are defined as formalised social rules and agreements such as laws, while structures include organisational and physical infrastructures. Here, active transformative power means investors exercise transformative power themselves through developing new structures and institutions, while passive means investors enable other actors to develop new structures and institutions.

Like innovative power, investors are exercising transformative power actively as well as passively. Transformative power is exercised by mid- and later-stage investors such as venture capitalists, corporate venture capitalists and food corporates.

Among interviewed investors in the German space, there are investors using passive as well as active transformative power. For passive transformative power, Int1 emphasises that they have so far exclusively invested into alternative ‘meat’ because they see the largest impact there to build platform technologies that power the structural transition of the animal meat sector towards alternative ‘meat’. This is the structural change they want to support with their investments. He sees venture capital as a small but important part of the alternative ‘meat’ transition through making such structural changes possible. This is a passive power exercise, because Int1 is using investments to enable start-ups to develop new alternative ‘meat’ infrastructure which can replace existing animal meat infrastructure and change the distribution of resources.

Other investors exercise transformative power more actively. On one hand, they create new institutions such as normalising alternative ‘meat’ in German lifestyles and diets, and on the other hand create new infrastructures for the production and distribution of these resources to consumers. Int4 has several kinds of investments they undertake. While their work as an innovation hub was established as being passive innovative power exercise in the previous section, another investment they conduct is an example of active transformative power exercise. Int4 states that when the firm sees that they can create a strong impact with a topic which has an added value for the whole food system, such as alternative ‘meat’, they use their expertise and platform to connect different actors along the alternative ‘meat’ supply chain. Through this, they exercise transformative power as an enabler between actors in the sector that works on introducing collaborations between actors to further alternative ‘meat’.

Through bringing together actors, they use those projects to increase visibility and create an effect on the industry overall, aiming to introduce new institutions to it. Another exercise of active transformative power includes investors developing new infrastructure themselves. Int4 emphasises that the alternative 'meat' sector requires a lot of capital to build up the right infrastructures and to create a lobby. Int5, as a large food corporate with investments in alternative 'meat', has created new infrastructure through building a plant-based production unit in one of their production plants in Germany. Secondly, they have entered distribution partnerships with large plant-based 'meat' companies from abroad to distribute them in the European market. In this way, they are actively engaging in shaping the infrastructure and institutions around alternative 'meat' in Europe and thus exercise active transformative power. Int5 underlines that through their encompassing strategy in the business sector of alternative 'meat', they are actively paving the way for a new nutritional diversity, agreeing that they have influence in shaping the alternative 'meat' transition.

Transformative power, then, is actively and passively exercised by investors investing in the later-stage growth stage of alternative 'meat' innovations to support the niche's development. This is mainly done by venture capitalists and corporate venture capitalists and innovation sub-units. However, more investors are passively enabling start-ups to develop the new infrastructure, with only the corporate mobilising artifactual and physical resource to develop its own new production infrastructure. While transformative power has the aim of changing the structures of the dominant regime by creating new ones, reinforcing power is explored in the next section.

Reinforcing power: Food corporates and institutional investors

Looking at the structural and institutional level of sustainability transitions, Avelino defines reinforcing power as "the capability of actors to reinforce and reproduce existing structures & institutions", where institutions and structures are defined as previously. This power is associated with the regime, and in the multi-level perspective, often associated with resistance to ambitions of the niche to get into the mainstream market and advance the transition. While reinforcing power can mean reinforcing dominant structures and trends, it can also act as a catalyst for using existing infrastructure to advance alternative 'meat' more swiftly and effectively, supporting the countermovement of the niche against the regime. The size and strong commercialisation capabilities of big investors and companies can be a big advantage and gives them a unique opportunity in the alternative 'meat' space. They can successfully invest in alternative 'meat' within their own company and more and more large food companies such as Unilever, Nestle and Danone are exploring the alternative 'meat' space and introducing their own product lines (Witte et al., 2021).

While much smaller than international alternative 'meat' innovation frontrunners like the U.S. and Israel, Germany also has big animal meat companies exploring the sector and using their resources to take part in the alternative 'meat' transition. Among interviewees, Int5 as a big food company with an alternative 'meat' sub-unit is a good example of an investor using reinforcing power. Int5 emphasises that they have discovered the importance of bringing convincing alternative 'meat' products to the market, being open to new technologies and supporting them actively. They see this development not as a threat to their core business but as a chance. They have realised that with their existing infrastructure and institutions,

they have a competitive advantage that they can use to create their own products as well as go into strategic partnerships with other alternative 'meat' producers. In this sense, Int5 mobilises resources to reinforce the existing structures and institutions of the food industry, and only changes their input to new alternative 'meat' sources. Overall, they want to use the opportunity of alternative 'meat' as a chance to make their company future-proof and to play an active role in the diverse and sustainable food mix of the future. They not only invest strategically in alternative 'meat' innovations around the world, but also invest in their own product line which they distribute on the European market and have distribution partnerships with two large alternative 'meat' companies from abroad. They emphasise that next to the alternative 'meat' business unit, they continuously develop their core business. This showcases that for them animal meat is still a dominant trend they are following. This type of power exercise is on the one hand a reinforcing power that helps spread alternative 'meat', but on the other hand showcases that animal meat should still represent a major part of the industry and thus regime as well. This is an active reinforcing power exercise as a regime actor to uphold current structures of animal meat consumption and production while adding alternative 'meat' as an input without changing the distribution of resources. This is further underlined by Int5 emphasising that their products are made to reach consumers in the market quickly and that they target flexitarians as a group, who still eat animal meat. Int5 mentions that in the future, next to innovative alternative 'meat' products, they see traditional animal meat products as relevant nutritional components of a diet. Int6 is not surprised by such power exercises and calls this stage of investment the 'imitation field'. Big companies start investing in imitating alternative 'meat' innovations that are already on the market or invest strategically in start-ups that complement their business. He mentions that in this imitation field, with economic growth, more and more venture capitalists come into the sector which in turn has the effect that there are less investment objects for consideration.

Int6, as a researcher, gives an example of how investors can use passive reinforcing power in a positive way to go with the countermovement of alternative 'meat'. He says that investors' network and contacts to market actors and thus market access can benefit alternative 'meat' start-ups, such as through sending their product through existing infrastructure of a company on their maintenance or off day. Such access issues are important and difficult to solve for start-ups on their own but investors with the right contacts can help in mitigating that if they key levers of action in the market.

When asked whether he thinks that investors play a role in transforming existing structures through their investments, Int6 agrees, to some extent. He underlines that it depends on the type of investor. He exemplifies it on the power of an institutional investor, a pension fund, saying that with a such large budget and institutional level, you also have an influence on politics, which are an important lever in accelerating the alternative 'meat' transition. Still, he also mentions that investors can use their networks through which they are tied to state funds. He stresses that institutional investors such as pension funds come into the transition later when niche companies already have a considerable size, valuation, sales volume, and financial security through going public on the stock exchange. Int1 also mentions this power of investors and food companies investing in start-ups through the example of infrastructure. Established animal meat industries have access to the food retail industry, often internationally, which start-ups do not have to that extent. But start-ups have the disruptive innovative technologies that the industry does not have and there is a point where these two

actors complement each other and can benefit from each other. While he acknowledges that there are actors who have an interest in keeping alternative 'meat' in its niche, he sees it as more important and interesting that many established and big food companies from the animal meat sector realise the benefits of alternative 'meat' and work together with start-ups to bring their solutions to the market.

Overall, reinforcing power is exercised actively and passively by food corporates and can be in the future by institutional investors when alternative 'meat' innovations have a proven track record of growth and profits. While there are instances of investors using this power positively to support alternative 'meat', reinforcing power by large investors and actors can also swallow alternative 'meat' innovations without changing the underlying infrastructure and institutions around the animal meat industry, although changing said infrastructure is an important goal of the alternative 'meat' transition.

In summary, power exercise changes as the alternative 'meat' start-up financing cycle progresses. While examples for passive and active power exercise are found, most investors in the sample exercise passive innovative and transformative power to support the alternative 'meat' transition. Further, reinforcing power exercise is enabling but also disabling the alternative 'meat' niche.

Are investors transition intermediaries in the alternative 'meat' transition?

Sovacool et al. (2020) identify six functions of transition intermediaries in sustainability transitions. These include knowledge and learning, networking, brokering, innovation and diffusion, visioning and institutional intermediation. Previous sub-questions have covered the differing powers investors use in the alternative 'meat' transition, finding that some exercise innovative power, some transformative and some reinforcing. This section explores if investors are regime-based transition intermediaries and what functions they undertake, also keeping in mind whether different types of investors exercise different functions depending on their power exercise.

In the document analysis of international investments reports related to alternative 'meat', little mention of investors as incumbent-oriented transition intermediaries is found. Witte et al. (2021) allude to it, mentioning that investors could become integral players in accelerating the transition to a sustainable food system. The report by Wirsam et al. (2020) underlines some characteristics of investors that can be interpreted as intermediary functions. They state that investors are an "important influencing factor for development and implementation of innovations, but also in the transformation of food companies" (p. 46). Especially private investors from the venture capital space offer targeted financing to start-ups that enables efficiency improvements and expands the demand for alternative food products on the market. The authors state that an increasing amount of private investor companies have positioned themselves as specialists in the alternative food segment, thus aiming to close the gap between innovative start-up products and the slow-moving and static structures of large food corporates, to develop products for consumers more quickly. This bridging between start-ups and corporates via the expertise of investors can be seen as networking, which is the most identified intermediary function in the interviews with German investors. This is

followed by knowledge and learning, brokering and institutional, with minor mentions of innovation and diffusion and visioning.

The most common intermediary function identified is *networking*, which includes managing actors in networks, building trust and organising events, is mentioned by all interviewed actors. Int1 previously underlined the firm's network as a resource they offer the start-ups in their portfolio. He goes further on by saying that they make introductions to other venture capitalists and partners in the industry and use their network to give the start-ups access to these contacts. For their firm, it is essential that many different actors come together and work on new technologies to be able to accelerate innovations, from its development to regulation. They are convinced that for the successful scaling of alternative 'meat' start-ups, many actors must work together and join forces, especially established industries and start-ups. He underlines that as a venture capitalist, they have a special position which allows them to work together openly with many actors such as start-ups, universities, corporates, other investors, and regulatory bodies and smartly set up collaborations between them. They also speak at conferences to get more actors engaged in the alternative 'meat' space. Int2 and Int3 have their network of advisors as one of the resources they use in their process. While they mobilise resources differently depending on the context of the project, they connect actors across the networks for the sake of developing their start-up or venture, to help them with building their company up. Int4 also exhibits a networking function. He mentions the importance of collaboration for bringing ground-breaking innovations to the market. His firm creates an ecosystem of matchmaking strategic corporate and start-up collaboration to move the transition faster and to "drive change hand in hand". Int4 explicitly mentions the term building bridges between start-ups and established companies in the interview, underlining that they acted and still are an intermediary between investors, start-ups, corporates, and other institutions in the alternative food space. He underlines that his firm takes on the role of networking and bringing actors together deliberately, organising events and consulting clients on collaborations. Int6 also mirrors the importance of investors as networkers, calling this type of resource "smart money". For him, networking and matchmaking skills, among others, are important influences of investors in the alternative 'meat' sector. Investors know the ins and outs of the market and have a good overview and contacts with which connecting start-ups can really move along an innovation's growth and development. Int7 also sees their organisation as having a networking role, underlining that there is much fragmentation across the supply chain in alternative 'meat', and having an overview over the sector and merging networks to bring actors together and connect them is a primary role of their organisation. They also do this by organising events that bring investors and start-ups together.

The second most identified function is *knowledge and learning*, which includes on one hand knowledge gathering and diffusion but also facilitating experimentation and providing advice and support. As mentioned in sub-question two, one important resource investors offer is their knowledge and expertise. Exp1 underlines that especially angel investors and venture capital firms use their experience as an input of support and advice for the start-ups they support. Often, angel investors were themselves active in the sector and offer their gathered knowledge as a resource on top of the financial investment. This can also be identified as an intermediary function in the interviews with German investors. Int1 underlines that a diversity of actors like to work with their firm because they have a lot of knowledge in innovations and can connect corporates with new start-ups, while start-ups want to connect with them

because corporates give them market access. With a long-spanning experience as a family business in the food industry, they also bring sector-specific knowledge into their investments, which is exercised for example when Int1 takes a position in a start-up's director board, actively aiding in making business-related decisions in the start-up. Int3 have identified the bridge that is missing in the German alternative 'meat' space: the connection between scientific innovations in research and bringing these innovations into the market. They see their role as building that missing bridge by partnering with scientists and creating companies together. Through their double role as an investor as well as company builder, they have a good overview of the market, and thus can smartly advise and support scientists in the niche with resources and knowledge to bring products into the regime. Int5 is the only investor that actively mentions the need for continuous investments in research & development of new alternative 'meat' products. Supporting knowledge creation is also an intermediary function that investors can take on, as Int5 showcases. He underlines that their firm continuously invests in research together with their partners to explore further alternative 'meat' sources.

The third most identified function is *brokering*, which includes representing organisations, mediating between actors and interests and financial brokering. Int1 represent not only their venture capital firm but the possibilities of alternative 'meat' on conferences, using their position in the field to interest new actors in the field. And while their focus is to help start-ups develop their innovations, Int1 also underlines that for these innovations to disrupt the status quo of the regime industry, they need to be scaled globally. To achieve this, a collaboration with established firms is very useful. Thus, while they have their client's interests in mind, they also use their position to mediate with other interests in the regime. As an established venture capital fund, they have a reputation that allows them to assume such a broker role between the niche and regime actors. Int2 calls their brokering approach "bringing together the best of both worlds". For his firm, that means combining the agility and speed of start-up innovations with the resources and aims of established companies. In their firm, they bridge to food corporates by assessing markets of the future and catering to the interests and advantages of the firm by creating a new brand or technology. Int3 engages in financial brokering. He says that while they conduct an initial investment in their portfolio companies, they also help them with all other development work, from set up to recruiting. This also includes more fundraising, for which they use their position in the sector to attract investors. He emphasised to me that such an external validation helps in gauging growth potential of the company and demand for the innovation, which so far has been incredible. Int4 underlines the importance of investors in alternative 'meat' for raising support through financial capital to support these innovations and their growth. They find themselves in a position in the market where start-ups and corporates alike come to them for consultation because of their established position in the market as a mediator.

Innovation and diffusion and visioning are least mentioned. *Innovation and diffusion* is a complex intermediary function as it on one hand includes managing the innovation process itself while on the other hand experimenting with and connecting the new technology to users and markets. This intermediary function was not clearly stated by any of the investors. Some aspects can be seen in Int3, who have the approach of supporting scientists to bring their innovation to the market, thereby connecting technology that was disconnected from the economy to users and markets. Similarly, Int2, who also takes a differing approach to general investors by building up cases for corporates, can be seen as managing the innovation

process itself. The firm changes the course of how innovations usually occur, from the safe space of the niche, and instead take resources and unfair advantages of their corporate clients into account to create innovations that originate from the regime level. *Visioning* includes articulating expectations and exclaiming visions. Only Int4 mentions expectation management as an intermediary function of their firm, which they use between start-ups who pitch their innovations to them and the interests of their parent company, which need to be aligned through formulating realistic expectations. Further, Int4 says that they believe that “you can only affect change if you show all stakeholders how they can contribute and participate positively in the transition, creating a common vision for the future of alternative ‘meat’”.

Institutional intermediation is explored last, because although only mentioned by few interviewed actors, it seems to be an intermediary function of investors that could be strengthened and crucial in the future. It includes political advocacy, lobbying, and policy implementation and legitimisation. Int1 mentions that he aims for his venture capital firm to work more with regulatory bodies in the future, such as the European Food Safety Authority or firms and non-government organisations that develop new legislation. This is currently not the case, but he wishes for them to work more closely in the future. He also believes that regulation will be a sector in the future where more venture capitalists can give their input and share knowledge with policy makers regarding trends, new technologies and markets of the future. Thus, policy makers can be prepared for future regulatory decision-making. Int4 mentions that the alternative ‘meat’ sector still lacks enough capital to not only build appropriate infrastructure but also to establish a strong lobby. One of Int7’s main aims as an organisation is to influence politics, especially the agricultural funding scheme system. They are actively working on putting alternative ‘meat’ on the political agenda in Germany, which Int7 admits is a lot of work and requires a lot of public relations work and activism. Int6 and Exp1 mention the importance of politics in the alternative ‘meat’ transition. Politics can build bridges or barriers for the development of alternative ‘meat’, and larger investors still have most power in decision-making regarding agricultural regulations, laws and subsidy structures. While politics do listen to investors, they are still mostly influenced by powerful incumbent regime actors such as food corporations. For this power relation to shift, well-connected and powerful investors could engage in more institutional intermediation to move alternative ‘meat’ further up on the political agenda.

Investors do exhibit some transition intermediary functions, especially networking, knowledge and learning, and brokering, showcasing that they engage positively with the niche and other actors in the transition, bridging between them naturally. An interesting finding is that the two main intermediary functions mentioned are intimately tied to the two main resources investors mobilise next to their financial resources in the alternative ‘meat’ transition: their network and their expertise and experience. Although investors have no inherent obligation to act as an intermediary outside of their interest in their investment returns, they still showcase these functions, with some even mentioning the possibility of including institutional intermediation as a future function of investors.

Discussion

Theoretical significance

The research adds to a growing literature on transitions in agriculture and food systems, for which there is still little research compared to energy and transport transitions (El Bilali, 2019b) despite being an important transition for future sustainable development. The alternative 'meat' or, in the grander sense, protein transition has received little attention in transitions research so far (Mylan et al., 2019; Tziva et al., 2020). This thesis adds to the existing literature and underlines its importance for sustainable future food systems and thus encourages more research in this specific transition area. Regime actors are seen in the multi-level perspective as upholding existing structures of society. This research has added that instead, some regime actors, such as investors, indeed promote the development of the niche because they pursue goals that promote the transition, thus breaking the preconceived idea of what a regime actor in the multi-level perspective does.

This goes hand in hand with the research's contribution to transition intermediary theory. The research has shown that investors indeed engage positively with the niche through taking on some intermediary functions in the transition, even if this is done quite unconsciously through the resources they mobilise as part of their power exercise. This shows the opportunity of applying intermediary theory to other regime-based actors to observe whether they also unconsciously or consciously intermediate between other actors in sustainability transitions in future research.

An interesting finding that intimately connects intermediary theory and power theory is the overlap between the intermediary functions of networking and knowledge and learning with the mobilised resources of networks and expertise and experience by investors in the alternative 'meat' sector. While the exercise of power by investors changes over the course of the transition, in turn going from more enabling to more disabling the transition as it comes closer to changing the regime, these resources and intermediary functions by investors engaged in alternative 'meat' remain the same. This was not anticipated prior to the results and shows a link between the two theories that has not previously been researched on. This extends opportunity for future research on the nexus effects between power in transition theory and intermediary theory for other actors within sustainability transitions.

Societal significance

What is significant in the alternative 'meat' transition is the importance of getting beyond the 'David vs. Goliath' mentality of niche against regime but to continue exploring more regime actors in the transition, rather than only arguing for disruption stemming from the niche. While investors appear to be a typically regime-situated actor in the transition, the research shows that investors who do engage in the niche through their investments play a positive role and use power to enable the transition most of the time. This enabling position of investors has important implications for future capital inflows in the sector and the development of the alternative 'meat' transition.

Regime actors have the benefit of sitting in the dominant setup, embedded with a large amount of power and resources. Identifying which regime actors use this position to support the alternative 'meat' transition rather than prevent it can be very insightful to how cooperation can be created between actors to create alliances that strengthen the position of the alternative 'meat' niche in the market and the policymaking space. Investors there play a role through their strong networking and brokering skills across the sector.

While German actors investing in alternative 'meat' is used as a case study in this thesis, the alternative 'meat' space is quite global and boundary-crossing. Interviewed investors interact with actors and have investments distributed across the globe. The German alternative 'meat' investment space is situated within the broader global investment space for the alternative 'meat' sector. This niche is still small, but very dynamic and actors worldwide are interacting within it, thus it cannot be confined to country boundaries. The impact that a transition from animal to alternative 'meat' can have for global production and consumption patterns as well as supply chains spanning countries makes this transition inherently cross-boundary.

With population growth and changing consumption patterns, the protein market will increase until at least 2050 which provides many opportunities for alternative 'meat' to capture market shares and affect change in food systems worldwide. Currently, alternative 'meat' is most established in developed Western markets. However, most population growth and consumption until 2050 will come from Asia and Africa, two markets that are still in the earliest stages of alternative 'meat' development but will have an important impact on its growth as decades go by. Increasing alternative 'meat' access in these markets is vital to influence alternative 'meat' share in the meat market and its adoption until 2050, influencing food security, diets and lifestyles of future generations. Financial capital for getting innovations off the ground in these countries is crucial for the sector and investors are starting to recognise this as non-government organisations such as the Good Food Institute are highlighting the potential in these regions.

Investors engaged in the alternative 'meat' transition using their power and role to support start-ups are not a panacea for enabling a successful and effective alternative 'meat' transition. Sustainability transitions are complex, multi-level and multi-actor processes that are dynamic and non-linear (Jonathan Köhler, Geels, Kern, Onsongo, & Wieczorek, 2017) . Thus, also the future of alternative 'meat' depends on many interacting factors in the niche, regime, and landscape, such as consumer demand and acceptance, supply chains and infrastructure, regulation, and legislation, among others. It includes a multitude of actors from producers and consumers to policymakers and investors who all have important roles to play. Wirsam et al. (2020) and Exp2 emphasise that the transition is situated within the overall dynamics of the food system which is influenced by many factors such as new technologies, digitization, politics, capital, consumer behaviour and market dynamics. The disruption of the meat industry will not occur by going from one state to another abruptly. Shifting from animal meat to alternative 'meat' is a long-term and parallel transition, which is situated in the broader food system transformation.

Limitations

Several limitations were encountered during the research. Firstly, the selection of interviewees limits the generalisability of the research. While many investors in the German space were identified in the beginning, the market is still relatively small and due to lack of responses from some actors, the distribution of interviewees is skewed in the direction of venture capital investors, with a lack of later-stage institutional investors as well as early-stage research funding investors. Further, some interviewees identified as investors turned out to only invest as a side business upon interviewing or be less focused on alternative 'meat' than anticipated. Additionally, German investors invested internationally, not only focussing their investments on German alternative 'meat' innovations due to the niche's global nature. To improve the validity of the research, triangulation methods were applied, including other alternative 'meat' investors' online materials as well as investment reports on alternative 'meat' globally. Additionally, the researcher added expert interviews to get more perspectives on investors without interviewing investors themselves. These inputs were combined with the document analysis to craft a more balanced image of investors. However, as the current financing stage of the alternative 'meat' niche can be described as early to later stage, it is the circumstance of that stage that most investors currently engaged in it are venture capitalists and corporates. Thus, the overrepresentation of these investors cannot be remedied due to the current stage. However, with passing years, future research can reapply this research and include a more diverse array of investors as more start-ups becoming public companies.

A second limitation lies in the nature of exploratory research on the practical implications of the findings. Interviews with investors as well as investor materials and investment reports showcase what investors say they do, not necessarily what they actually do. Due to the set-up of the research, there was no empirical observation of investor activity or behaviour, thus it is unclear whether the power exercise and intermediary role identified through investors interviews and materials is really exercised in their interactions within the transition. The researcher consulted two outside experts, who underlined that there can be a gap between what investors say they provide start-ups with and the reality of their behaviour (Exp2). Thus, future empirical research on investor's power and role in the transition can test the findings of this research.

A third limitation lies in the generalisability of sub-question 4. Originally, a different theory approach was used to study investors as intermediary actors, with the current framework only being adapted after interviews were conducted. Thus, the interview guide did not include explicit questions to capture notions of the six intermediary functions identified by Sovacool et al. (2020). However, the new theory was partly chosen because it allowed for analysis of existing qualitative data and thus the results can still be seen as an exploratory examination of investor's intermediary role in the alternative 'meat' transition.

Recommendations for investors and policymakers

The research offers insights to investors regarding their possibilities of power exercise within the alternative 'meat' transition. It has become clear that different phases of the start-up niche financing cycle not only require different types of investors, but also a different type of power exercise. Investors who want to engage positively in the alternative 'meat' transition have plenty of opportunity to use their power to do so. While the take-off phase of the alternative 'meat' sector has begun, scaling and changing supply chain and distribution infrastructure still requires substantial investment. Investors who are already investing in alternative 'meat' can use their position to inform other, larger investors on how they can positively participate in the transition, using economic and financial impacts as goals to incentivise them. They can mobilise their mental and human resources not only for their portfolio companies, but also to bridge between niche and other regime actors in the transition, assuming an intermediary function through their strong networking and knowledge and learning skills.

There is a lot of potential for investors to play a more active role in the alternative 'meat' transition. Some investors already show desire to play this more active role and use their power to also undertake intermediary functions of visioning and institutional work. Leveraging their intermediary position would mean interacting with other intermediary actors in the field, such as interest organisations and non-profits. Further, creating platforms where actors in the alternative 'meat' transition can come together to exchange knowledge, collaborate and create a common vision for the transition can be transformational to bridge between actors. Investors as embedded actors in the financial regime can use their position to bridge to larger investors in finance as well as the corporate regime. However, this also needs to make sense for investors, and while social and environmental impact is important to some investors, the majority engages in investments for beneficial economic returns. Engaging these investors in the transition can be partially done by investors already in the alternative 'meat' space presenting alternative 'meat' at investor conferences or doing institutional work by lobbying and advocate for regulation supporting alternative 'meat' development.

Private engagement of investors can come from an individual or collective basis. Individually, investors should make sure that they mobilise their resources for innovations that not only have good financial returns, but also have good environmental and social impacts. Investors supporting sustainable start-up innovations such as alternative 'meat' need to be patient in their economic return expectations, as those innovations follow the triple bottom line of environmental, social and economic impact, thus its success cannot strictly be measured by its economic profits and valuation. Investors need to balance the environmental and social impacts with the financial returns when investing but proving that such investments can be profitable can be an immense catalyst for more investors to enter the space (Bocken, 2015).

Regarding collective engagement, investors can become more active as part of an investor network or platform. Notable examples of such collective private engagement of investors for supporting the alternative 'meat' and broader protein transition include the LiveKindly Collective and the FAIRR Initiative mentioned in the Background chapter. While having different approaches, both pool experts and resources to have a more powerful position in

supporting the alternative 'meat' transition (as well as the sustainability of the meat sector). They span companies, brands, country borders, scale, and value chain steps and show that the present and future of alternative 'meat' is indeed cross-boundary, multi-actor and multi-level.

While private market engagement by investors has done a lot of work in developing alternative 'meat' innovations to where they are, the sector still presents a niche. The meat industry still captures around 99% of the meat market share and some regime actors are using their position and lobbying power to oppose alternative 'meat' through e.g., lobbying against alternative 'meat' using meat nomenclature and receiving funding and subsidies. Most mentioned regulatory hurdles mentioned by investors include funding barriers, existing unfair animal meat subsidies, restrictive labelling legislation, branding and lack of uniform definitions and quantifications. This can have a big impact on the success of scaling up and mainstreaming alternative 'meat' (Belderok et al., 2021).

Legislation is key for bringing in large amounts of capital and investors in the sector. This is where policymakers interested in supporting the alternative 'meat' transition can play a two-fold role. Firstly, creating legislation that supports the development of alternative 'meat' innovations and its infrastructure has an indirect effect on improving and increasing the sector's financial capital flows. Proposed regulations among interviewees include a carbon tax on animal meat products (Int6), more structured research funding opportunities for alternative 'meat' research (Int7), and changes to the meat sector's subsidy structure which would include offering subsidies to farmers growing alternative 'meat' ingredients (Exp1). Clarifying the alternative 'meat' sector through such a comprehensive set of guidelines supports the representation of its interests in the policymaking space, which is currently dominated by the meat industry. This will incentivise more entrepreneurs and investors to enter the alternative 'meat' space as animal meat becomes a less desirable sector and investment space (Wirsam et al., 2020). Further, setting up a clear regulatory framework around alternative 'meat' labelling, branding and nomenclature can avoid regulatory barriers set by lobbying activities of meat companies and producers that oppose the alternative 'meat' transition.

Secondly, regulation needs to be established that unites all types of investors in the financial market under a common vision and guidelines for investments in sustainable business sectors such as alternative 'meat'. Sustainable finance is not only relevant for the alternative 'meat' transition, but also for achieving sustainable development overall. It could already be seen that with alternative 'meat' becoming a sector with high economic growth, investors who cared more about economic returns than environmental and social impacts entered the sector. This runs the risk of innovations losing their sustainability impacts as they are scaled, which diminishes its original purpose and impact for sustainable development. As private markets cannot regulate this, because environmental and social impacts are not as quantifiable as financial returns, institutional measures need to be put in place. Int6 mentions the importance of finance for the future of the alternative 'meat' transition. For him, an important tool is the implementation of the Sustainable Finance Initiative by the European Union. He sees it as an important step to bring sustainable finance more in focus of investors of all types and on all levels. The initiative aims to develop investment guidelines guided by the Green New Deal, Agenda 2030 and the Sustainable Development Goals. This includes including

quantifiable environmental, social and governance aspects into investment decisions and portfolios in the EU financial market. He emphasises the importance of making sustainability quantifiable, through capturing e.g., reductions in CO2 emissions. This Initiative and its plans, guidelines and agreements are currently still in development. However, the implementation of such an Initiative on an EU-wide level, it is sure to profit capital and investor inflow in sustainable business sectors such as the alternative 'meat' niche.

Conclusion

This thesis examined the role and power of investors in the alternative 'meat' transition through an exploratory qualitative case study. The research combined sustainability transition theory, power in transition theory and transition intermediary theory to explore whether investors use their role and power to enable or disable the alternative 'meat' transition. The researcher conducted interviews and document analysis of investors in the German alternative 'meat' investment space.

The results revealed that regarding goals to achieve, early-stage investors mainly aim for achieving environmental and social goals, while later-stage investors emphasise economic and financial goals. Further, all investors in the sample mobilise financial resources, but also mental and human resources. Few investors also mobilise artifactual resources. Different types of investors exercise different types of power depending on their type and position along the alternative 'meat' niche's financing cycle. Innovative power is exercised by early-stage investors such as angels and venture capitalist to support start-up innovations in creating new resources. Transformative power is exercised more by later-stage investors such as corporate venture capitalists and corporates, which enables start-ups to develop new infrastructure in the alternative 'meat' transition. Most of these two power exercises by investors occurs passively by enabling start-ups to exercise power rather than mobilising artifactual resources themselves. Reinforcive power exercise by corporates and institutional investors is enabling in some instances but also disabling in engaging with the alternative 'meat' transition.

Further, the enabling role of investors as regime actors was explored by examining their intermediary functions. It was found that they exercise some intermediary functions, most dominantly found were networking, knowledge and learning and brokering functions of investors as regime-based intermediaries in the transition. This aligned with investor's most mobilised resources outside of financial capital as networks and experience and expertise.

This research contributes to enriching the sparse literature on the alternative 'meat' transition and adds to power in transition theory by observing how different types of one actor can exercise different powers in a transition. It further adds to research on the positive role to be played by regime actors and creates an understanding of such intermediaries in the alternative 'meat' transition. For investors in the alternative 'meat' space, this research presents a different way of seeing their role in the transition and how they can use their power more actively to be a transition intermediary.

Future research could build on these findings by exploring more regime-based intermediary actors in the alternative 'meat' transition and other food system transitions and how they can enable collaboration in the transition. Further, an empirical case analysis of investor behaviour can test the findings of this research in a practical context. As the alternative 'meat' sector is still a niche now, good intermediation is necessary to get niche and regime actors on the same page to avoid barriers that might block the development of the transition.

To support the alternative 'meat' transition, investors can utilise their resource strengths of networks and expertise as investors more and create investors networks and alliances to pool

power resources and establish an enabling power position for the alternative 'meat' niche in the dominant meat industry and policymaking space. Policymakers can support the transition by crafting a comprehensive policy framework for supporting alternative 'meat' as well as establishing guidelines for including environmental and social investment criteria in sustainable investment decision-making. These will support an inflow of investment in sustainable business sectors such as the alternative 'meat' niche and support the growth of these sectors for achieving re-direction of capital for future sustainable development.

References

- Aiking, H., & de Boer, J. (2020). The next protein transition. *Trends in Food Science and Technology*, 105, 515-522. doi:10.1016/j.tifs.2018.07.008
- Ampe, K., Paredis, E., Asveld, L., Osseweijer, P., & Block, T. (2021). Incumbents' enabling role in niche-innovation: Power dynamics in a wastewater project. *Environmental Innovation and Societal Transitions*, 39, 73-85.
- Apostolidis, C., & McLeay, F. (2016). Should we stop meating like this? Reducing meat consumption through substitution. *Food Policy*, 65, 74-89. doi:10.1016/j.foodpol.2016.11.002
- Appel, C. (2021). Alternative Proteine. *Horizont*.
- Avelino, F. (2011). *Power in transition: empowering discourses on sustainability transitions*.
- Avelino, F. (2017). Power in Sustainability Transitions: Analysing power and (dis)empowerment in transformative change towards sustainability. *Environmental Policy and Governance*, 27(6), 505-520. doi:10.1002/eet.1777
- Avelino, F., & Rotmans, J. (2009). Power in transition: An interdisciplinary framework to study power in relation to structural change. *European Journal of Social Theory*, 12(4), 543-569. doi:10.1177/1368431009349830
- Avelino, F., & Rotmans, J. (2011). A dynamic conceptualization of power for sustainability research. *Journal of Cleaner Production*, 19(8), 796-804.
- Bechtold, K.-B., & Sommer, L. (2020). *Plant-based foods: Market size and consumer insights*. Retrieved from Berlin: <https://proveg.com/what-we-do/corporate-engagement/proveg-consumer-survey-report-download/>
- Belderok, A., Broersen, D., & Zerktoni, S. (2021). *The protein revolution- The future of food*. Retrieved from Amsterdam: <https://www.rolandberger.com/en/Insights/Publications/The-rise-of-alternative-proteins.html>
- Berggren, C., Magnusson, T., & Sushandoyo, D. (2015). Transition pathways revisited: established firms as multi-level actors in the heavy vehicle industry. *Research Policy*, 44(5), 1017-1028.
- BeyondBrands. (2017). New Crop Capital and BeyondBrands form unique joint venture: venture capital and consulting firms to collaborate on plant-based meat alternatives *PR Newswire*.
- Blumenfeld, J. (2016). New VC firm & nonprofit buy plant-based innovations. *newhope360*.
- Bocken, N. M. (2015). Sustainable venture capital—catalyst for sustainable start-up success? *Journal of Cleaner Production*, 108, 647-658.
- Boukid, F. (2021). Plant-based meat analogues: from niche to mainstream. *European Food Research and Technology*, 247(2), 297-308. doi:10.1007/s00217-020-03630-9
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative research journal*.
- Bulkeley, H., & van Veelen, B. (2020). *Financing net zero: How can investment meet the climate challenge?*. Retrieved from London: <https://www.rgs.org/geography/advocacy-and-impact/impact/financing-net-zero/>
- Buschmann, G. (2020). Alternative Proteine: Mit welchen Aktien Anleger vom Boom der Fleischalternativen profitieren. *Wirtschaftswoche*.

- Curtain, F., & Grafenauer, S. (2019). Plant-based meat substitutes in the flexitarian age: An audit of products on supermarket shelves. *Nutrients*, *11*(11). doi:10.3390/nu11112603
- De Boer, J., & Aiking, H. (2011). On the merits of plant-based proteins for global food security: Marrying macro and micro perspectives. *Ecological Economics*, *70*(7), 1259-1265. doi:10.1016/j.ecolecon.2011.03.001
- de Lange, D. E. (2019). A paradox of embedded agency: Sustainable investors boundary bridging to emerging fields. *Journal of Cleaner Production*, *226*, 50-63.
- DiCicco-Bloom, B., & Crabtree, B. F. (2006). The qualitative research interview. *Medical education*, *40*(4), 314-321.
- Düthmann, C. (2020a). Das Beste aus beiden Welten. *Lebensmittel Zeitung*.
- Düthmann, C. (2020b). Kein Hype, der schnell vorbeigeht. *Lebensmittel Zeitung*.
- Dutt, S. (2012). How to make a veal of it. *South China Morning Post*.
- Dyck, F. (2019). Burger aus der Erbse: Aminosäuren, Lipide, Spurenelemente, Wasser: Das ist Fleisch. Kann man im Labor nachbauen, nun boomt der Markt für pflanzliche Burger. Wer macht hier mit wem Geschäfte? *ZEIT Online*.
- El Bilali, H. (2019a). The Multi-Level Perspective in Research on Sustainability Transitions in Agriculture and Food Systems: A Systematic Review. *Agriculture-Basel*, *9*(4). doi:10.3390/agriculture9040074
- El Bilali, H. (2019b). Research on agro-food sustainability transitions: A systematic review of research themes and an analysis of research gaps. *Journal of Cleaner Production*, *221*, 353-364. doi:10.1016/j.jclepro.2019.02.232
- FAO, I., UNICEF, WFP, & WHO. (2020). The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets. Rome, FAO. In.
- Fischer, L.-B., & Newig, J. (2016). Importance of actors and agency in sustainability transitions: a systematic exploration of the literature. *Sustainability*, *8*(5), 476.
- Frey, C. (2012). Aufbruch ins Ungewisse. *Wirtschaftswoche*.
- Gaan, K., Dabir, S., Ignaszewski, E., Manu, N., Murray, S., & Weston, Z. (2021). *2020 State of the industry report: Plant-based meat, eggs and dairy* Retrieved from <https://gfi.org/resource/plant-based-meat-eggs-and-dairy-state-of-the-industry-report/#:~:text=Download%20the%20report&text=%242.2Bwas%20raised%20by,as%20much%20as%20in%202019.&text=196new%20unique%20investors%20made,sector%2044%20percent%20from%202019>.
- Geddes, A., & Schmidt, T. S. (2020). Integrating finance into the multi-level perspective: Technology niche-finance regime interactions and financial policy interventions. *Research Policy*, *49*(6), 103985.
- Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy*, *31*(8-9), 1257-1274. doi:10.1016/S0048-7333(02)00062-8
- Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, *33*(6-7), 897-920. doi:10.1016/j.respol.2004.01.015
- Geels, F. W. (2013). The impact of the financial-economic crisis on sustainability transitions: Financial investment, governance and public discourse. *Environmental Innovation and Societal Transitions*, *6*, 67-95.

- Geels, F. W. (2014). Regime Resistance against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective. *Theory, Culture & Society*, 31(5), 21-40. doi:10.1177/0263276414531627
- Geels, F. W. (2019). Socio-technical transitions to sustainability: a review of criticisms and elaborations of the Multi-Level Perspective. *Current Opinion in Environmental Sustainability*, 39, 187-201. doi:10.1016/j.cosust.2019.06.009
- Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research Policy*, 36(3), 399-417. doi:10.1016/j.respol.2007.01.003
- Geijer, T. (2017). *The protein shift: Will Europeans change their diet?*. Retrieved from London: <https://think.ing.com/reports/the-protein-shift-will-europeans-change-their-diet/>
- Geijer, T., & Gammoudy, A. (2020). *Growth of meat and dairy alternatives is stirring up the European food industry*. Retrieved from Amsterdam: <https://think.ing.com/reports/growth-of-meat-and-dairy-alternatives-is-stirring-up-the-european-food-industry>
- Gerhardt, C., Ziemßen, F., Warschun, M., Donnan, D., & Kühnle, H.-J. (2019). *How Will Cultured Meat and Meat Alternatives Disrupt the Agricultural and Food Industry?* Retrieved from Düsseldorf: <https://www.de. Kearney.com/pressecenter/article/?/a/a-t-kearney-studie-zur-zukunft-des-fleischmarkts-bis-2040>
- Gibbs, G. R. (2007). Thematic coding and categorizing. *Analyzing qualitative data*, 703, 38-56.
- Giese, G., Lee, L.-E., Melas, D., Nagy, Z., & Nishikawa, L. (2019). Foundations of ESG investing: How ESG affects equity valuation, risk, and performance. *The Journal of Portfolio Management*, 45(5), 69-83.
- Gliedt, T., Hoicka, C. E., & Jackson, N. (2018). Innovation intermediaries accelerating environmental sustainability transitions. *Journal of Cleaner Production*, 174, 1247-1261.
- Gross, J. (2019). Appetit auf mehr: Der Siegeszug pflanzenbasierter Produkte, die Fleisch, Milch und Ei ersetzen, krepelt die gesamte Branche um. Wo Anleger mitverdienen können *Euro am Sonntag*.
- Hargreaves, T., Hielscher, S., Seyfang, G., & Smith, A. (2013). Grassroots innovations in community energy: The role of intermediaries in niche development. *Global Environmental Change*, 23(5), 868-880.
- Hartmann, C., & Siegrist, M. (2017). Consumer perception and behaviour regarding sustainable protein consumption: A systematic review. *Trends in Food Science and Technology*, 61, 11-25. doi:10.1016/j.tifs.2016.12.006
- He, J., Evans, N. M., Liu, H., & Shao, S. (2020). A review of research on plant-based meat alternatives: Driving forces, history, manufacturing, and consumer attitudes. *Comprehensive Reviews in Food Science and Food Safety*, 19(5), 2639-2656. doi:10.1111/1541-4337.12610
- IFFA. (2021). The world's leading trade fair- Technology for meat and alternative proteins. Retrieved from <https://iffa.messefrankfurt.com/frankfurt/en.html>
- IPCC, I. P. o. C. C. (2019). *Climate change and land*. Retrieved from Geneva:
- Jetzke, T. R., Stephan; Keppner, Benno; Domröse, Lena; Wunder, Stephanie; Ferrari, Arianna. (2019). *Die Zukunft im Blick: Fleisch der Zukunft* Retrieved from

<https://www.umweltbundesamt.de/publikationen/die-zukunft-im-blick-fleisch-der-zukunft>

- Kampers, F. W., & Fresco, L. O. (2017). *Food transitions 2030: How to achieve the transitions to a sustainable, affordable, trustworthy and high-quality food system in the next decade or two that will fulfil the needs of a diverse and growing world population*. Retrieved from <https://www.wur.nl/en/article/Food-Transitions-2030.htm>
- Kapalschinski, C. (2019). Branche unter der Lupe: Der Biotrend geht an den Anlegern vorbei. *Handelsblatt*.
- KatjesGreenfood. (2021). Website. Retrieved from <https://www.katjesgreenfood.de/>
- KC, K. B., Dias, G. M., Veeramani, A., Swanton, C. J., Fraser, D., Steinke, D., . . . Fraser, E. D. G. (2018). When too much isn't enough: Does current food production meet global nutritional needs? *PLoS ONE*, *13*(10). doi:10.1371/journal.pone.0205683
- Keeve, V. (2016). Alle im grünen Bereich. *Manager Magazin*.
- Kivimaa, P., Boon, W., Hyysalo, S., & Klerkx, L. (2019). Towards a typology of intermediaries in sustainability transitions: A systematic review and a research agenda. *Research Policy*, *48*(4), 1062-1075. doi:10.1016/j.respol.2018.10.006
- Kivimaa, P., Hyysalo, S., Boon, W., Klerkx, L., Martiskainen, M., & Schot, J. (2019). Passing the baton: How intermediaries advance sustainability transitions in different phases. *Environmental Innovation and Societal Transitions*, *31*, 110-125.
- Köhler, J., Geels, F., Kern, F., Onsongo, E., & Wieczorek, A. (2017). A research agenda for the Sustainability Transitions Research Network. *Sustainability Transitions Research Network (STRN), Sustainable Consumption Institute, University of Manchester: Manchester, UK*.
- Köhler, J., Geels, F. W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., . . . Wells, P. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions*, *31*, 1-32. doi:10.1016/j.eist.2019.01.004
- Kort, K. (2018). Beyond Meat: Fleischlos aufs Parkett. *Handelsblatt*.
- Krönert, A. (2020). Zusammen sind wir stärker. *Lebensmittel Zeitung*.
- Kumar, P., Chatli, M., Mehta, N., Singh, P., Malav, O., & Verma, A. K. (2017). Meat analogues: Health promising sustainable meat substitutes. *Critical Reviews in Food Science and Nutrition*, *57*(5), 923-932.
- Lachman, D. A. (2013). A survey and review of approaches to study transitions. *Energy Policy*, *58*, 269-276.
- Lange, K. (2020). Beyond Meat startet Produktion in Europa. *Manager Magazin*.
- Lawhon, M., & Murphy, J. T. (2012). Socio-technical regimes and sustainability transitions: Insights from political ecology. *Progress in Human Geography*, *36*(3), 354-378. doi:10.1177/0309132511427960
- Lonkila, A., & Kaljonen, M. (2021). Promises of meat and milk alternatives: an integrative literature review on emergent research themes. *Agriculture and Human Values*. doi:10.1007/s10460-020-10184-9
- LZ, R. (2020). Fleischalternativen: LiveKindly stockt Kapital um Millionen auf. *Lebensmittelzeitung*.
- Meadowcroft, J. (2009). What about the politics? Sustainable development, transition management, and long term energy transitions. *Policy Sciences*, *42*(4), 323-340.
- Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation*: John Wiley & Sons.

- Moss, T. (2009). Intermediaries and the governance of sociotechnical networks in transition. *Environment and planning A*, 41(6), 1480-1495.
- Mylan, J., Morris, C., Beech, E., & Geels, F. W. (2019). Rage against the regime: Niche-regime interactions in the societal embedding of plant-based milk. *Environmental Innovation and Societal Transitions*, 31, 233-247.
- Nijdam, D., Rood, T., & Westhoek, H. (2012). The price of protein: Review of land use and carbon footprints from life cycle assessments of animal food products and their substitutes. *Food Policy*, 37(6), 760-770. doi:10.1016/j.foodpol.2012.08.002
- OECD/FAO. (2020). *OECD-FAO Agricultural Outlook 2020-2029* Retrieved from Paris: https://www.oecd-ilibrary.org/agriculture-and-food/oecd-fao-agricultural-outlook-2020-2029_1112c23b-en
- Pimentel, D., & Pimentel, M. (2003). Sustainability of meat-based and plant-based diets and the environment. *The American journal of clinical nutrition*, 78(3), 660S-663S.
- ProVeg-International, & Copenhagen, U. o. (2021). *Plant-based foods in Europe: How big is the market?* . Retrieved from <https://smartproteinproject.eu/plant-based-food-sector-report>
- Rackow, H., Cordesmeier, F., & Draganov, I. (2021). *FoodTech Invest Report 2021*. Retrieved from Berlin: <https://www.hungry-ventures.com/en/food-tech-invest-report-2021/>
- Ramachandran, A., Raven, J., & Hau, L. (2021). *Building ESG into the alternative protein terrain*. Retrieved from <https://www.fairr.org/sustainable-proteins/food-tech-spotlight/building-esg-into-the-alternative-protein-terrain/>
- Ramachandran, A., Raven, J., & Wardle, R. (2019). *Appetite for disruption*. Retrieved from London: <https://www.fairr.org/article/appetite-for-disruption-how-leading-food-companies-are-responding-to-the-alternative-protein-boom/>
- Randjelovic, J., O'Rourke, A. R., & Orsato, R. J. (2003). The emergence of green venture capital. *Business Strategy and the Environment*, 12(4), 240-253.
- Raven, J., & St. Clere Smithe, K. (2020). *Appetite for disruption- A second serving*. Retrieved from London: <https://www.fairr.org/article/appetite-for-disruption-a-second-serving/>
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., . . . Schellnhuber, H. J. (2009). A safe operating space for humanity. *nature*, 461(7263), 472-475.
- Rockström, J., & Sukhdev, P. (2016). How food connects all the SDGs. *Sustainable Development Goals*.
- Santo, R. E., Kim, B. F., Goldman, S. E., Dutkiewicz, J., Biehl, E. M. B., Bloem, M. W., . . . Nachman, K. E. (2020). Considering Plant-Based Meat Substitutes and Cell-Based Meats: A Public Health and Food Systems Perspective. *Frontiers in Sustainable Food Systems*, 4. doi:10.3389/fsufs.2020.00134
- Schadwinkel, A. (2013). Einmal Kunstfleisch-Burger für 300.000 Euro, bitte! Einzigartige Kochshow: Der Forscher Markt Post serviert live in London das erste Hack aus der Petrischale. Eine teure wie zukunftsweisende Fleischkost. *ZEIT Online*.
- Schröppel, A.-K. (2019). Alle wollen vom Fleischimitat profitieren. *Stuttgarter Zeitung*.
- Secretary-General, I. G. o. S. a. b. t. (2019). *Global Sustainable Development Report 2019: The future is now- Science for achieving Sustainable Development* Retrieved from New York: <https://sustainabledevelopment.un.org/gsdr2019>
- Shove, E., & Walker, G. (2007). CAUTION! Transitions ahead: politics, practice, and sustainable transition management. *Environment and planning A*, 39(4), 763-770.

- Smetana, S., Mathys, A., Knoch, A., & Heinz, V. (2015). Meat alternatives: life cycle assessment of most known meat substitutes. *International Journal of Life Cycle Assessment*, 20(9), 1254-1267. doi:10.1007/s11367-015-0931-6
- Smink, M., Negro, S. O., Niesten, E., & Hekkert, M. P. (2015). How mismatching institutional logics hinder niche–regime interaction and how boundary spanners intervene. *Technological Forecasting and Social Change*, 100, 225-237.
- Sovacool, B. K., Turnheim, B., Martiskainen, M., Brown, D., & Kivimaa, P. (2020). Guides or gatekeepers? Incumbent-oriented transition intermediaries in a low-carbon era. *Energy Research & Social Science*, 66, 101490.
- Stehfest, E., Bouwman, L., Van Vuuren, D. P., Den Elzen, M. G. J., Eickhout, B., & Kabat, P. (2009). Climate benefits of changing diet. *Climatic Change*, 95(1-2), 83-102. doi:10.1007/s10584-008-9534-6
- Sternlieb, F., Bixler, R. P., & Huber-Stearns, H. (2013). A question of fit: reflections on boundaries, organizations and social–ecological systems. *Journal of environmental management*, 130, 117-125.
- Terpitz, K. (2019). Revolution auf dem Teller: Wie innovative Start-ups die Nahrungsmittelbranche aufrütteln. *Handelsblatt*.
- Tilman, D., & Clark, M. (2014). Global diets link environmental sustainability and human health. *nature*, 515(7528), 518-522.
- Turnheim, B., & Sovacool, B. K. (2020). Forever stuck in old ways? Pluralising incumbencies in sustainability transitions. *Environmental Innovation and Societal Transitions*, 35, 180-184.
- Tziva, M., Negro, S. O., Kalfagianni, A., & Hekkert, M. P. (2020). Understanding the protein transition: The rise of plant -based meat substitutes. *Environmental Innovation and Societal Transitions*, 35, 217-231. doi:10.1016/j.eist.2019.09.004
- UNEP. (2015). *The financial system we need: Aligning the financial system with sustainable development*. Retrieved from Geneva
<https://wedocs.unep.org/handle/20.500.11822/9862>
- United Nations, D. o. E. a. S. A., Population Division. (2019). *World Population Prospects 2019: Highlights* (ST/ESA/SER.A/423). Retrieved from
<https://population.un.org/wpp/>
- van der Weele, C., Feindt, P., van der Goot, A. J., van Mierlo, B., & van Boekel, M. (2019). Meat alternatives: an integrative comparison. *Trends in Food Science and Technology*, 88, 505-512. doi:10.1016/j.tifs.2019.04.018
- van Mossel, A., van Rijnsoever, F. J., & Hekkert, M. P. (2018). Navigators through the storm: A review of organization theories and the behavior of incumbent firms during transitions. *Environmental Innovation and Societal Transitions*, 26, 44-63.
- Vegconomist. (2020). German sales for vegetarian and vegan products increased 37% in Q1. *Vegconomist*.
- Weinrich, R. (2019). Opportunities for the Adoption of Health-Based Sustainable Dietary Patterns: A Review on Consumer Research of Meat Substitutes. *Sustainability*, 11(15). doi:10.3390/su11154028
- Westhoek, H., Lesschen, J. P., Rood, T., Wagner, S., De Marco, A., Murphy-Bokern, D., . . . Oenema, O. (2014). Food choices, health and environment: Effects of cutting Europe's meat and dairy intake. *Global Environmental Change*, 26, 196-205.
- Wettstein, F., Dey, P., Schaefers, K., & Bahlmann, J. (2019). *Impact Investing: Konzept, Spannungsfelder und Zukunftsperspektiven- Eine Orientierung für private und*

- institutionelle Investoren*. Retrieved from St. Gallen, Bad Homburg:
https://www.researchgate.net/publication/332144873_Impact_Investing_Konzept_Spannungsfelder_und_Zukunftsperspektiven_-_Eine_Orientierung_fur_private_und_institutionelle_Investoren
- Wild, F., Czerny, M., Janssen, A. M., Kole, A. P. W., Zunabovic, M., & Domig, K. J. (2014). The evolution of a plant-based alternative to meat: From niche markets to widely accepted meat alternatives. *Agro Food Industry Hi-Tech*, 25(1), 45-49.
- Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., . . . Wood, A. (2019). Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet*, 393(10170), 447-492.
- Williams, P. (2002). The competent boundary spanner. *Public administration*, 80(1), 103-124.
- Wirsam, J., Biber, A., & Bahlmann, J. (2020). *Future Trend “Alternative Food”: Disruption and Transformation of Global “Food Systems”*. Retrieved from Bad Homburg/Berlin:
<https://www.feri.de/en/ag/newsroom/202011242>
- Witte, B., Obloj, P., Koktenturk, S., Morach, B., Brigl, M., Rogg, J., . . . Grosse-Holz, F. (2021). *Food for thought: The protein transformation*. Retrieved from Zurich:
<https://www.bcg.com/publications/2021/the-benefits-of-plant-based-meats>
- Wittmayer, J. M., Avelino, F., van Steenbergen, F., & Loorbach, D. (2017). Actor roles in transition: Insights from sociological perspectives. *Environmental Innovation and Societal Transitions*, 24, 45-56.
- Yau, E. (2014). Stanford Professor Patrick Brown doesn’t mince words on the subject of burgers: plant patties are the green way to go, he tells Elaine Yau. *South China Morning Post*.
- Zhang, D., Zhang, Z., & Managi, S. (2019). A bibliometric analysis on green finance: Current status, development, and future directions. *Finance Research Letters*, 29, 425-430.

Appendix

Appendix 1: Table of searched keywords for the literature review

Concept	Keywords
Multi-level perspective	<ul style="list-style-type: none"> • MLP • MLP and power • MLP and meat substitute (+ synonyms) • MLP and food system • MLP and finance • MLP and intermediary (+ synonyms)
Power (in transition)	<ul style="list-style-type: none"> • Power • Power and MLP • Power and transition • Power and finance • Power and food system • Power and intermediary (+ synonyms)
Protein transition	<ul style="list-style-type: none"> • Meat substitute (+ synonyms) • Plant-based and MLP • Protein transition
Sustainable finance	<ul style="list-style-type: none"> • Sustainable finance (+ synonyms) • Sustainable investment (+ synonyms) • Finance and intermediary (+synonyms) • Finance and transitions • Finance and meat substitute (+synonyms)

Appendix 2: Detailed interview guide

General questions/Introduction	<ul style="list-style-type: none"> • Clarification of research aim: Exploring the role of investors in the alternative 'meat' transition in Germany • Position of interviewee • Background of interviewee
Investment in the alternative 'meat' sector (Goals and resources of power)	<ul style="list-style-type: none"> • How did you get into investing in the alternative 'meat' sector? • What are your goals for investments in the sector? • In what innovations are you investing? • With what resources do you invest in these innovations? Other than financial, what else? • Follow-up questions to investment

Actor network (Type of power exercise, intermediary actor)	<ul style="list-style-type: none"> • Which actors are you interacting with most frequently in the sector? • What is your relationship to these actors? • What roles do these actors play in the sector? • What role do you see yourself as having in the transition? • Do you feel you have influence in the transition? • Do you see yourself as boundary-bridging actor between the alternative 'meat' niche and the meat industry?
Predictions and barriers in the transition: Future visions for alternative 'meat'	<ul style="list-style-type: none"> • What predictions do you have for the future of alternative 'meat'? • What barriers/challenges do you see for the transition?

Appendix 3: Full list of international investment reports

Document type	Document name	Author(s)	Year/Month
Report	How will cultured meat and meat alternatives disrupt the agricultural and food industry?	AT Kearney	2019/May
Report	The protein revolution- The future of food	Roland Berger B.V.	2021/March
Report	Appetite for disruption	FAIRR Initiative	2019/July
Report	Appetite for disruption: A second serving	FAIRR Initiative	2020/July
Report	2020 State of the industry report: Plant-based meat, eggs and dairy	Good Food Institute (GFI)	2021/May
Report	2020 State of the industry report: Cultivated meat	Good Food Institute (GFI)	2021/May
Report	2020 State of the industry report: Fermentation	Good Food Institute (GFI)	2021/May
Report	Plant proteins: a key lever to accelerate food system transformation	WBCSD (World Business Council for Sustainable Development)	2020

Report	The case for public investment in alternative proteins	Breakthrough Institute	2021/March
Report	AgFunder AgriFoodTech Investment Report	AgFunder	2021
Report	Rethinking Food and Agriculture 2020-2030	RethinkX	2019/September
Report	Sustainable Protein: Investing for Impact at the Nexus of Environment, Human Health and Animal Welfare	Cornerstone Capital Group	2019/February
Report	Food for thought: The protein transformation	Boston Consulting Group & Blue Horizon	2021/March
Report	The protein shift: will Europeans change their diet?	ING	2017/December
Report	Big things have small beginnings	ING	2020/October
Report	FoodTech Invest Report 2021	GoodSeed Ventures, Hungry Ventures & dealroom.co	2021
Report	Future Trend "Alternative Food " Disruption and Transformation of Global "Food Systems"	FERI Institute	2020/September

Appendix 4: Full list of data analysis codes (MaxQDA)

Code System	Memo	Frequency
Code System		2400
Green finance and investor as actor	Keywords: Green finance, green investment Impact and mission-driven investing Boundary-spanning: spanning different levels, bridging between different actors, crossing boundaries Investors: VC, Angel, Corporate, Public	45
Background		81
Are investors bridging boundaries between niche and regime?	Intermediary functions: Knowledge and learning: knowledge gathering, generation, facilitating experimentation, aggregation and circulation of knowledge, providing advice and support Networking: creating and managing networks. Translating between actors and interests, trust building and conflict resolution Brokering: representing organisations, negotiation, brokering between actors and interests, financial brokering by raising money for support	46

	Innovation and diffusion: innovation process management, technology transfer, connecting new technology and users Visioning: articulation of expectations, requirements and visions Institutional: political advocacy, lobbying, policy implementation, legitimising institutional change, developing standards	
Institutional		8
Visioning		2
Innovation and diffusion		8
Brokering		24
Networking		48
Knowledge and learning		20
MLP	Keywords: Niche: innovation, protective space, innovative potential Regime: dominant configuration, resistance, stability Landscape: macroeconomic trends, macro shocks/disruptions Niche-regime interactions: dynamics, niche breaking into mainstream, disruption of the current system	92
Power	Keywords: Power: capacity of actors (investors) to mobilise resources to achieve a certain goal 1) Goal to achieve 2) Resources that are mobilised: Which types of resources are mobilised? Person, assets, materials or capital, including human, mental, monetary, artefactual and natural resources Human: Human leverage: personnel, members, voters, clients, supporters Mental: Information, concepts, ideas, beliefs Monetary: Funds, cash and financial stock Artefactual: Apparatuses, products, construction and infrastructure Natural: Raw materials, physical space 3) Ability by investors to do so/ Type of power: Which types of powers are exercised? Innovative: capacity of actors to invent and create NEW resources (e.g. cultured meat/fish, plant-based protein) --> usually niches Reinforcive: capacity of actors to reinforce and reproduce EXISTING	75

	<p>institutions and structures (meat industry) --> rather regime Transformative: capacity of actors to invent NEW institutions and structures (plant-based meat industry) --> rather niche-regime Systemic: COLLECTIVE capacity of actors to shape (reproduce or challenge) macro-trends --> rather landscape Institutions: formalised social rules and agreements such as laws, norms or traditions Structures: organisational and physical infrastructures, determines how we value and distribute resources such as transport infrastructure or legal institutions and political ideologies</p> <p>Power exercise as Active: exercising power yourself Passive: enabling exercise of power by others Radical: using power to challenge dominant trends and/or strengthen undercurrent counter-movements Moderate: using power to support or go along with dominant trends</p>	
<p>What types of power are investors using?</p>	<p>Analyse the capacity of actors to bring about or prevent acts and interactions in order to accomplish a certain goal e.g. protein transition</p> <p>How resources are mobilised: Typology of power exercise as different ways in which one can mobilise resources, and the different levels at which one can do so Level of resources: Innovative: capacity of actors to invent and create NEW resources (e.g. cultured meat/fish, plant-based protein) --> usually niches Destructive: capacity of actors to destroy and annihilate EXISTING resources Level of structures and institutions Reinforcive: capacity of actors to reinforce and reproduce EXISTING institutions and structures (meat industry) --> rather regime Transformative: capacity of actors to invent and develop NEW institutions and structures (e.g legal structure or physical infrastructure, plant-based meat industry, new supply chains, new networks) --> rather niche-regime Level of societal (sub)systems Systemic: COLLECTIVE capacity of actors to mobilise resources for the survival of a societal system, enable and safeguard the survival of a societal system --> landscape macro-trends --> later: collective capacity of actors to create, renew and/or maintain functional systems that correspond with their perceived (collective) needs and desires. As such, this definition includes the capacity of actors to choose in which systems they operate</p> <p>Institutions: formalised social rules and agreements such as laws, norms or traditions Structures: organisational and physical infrastructures, determines how we value and distribute resources such as transport infrastructure or legal institutions and political ideologies (e.g. capitalism)</p> <p>Power exercise as Active: exercising power yourself Passive: enabling exercise of power by others</p>	<p>189</p>

What resources are investors mobilising?	2) Resources that are mobilised: Which types of resources are mobilised? Person, assets, materials or capital, including human, mental, monetary, artefactual and natural resources Human: Human leverage: personnel, members, voters, clients, supporters Mental: Information, concepts, ideas, beliefs Monetary: Funds, cash and financial stock Artefactual: Apparatuses, products, construction and infrastructure Natural: Raw materials, physical space	205
What goals are investors aiming to achieve?		146
Alternative protein	Keywords: Alternative protein and alternative food systems: definition, explanations, processes, etc. History of alternative protein Future predictions for alternative protein	15
Background		48
Other interesting insights	Anything that feels neither here nor there in the other categories e.g. economic, social, environmental arguments For interviews: Information about the company/business, other opinions outside of my framework that are important	129
Policy recommendations/Recs	Recommendations for policymaking for the future Criticism and possible limitations and barriers for transition Future predictions	126