DOCTORAL THESIS

Get it off the ground

– Facilitating water-related environmental measures to support agricultural managers in business model innovation processes for sustainability

Anna M. Hansson

Halmstad University | School of Business, Innovation and Sustainability
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To Maya and John

Afterall,
you two are the greatest results
that emerged during this PhD-process

Science is organised knowledge. Wisdom is organised life.

- Immanuel Kant

Thank you,

supervisors, mentors, colleagues, family, and friends

for continually helping me grow and develop in both science and wisdom.

Your support during this PhD-process has truly been invaluable.

With love,

Anna

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Abstract

Agricultural businesses, which currently maintain, manage, create, and capture economic value from natural resources on farmland, play an important role in creating sustainable economic, environmental, and social value through maintaining and utilising a variety of ecosystem services in addition to traditional food production. This thesis focuses on ecosystem services that derive from water-related environmental measures (WREMs). This focus is motivated by a growing awareness of WREMs in the agricultural landscape, and of their connection to climate effects and water quantity and quality issues, which have substantial societal impact. Even though many agricultural business managers have a genuine interest in sustainability concerns, they tend to favour food production at the cost of providing other ecosystem services. Part of the explanation is that ecosystem services' ability to provide social and environmental value for the public good often lacks full-cost accounting and clear market demand. This results in uncertainties among agricultural business managers about how to capture economic value from WREMs and associated ecosystem services, leading to their benefits and value being only partly known or only indirectly connected to the main agricultural production, and therefore not included in current business models to any great extent.

Business models can be developed to enable value capture from WREMs through the business model innovation process for sustainability (BMIpfS). The BMIpfS identifies changes of current activities and adapts existing business models to support sustainable development and produce positive (or reduce negative) environmental effects on society, while producing long-term prosperity for businesses and their stakeholders. Due to the wide range of activities and stakeholders, the BMIpfS is complex and needs to be incentivised and facilitated. To provide sufficient facilitation for the BMIpfS initiation, underlying barriers and drivers for business managers' value intention (their business motives) for the BMIpfS need to be explored. Facilitation based on the value intention of business managers can ease the process and be used to support identification of value not yet captured in business models, as well as provide expertise to identify marketable sustainable products and services beyond existing markets. Facilitation can be managed through government-affiliated intermediaries who are in a favourable position to assess local conditions, identify needs and resources, and develop partnerships with stakeholders that align with current agri-environmental programmes. To facilitate sustainable business commitments in agriculture, a better understanding is needed of how government-affiliated intermediaries can support implementation of WREMs and promote the BMIpfS initiation by aligning agricultural business managers' value intention with societal sustainability goals. Consequently, the overarching aim of this thesis is to explore how the facilitation of WREMs can support the BMIpfS through an improved understanding of (i) the value intention of agricultural business managers and (ii) how government-affiliated intermediaries can facilitate the process initiation.

This thesis builds on four sequential studies, all conducted within external research projects. The first two are qualitative interview studies that build on each other to inductively explore agricultural business mangers' incentives for taking on more long-term and high-effort WREMs and committing to value capture of sustainability-related measures. They identify barriers and drivers as part of the agricultural business managers' value intention and analyse its connection to the BMIpfS initiation. The third study is quantitative and was conducted through a survey that more deductively explores how opportunities for sustainable value creation and business model innovation through WREMs can be facilitated to align with the managers' value intention that emerged in the first two studies. Finally, the fourth study is a qualitative interview study that takes an evaluative approach to further clarify how the facilitation of WREMs can be structured and organised to promote BMIpfS initiation in agriculture.

The results of this research show that business change incentives for sustainability activities are part of pre-initiation conditions of the BMIpfS through the value intention of business managers. The value intention is clarified as business managers' (i) identification as producers of value, (ii) difficulties identifying uncaptured sustainability value, and (iii) prioritisation of profitability and practical benefits. Adding value intention to a pre-initiation process phase contributes to the BMIpfS literature by providing a better understanding of how to support the BMIpfS initiation and promote more long-term and high-effort sustainability commitments, and value creating and capturing activities, among business managers. The results also show how WREM commitments and initiation of the BMIpfS can be facilitated through government-affiliated intermediaries. The government-affiliated intermediation is explained as comprising structures and activities to promote: (i) WREMs that include synergy between environmental and business aspects from a long-term perspective on value creating and capturing activities; (ii) flexible approaches adapted to business managers' needs, that promote autonomy, trust, and sense of control; and (iii) structured collaboration and networks for knowledge exchange between stakeholders on different societal levels. With the value intention of business managers as a foundation, these results complement previous research on government-affiliated intermediaries and show how they can be structured to facilitate sustainable agricultural business activities and promote the BMIpfS initiation in line with societal sustainability targets.

To integrate its results, this thesis develops a framework that advances the understanding of how to facilitate business model innovation towards sustainability and capture a wider range of value from ecosystem services. Through facilitation, innovation of business models towards sustainability can be promoted to realise currently uncaptured value that could benefit business revenues and societal goals. In this way, agriculture could continue to provide the world's population with food, in line with the goals of sustainable development, but with an expanded approach so that food production becomes a basis on which to build business activities that also improve the conditions for several other goals, such as protection of ecosystems and water resources.

Keywords: Sustainable value creation, Business model innovation, Facilitation, Agriculture, Water management, Ecosystem services

Sammanfattning

Lantbruksföretag skapar ekonomiska värden genom att bruka naturresurser och förvalta ekosystemtjänster, främst i form av livsmedelsproduktion. Lantbruket har även en viktig funktion att fylla för att skapa ekonomiska, miljömässiga och sociala hållbarhetsvärden genom att främja och nyttja en rad andra ekosystemtjänster. Från samhällets sida finns en efterfrågan på ekosystemtjänster från vattenrelaterade miljöåtgärder som minskar klimatgasutsläpp och förbättrar förutsättningar för vattenkvantitet och kvalitet. Men även om många lantbruksföretagare har ett genuint intresse för hållbarhetsfrågor tenderar de att prioritera värdeskapande från livsmedelproduktion. En av förklaringarna är att det saknas marknadsefterfrågan för hållbarhetsåtgärder som gynnar det allmänna intresset, vilket skapar osäkerhet bland lantbruksföretagarna för hur de kan omsätta vattenrelaterade miljöåtgärder i deras nuvarande affärsmodeller.

Affärsmodeller kan genomgå en innovationsprocess för att utvecklas i en hållbarhetsriktning. Innovationsprocessen kan möjliggöra att affärsmodellerna fångar upp ekonomiskt värde, från hållbarhetåtgärder efterfrågade av samhället, genom företagsaktiviteter som ger positiv, eller minskar negativ, miljöpåverkan, samtidigt som de skapar lönsamhet för företaget och gynnar dess intresse. Affärsmodellsinnovation för hållbarhet är dock en komplex process som behöver motiveras och faciliteras. För att anpassa faciliteringen behöver företagarnas upplevda hinder och drivkrafter för att utveckla sina affärsmodeller utforskas. Dessa hinder och drivkrafter utgör en del av grunden för företagarnas värdeintention, m.a.o. deras affärsmässiga motiv för att genomföra affärsmodellsinnovation i en hållbarhetsriktning. Facilitering i linje med företagarnas värdeintention kan underlätta initiering av innovationsprocessen, genom anpassat stöd och förslag på företagsaktiviteter som inbegriper ekosystemtjänster, ännu inte inkluderade i affärsmodellen, och hur dessa kan marknadsföras på, och bortom, befintliga marknader. Faciliteringen kan genomföras via offentligt finansierade samordnare med uppgift att fungera som mellanhänder mellan officiella regelverk och företag. Samordnarna kan bedöma lokala förutsättningar, identifiera behov och resurstillgångar, samt etablera kontakter med intressenter i linje med de strategiska planerna för företagens miljöarbete.

För att underlätta hållbara företagsåtaganden inom lantbruket, behövs en bättre förståelse för hur offentligt finansierade samordnare kan stödja implementeringen av vattenrelaterade miljöåtgärder. Vidare behövs kunskap om hur samordnarna kan främja initiering av innovationsprocesser, där affärsmodeller utvecklas mot hållbarhet, genom att finna synergier mellan lantbruksföretagarnas värdeintention och samhällets hållbarhetsmål. Det övergripande syftet med denna avhandling är därför att undersöka hur facilitering av vattenrelaterade miljöåtgärder kan stödja initiering av innovationsprocesser för förändring av affärsmodeller mot hållbarhet genom en ökad förståelse för (i) lantbruksföretagares värdeintention och (ii) hur offentligt finansierade samordnare kan facilitera processinitieringen.

Avhandlingen bygger på fyra sekventiella studier, alla genomförda inom forskningsprojekt med extern finansiering. De två första är kvalitativa intervjustudier som bygger på varandra för att induktivt utforska lantbruksföretagares incitament för att skapa värde från större och mer långsiktiga vattenrelaterade miljöåtgärder. I studierna identifieras hinder och drivkrafter som en del av lantbruksföretagarnas värdeintention och kopplingen till initiering av innovationsprocessen för att utveckla affärsmodeller i en hållbarhetsriktning analyseras. Den tredje studien utforskar möjligheterna för hur hållbart värdeskapande och affärsmodellsinnovation kan underlättas genom att matchas med den värdeintention som framkom i de två första studierna. I studien tillämpas en

deduktiv ansats med enkäter och kvantifierade resultat. Slutligen tar den fjärde studien en utvärderande utgångspunkt när den genom en kvalitativ intervjustudie undersöker hur facilitering av vattenrelaterade miljöåtgärder kan struktureras och organiseras för att främja affärsmodellsinnovation för hållbarhet inom lantbruket.

Resultaten visar att incitament för hållbara företagsåtaganden föregås av en pre-initieringsfas där lantbruksföretagarnas värdeintention skapar förutsättning för genomförandet av innovationsprocesser där affärsmodeller utvecklas i en hållbarhetsriktning. Värdeintention som koncept förtydligas genom lantbruksföretagarnas (i) definition av sig själva som värdeskapande producenter, (ii) svårigheter att identifiera nya hållbarhetsvärden, och (iii) prioritering av lönsamhetsaspekter och åtgärder som underlättar produktionen. Genom att inkludera värdeintention till pre-initieringsfasen ökar avhandlingen förståelsen av hur initiering av innovationsprocesser för hållbarhet kan stimuleras så att mer omfattande och långsiktiga hållbarhetsåtaganden inkluderas i affärsmodeller.

Resultaten visar också att offentligt finansierade samordnare kan underlätta initiering av innovationsprocessen av affärsmodeller mot hållbarhet genom att främja implementering av vattenrelaterade miljöåtgärder. Samordnarnas roll som mellanhänder förtydligas genom identifiering av strukturer och aktiviteter som främjar (i) vattenrelaterade miljöåtgärder som inkluderar synergier mellan hållbarhets- och företagsaspekter utifrån långsiktiga lönsamhetsperspektiv, (ii) flexibla arbetssätt anpassade utefter lantbruksföretagarnas behov och som därmed främjar självständighet, förtroendeskapande och egenbestämmande, och (iii) strukturerat samarbete i nätverk för kunskapsutbyte mellan intressenter på olika samhällsnivåer.

Genom dessa resultat kompletterar avhandlingen tidigare forskning om facilitering av innovationsprocesser och visar hur samordnarnas arbete, med lantbruksföretagarnas värdeintention som grund, kan struktureras för att underlätta hållbarhetsåtaganden i lantbruket och främja innovationsprocesser av affärsmodeller i linje med samhälleliga hållbarhetsmål.

I avhandlingen integreras resultaten i ett ramverk som bidrar till förståelsen för hur facilitering av affärsmodellsinnovation för hållbarhet kan underlättas så att värde från fler ekosystemtjänster kan bevaras och tillvaratas. Facilitering av innovationsprocesser som driver innovation av affärsmodeller i en hållbarhetsriktning kan främja identifiering av nya värden som skulle kunna gynna både företagens intäkter och samhällets mål. På så sätt skulle lantbruket kunna bibehålla sin betydelsefulla roll som livsmedelsförsörjare åt världens befolkning i linje med de globala hållbarhetsmålen, samtidigt som livsmedelsproduktionen blir en bas för nya åtaganden som skapar värde och förbättrar förutsättningarna för en rad andra hållbarhetsmål, så som skyddandet av ekosystem och vattenresurser.

Nyckelord: Hållbart värdeskapande, Affärsmodellsinnovation, Facilitering, Lantbruksföretagande, Vattenförvaltning, Ekosystemtjänster

Abbreviations

BMIpfS – Business model innovation process for sustainability

WREMs – Water-related environmental measures

List of appended papers

1. Hansson, A., Pedersen, E., & Weisner, S. E. B. (2012). Landowners' incentives for constructing wetlands in an agricultural area in south Sweden.
Journal of Environmental Management, 113, 271-278.

2. Hansson, A. M., Pedersen, E., Karlsson, N. P. E., & Weisner, S. E. B. (2023). Barriers and drivers for sustainable business model innovation based on a radical farmland change scenario.
Environment, Development and Sustainability, 25(8), 8083-8106.

3. Hansson, A. M., Karlsson, N. P. E., Pedersen, E., Johansson, J., & Mattsson, M. Facilitation of water-related environmental measures to support business model innovation for sustainability in agricultural business. *Submitted.*

4. Hansson, A. M. Structuring government-affiliated intermediation to facilitate water related environmental measures in agricultural businesses. *Submitted.*

Contributions through conferences

Wiborg, I., Sørensen Langvad, A. M., **Hansson, A.**, Balskilde Stoltenborg, T. (2011). Bridging the gaps between science, regulation and practice in water environment management. Proceedings of Science for the environment - environment for society: Bridging the gap between scientists and practitioners in environmental science. Aarhus, Denmark.

Hansson. A., Pedersen, E., & Hoveskog, M. (2018). Willingness to Innovate Business Models for Sustainability amongst Agricultural Businesses. Proceedings of the 3rd International Conference on New Business Models, New Business Models with impact: focused, scalable, and international. Sofia, Bulgaria.

Hansson, A. M., & Karlsson, N.P.E. (2022). Drivers and Barriers for Initiating the Business Model Innovation Process for Sustainability Based on Ecosystem Services. Proceedings of the 7th International Conference on New Business Models: Sustainable Business Model Challenges: Economic Recovery and Digital Transformation. Rome, Italy.

Contents

My research journey

With my background in Environmental Science, I have become aware of the importance of striving for a society that embraces a holistic perspective on sustainable development and that values natural resources for the materials and ecosystem services they provide. My research approach, as a critical realist, began to develop already as a student when I became familiar with research that presented technical and biological solutions for reducing the human burden on the environment. At the same time, I realised that sustainability changes seemed related to great resistance, for example, evoking fear of decelerated business development or personal sacrifices. One such example was the research on wind power acceptance at Halmstad University, which showed a generally positive view of the production of renewable energy, but only as long as the wind turbines were built far from one's own backyard. With these kinds of insights, I became interested in key actors who prevent or implement solutions to sustainability challenges. A critical realist interacts with the world to understand the underlying structures and mechanisms that are the causes of various events. I wanted to explore how we could better understand the actors and processes surrounding the implementation of environmental measures to achieve the desired changes. There are many sustainability solutions, as they are presented in the so-called objective world, but how would these solutions be perceived and what impact would these perceptions have on the possibility of successful implementation?

After my master's degree in Applied Environmental Science, I was employed as a research assistant in an EU-funded project on "Farmers as water managers" at Halmstad University. In the project, we studied how to motivate wetland construction to reverse an international declining trend in interest in wetland construction among agricultural business managers. The project was based on collaboration between the university, municipalities, the County administration, and the Rural Economy and Agricultural Societies, in Halland. I was given an active role in the project and worked with several professionals in different parts of the field. This gave me new experiences in planning a research study, collecting and analysing data and results, and presenting our work at conferences. Within the project, I travelled to other countries to discuss similarities and differences in the challenges ahead. The conclusion from the project pointed out that business aspects and business managers should be in focus for the success of environmental measures such as wetland construction and the conservation of ecosystem services, a focus that was not obvious at the time. The improved understanding of the links between business aspects and environmental measures formed the basis for further research and this thesis.

In the following years, I got to further explore business managers' incentives for and roles in sustainability change in a research project funded by the Swedish Energy Agency. The aim was to understand how energy efficiency could be motivated for better stewardship of natural resources and reduced emissions among agricultural business managers. The results emphasised the role of business concerns in implementing environmental measures. I also worked on a project with the environmental departments of the five municipalities in Halland County where the focus was on further developing evaluative aspects of the work with environmental strategies at municipal level. The results provided new insights into government structures concerning the support and evaluation of local environmental measures, and how these were perceived by stakeholders. In parallel, I developed my role at the university, as a lecturer and as programme director of the Environmental Science education. Meanwhile, a new research education programme was being developed at Halmstad University, i.e., Innovation Science. The Innovation Science research programme was established to promote the development of knowledge and understanding of the processes and dynamics involved in innovation to support business and society. The research focus is applied, and proximity to practice and empirical phenomena and events are central to the research and

knowledge development in the programme. Innovation is seen from a broad perspective, in terms of new products, services, processes, markets, and organisations. It can vary in degree of novelty, from incremental to radical, and lead to different outcomes at different levels, such as the organisational, industrial, and societal levels. This makes Innovation Science at Halmstad University a research area in which knowledge from different traditions, such as business, industrial organisation, energy engineering, and environmental science, can come together around the common phenomenon of innovation.

With the establishment of Innovation Science as a research programme, the university launched its Green Innovation initiative to connect researchers in Environmental Science and Biology with researchers from Business Organisation and Management. Within this initiative, the circumstances of my PhD studies started to coalesce. Together with those who would become my supervisors and mentors, I discussed aspects of business change processes and the role of business managers. The ability to use environmental measures and sustainability value as competitive advantages led us towards business models. The need to study prerequisites for business change then defined the research area as business model innovation process for sustainability.

When I had the opportunity to enrol as a PhD student in Innovation Science, I continued to work in various externally funded research projects. I maintained my emphasis on empirical phenomena but focused my studies on barriers to and drivers of business model innovation for sustainability. In a research project funded by FORMAS, business managers' perceptions of rewetting previously drained agricultural land were studied and barriers and drivers to moderate business model change emerged. In the following studies, partly funded by the Swedish Agency for Marine and Water Management, the research focused on how barriers and drivers as incentives for change could be facilitated. It involved exploration of organisational structures for facilitation and impact of government-affiliated intermediaries on the initiation of the business model innovation process for sustainability (BMIpfS). In this way, my thesis' research questions emerged from empirically identified challenges in projects that were linked to theoretical aspects of business model innovation for sustainability and process initiation issues described in the literature. As a result, my thesis allowed me to further explore how to motivate business managers and, based on their perceptions and incentives, facilitate desired changes towards business models for sustainability. Also, applying for, adapting to, communicating with, and delivering to external funders constituted a great learning process. Alongside the articles in this thesis, I wrote, presented, and published reports to funders, the media, and public stakeholders.

In parallel to my thesis work, I took part in research projects on the promotion of farm-based biogas production, financed by Vinnova, the Energy Agency, and the Region of Halland. These projects supported my understanding of the need to further explore BMIpfS initiation and to facilitate the inclusion of more sustainability value in business models. The promotion of farm-based biogas production needs to consider a variety of sustainability value to become profitable, independently of subsidies and subventions. It depends on stakeholder cooperation and the value network and, just as with the implementation of water-related environmental measures (WREMs), there is need for support to realise the potential value and connect with stakeholders. This highlights the role of facilitation and the need to explore its possible effects also in biogas production.

As a member of Halmstad University's research programme on Promoting Resource Efficiency, Co-Creative Actions and Innovation for Sustainable Transition (ProActS), I will continue my research endeavours regarding both WREMs and biogas production. As my research group has received more funding, we are now venturing into the field of industrial symbiosis and how facilitation can impact long-term sustainable value networks and the process of business model innovation for sustainability.

1 Introduction

This chapter sets the research scene and explains the relevance of studying implementation of water related environmental measures on agricultural land. Moreover, it explains how the measures can be facilitated to promote commitment to the business model innovation process for sustainability including value from ecosystem services. This chapter also clarifies the research problem, defines the overarching research aim, and presents the four research questions that will be addressed.

1.1 Setting the research scene

Agricultural businesses, with their extensive use and refinement of the earth's natural resources, have an important role in reaching the global Sustainable Development Goals defined by the United Nations (Tamburini et al., 2020). Their main contribution, i.e., to provide food to an increasing population and meet the target of zero hunger, could greatly advance the overall fulfilment of the Goals. This is especially true if agricultural business managers also adopt a long-term and strong sustainability approach to their land and water management, with positive impacts not only on the business itself but also on society and the environment. In that way, agricultural businesses can create financial and social value from natural resources while improving the conditions for several other Sustainable Development Goals, such as protection of ecosystems and water resources (Alcamo, 2019).

A strong sustainability approach among business managers refers to the view of natural resources as complex systems of living and non-living elements that, through their interactions, regulate the ecosystem's capacity to provide human society with an array of functions and services (De Groot et al., 2003; Ekins et al., 2003). Such an approach views natural and manufactured resources as complementary, but not interchangeable. It accepts that there are certain functions that the environment performs that cannot be duplicated by humans, and therefore the natural resources need to be valued in their own right (De Groot et al., 2003; Ekins et al., 2003). In contrast, a weak sustainability position assumes that natural capital and manufactured capital are substitutable and that there is no essential difference in the kind of well-being they create (Neumayer, 2003). Thus, a weak sustainability position could prioritise profit maximisation through environmental degradation.

Benefits from natural resources provided by ecosystems can be utilised to reach sustainability targets, such as the UN's Sustainable Development Goals. These benefits that the ecosystems provide to humans are characterised as ecosystem services (Costanza et al., 1997). Ecosystem services are critical to the function of life-support systems on earth, such as food production, climate and water regulation, and nutrient cycling (MEA, 2005). The ecosystems significant contributions to human welfare through the services that e.g., enables food production and access to clean water, make them a valuable part of the global economy and their valuation could be important for securing societal needs for long-term functioning ecosystems (Costanza et al., 2017; Porter et al., 2009).

Agricultural businesses, that maintain, manage, and create value from natural resources on farmland play an important role in creating sustainable value through a variety of ecosystem services, in addition to their traditional role of creating economic value through food production (Daily, 1997; Islam et al., 2019; Porter et al., 2009; Sandhu et al., 2010). The business managers could, e.g., construct wetlands, which can positively affect the ecosystems' ability to provide services in connection to nutrient retention and climate mitigation. At the same time, the wetland could provide

water storage for irrigation in dry periods or buffer flooding during wet conditions, and thus have a positive impact on crop yields. However, current arable production systems tend to favour food production at the cost of the provision of other ecosystem services (Westerink et al., 2020). This is partly explained by that ecosystem services' ability to provide value for the public good often lacks full-cost accounting and clear market demand due to their intangibility and long-termism (Bocken and Geradts, 2019; Eyhorn et al., 2019). As a result, agricultural business managers associate the inclusion of sustainability-oriented ecosystem services, such as climate regulation and increased water quality, with uncertain incomes (Smith and Sullivan, 2014). Such an association can negatively affect their decision-making about the provision of ecosystem services that extend past food production (Gavetti and Levinethal, 2000).

Consequently, there is potential to capture value through ecosystem services that are currently not utilised, although there are barriers to the inclusion of sustainability-oriented ecosystem services in business value creating activities that need to be overcome (Smith and Sullivan, 2014). This thesis focuses on how agricultural businesses can capture economic value from ecosystem services (e.g., flood control, water purification, and climate mitigation) based on water-related environmental measures (WREMs) in agriculture, such as water protection zones and construction of wetlands (Costanza et al., 1997; Malinga et al., 2018). This focus was chosen due to a growing awareness of WREMs in agriculture and their connection to climate effects and water quantity and quality issues, all of which have substantial societal impact (Graversgaard et al., 2021; Jenkins et al., 2010; Li and Gao, 2016; Semeraro et al., 2015). Moreover, WREMs such as wetland construction for water regulation and irrigation purposes have previously been shown to promote ecosystem services without compromising yields, emphasising their potential to be aligned with food production (Tamburini et al., 2020; Van der Ploeg et al., 2019). WREM commitments could even add to diversification of agricultural business activities and foster new ways of proposing economically, socially, and environmentally sustainable value (Destaw and Fenta, 2022). This means that there is a potential to include sustainability value from a wide range of ecosystem services in agricultural business and shift the focus from traditional production-related issues in food production towards market development for a wide range of sustainability value (Spendrup and Fernqvist, 2019).

Exploring how value from WREMs could be created and captured puts the focus on agricultural business models. A business model is described as the logic of how to create, deliver, and capture value within a business (Geissdoerfer, 2018). Every business has a business model that functions as a cognitive map used to make and evaluate change decisions, but the level of awareness and application of the business model varies among business managers (Teece, 2010). The business model is useful for business managers when they need to plan, describe, and analyse the effects on profit of the value of different products and services (Amit and Zott, 2010; Chesbrough and Rosenbloom, 2002; Teece, 2010). Traditionally, business models have primarily focused on short-term economic value creation (Osterwalder et al., 2005; Teece, 2010), but they can undergo changes through innovation processes that give them a broader and more long-term value perspective. A business model can be innovated towards sustainability, which means going beyond the creation of economic value. Instead, such business model innovation focuses on the creation, delivery, and capture of balanced economic, ecological, and social value by solving environmental and societal issues through a wide range of activities (Pan et al., 2023). Business models for sustainability are developed based on business activities with sustainability as their purpose, meaning that the key challenge is designing them to create economic success through, and not just along with, environmental and social value creating activities (Preghenella and Battistella, 2021; Schaltegger et al., 2012).

However, many agricultural businesses are small and family owned with a reliance on primary production, identified by efficiency and homogeneous products (Cucagna et al., 2018), turning sustainability changes that would require greater diversity of business activities into pressures instead of opportunities (Zaridis et al., 2021). In Sweden, small agricultural businesses have focused on increased efficiency and production to improve profitability (Fernqvist et al., 2022). This is partly due to subcontractors' goals, which have concentrated more on profit and cost-effective production than on societal and environmental issues (Nybom et al., 2021; Ulvenblad, 2023). This means that knowledge development and innovation within agriculture have focused more on product-related issues and less on market development (Spendrup and Fernqvist, 2019). Consequently, agricultural business managers need support in how to innovate their business models to become more diverse and more sustainable (Cagliano et al., 2016) and in how to introduce new sustainability value into new or developed markets (Geissdoerfer et al., 2018). This could mean supporting business model innovation that includes value by utilising different types of ecosystem services from WREMs that align with food production, such as in the example of constructing wetlands for climate and nutrient control as well as crop irrigation (Rowbottom et al., 2022; Thorsøe et al., 2022).

Business models need constant adaptation in line with the changing business landscape to maintain their competitiveness and achieve renewal and growth (Chesbrough and Rosenbloom, 2002; Lambert and Davidsson, 2013; Nielsen et al., 2018; Teece, 2010). Innovation refers to the implementation of ideas that result in the introduction of new or improved products or services and from a business model perspective, innovation can lead to efficient and long-term competitive advantages through changes in how business creates, delivers, and captures value (Amit and Zott, 2010). Business models can be innovated towards sustainability through processes that support sustainable development and produce positive (or reduce negative) environmental effects on society, while producing long-term prosperity for businesses and their stakeholders (Geissdoerfer et al., 2018). The strong sustainability focus is emphasised by their definition of business model innovation processes for sustainability (BMIpfS), meaning that sustainability is the main purpose, not just as an add-on to current business models. These processes are often incremental ways of identifying changes in current activities and of adapting existing business models to create, deliver, and capture a balance of economic, ecological, and social value, by solving environmental and societal issues over a wide range of activities (Geissdoerfer et al., 2018; Karlsson et al., 2018; Klein et al., 2021). Moreover, they are based on stakeholder needs and wellbeing to efficiently deal with societal sustainability issues (Boons and Lüdeke-Freund, 2013; Mitchell and Bruckner Coles, 2004).

However, BMIpfS can be a large undertaking for small businesses since there are financial uncertainties about its outcome and competitiveness (Bocken and Geradts, 2020; Evans et al., 2017; Karlsson et al., 2018). In this context, the uncertainties are partly linked to unidentified revenue streams connected to WREMs for the agricultural business. This is due to a lack of monetisation and a market for the associated ecosystem services (e.g., climate control, pollination, and recreation) that value could be captured from (Costanza et al., 2017; Porter et al., 2009). Instead, these services, which are currently not included in existing business models, can sometimes be provided as intentional or unintentional add-ons to main activities, leading to uncaptured revenues that could have improved the profitability of the business (Gachango and Jacobsen, 2017; Graversgaard et al., 2021). Thus, the BMIpfS requires an extended definition of value that includes products and services with commercial value to customers as well as sustainable value to all stakeholders (Freudenreich et al., 2020; Schaltegger et al., 2016; Stubbs and Cocklin, 2008; Yang et al., 2017a).

Furthermore, coherence between aspects that motivate or encourage business change, i.e., business incentives and the business model for sustainability, has previously been identified as an important

driver of the BMIpfS (Rauter et al., 2017). This has recently been expressed as the value intention behind a certain business model, or as the motivation of business managers for conducting business (Barth et al., 2017). There is a need to deepen the general understanding of the value intention, but it seems to be of special relevance to agricultural businesses that operate under special circumstances (Ulvenblad et al., 2019), e.g., due to that they are often family-owned businesses, passed on over several generations, and are dependent on natural resources in a particular area as well as on stakeholder and neighbouring relations (Björklund, 2018). Moreover, business managers are crucial for business model innovation since they determine the process and outcome through their abilities to acquire, combine, and utilise valuable resources in ways that create, capture, and deliver value to customers and other stakeholders (Beltramello et al., 2013; Bocken et al., 2014). This emphasises the need to further understand the barriers and drivers as part of the perception amongst business managers of proposed changes, and how these can be used to facilitate the initiation of BMIpfS (in this thesis, through WREMs) in smaller businesses when the aim is to create business models for sustainability (Bocken and Geradts, 2020; Geissdoerfer et al., 2018; Pan et al., 2023; Swaffield et al., 2019).

Facilitation eases processes and could be used to support the identification of uncaptured value, i.e., potential value that could be but has not yet been captured by the business model (Yang et al., 2017a), and provides the expertise needed to identify marketable sustainable products and services beyond existing markets. Facilitation can be managed through intermediaries (Hjelm and Lindahl, 2016; Keskin et al., 2013; Swaffield et al., 2019), which are identified as organisations or persons that act as agents or brokers between two or more parties in any aspect of the innovation process (Howells, 2006). Intermediaries can develop systems for structuring and managing environmental and sustainability issues affiliated with different organisations, such as governments, businesses, research institutions, citizen groups, and networks, to support sustainability transitions (Kundurpi et al., 2021). Intermediaries can also act as bridges between actors involved in situations in which direct interaction is difficult due to perceptions of risks or challenges connected to e.g., costs, communication problems, cultural differences, and lack of incentives or knowledge (Kivimaa et al., 2019). Due to growing sustainability demands from governmental institutions and public policies, a better understanding of intermediation for agricultural business is needed (Feser, 2023; Masuda et al., 2022). Governments are important for the local implementation of global sustainability goals since they are in a favourable position to assess the local situation, identify needs and resources, and develop partnerships with stakeholders that align with current political agendas (Gustafsson and Mignon, 2020; Kivimaa, 2014).

Government-affiliated intermediaries are not profit driven and can thus be focused on the identification and management of business opportunities based on business managers' value intention and incentives as well as on the implications of EU, national, and/or regional sustainability policies (Ehnert et al., 2022). The establishment of government-affiliated intermediaries shows potential to support commitments or investments that benefit the common good (Kivimaa, 2014) if they align business concerns, such as profitability and market demand for ecosystem services from WREMs (Thorsøe et al., 2022; Whiteman et al., 2013), with an increased understanding among business managers of how the innovation process can result in business model changes that simultaneously capture economic, social, and environmental value (Yang et al., 2017a).

Thus, facilitation of the BMIpfS initiation through government-affiliated intermediaries could support agricultural business managers and the identification of uncaptured value connected to ecosystem services. However, a better understanding of future requirements for intermediation in agriculture is needed. This is especially evident in relation to growing sustainability demands from governmental

institutions and public policies (Feser, 2023; Masuda et al., 2022; Miranda et al., 2023), and since the innovation process is complex and uncertain it can create resistance among agricultural business managers due to lack of clear market demand or profitability from WREMs and associated ecosystem services (Dockès et al., 2019; Kivimaa, 2014). If the role of intermediation is further developed, it could provide expertise promoting the alignment of the financial and non-financial considerations of agricultural business managers with public sustainability targets, e.g., marketing sustainable products and services beyond existing markets (Swaffield et al., 2019), which could structure and manage sustainability issues such as WREMs and associated ecosystem services (Hjelm and Lindahl, 2016; Keskin et al., 2013).

1.2 Problem description

In Sweden, the restoration, rewetting, construction, and implementation of WREMs have gone more slowly than expected and agricultural business managers' incentives to participate in agri-environmental programmes have been too weak to meet national implementation targets (Franzén et al., 2016; Graversgaard et al., 2021). The incentives for agricultural business managers to participate in WREM commitments, as well as in agri-environmental programmes in general, are not fully known but show a strong connection to financial inducements, which appear necessary for alternative land uses, such as WREMs, to be considered (Franzén et al., 2016; Girkin et al., 2023; Morris et al., 2000; Nebel et al., 2017; Söderqvist, 2003). Even though many business managers have a genuine interest in environmental issues (Welsh et al., 2018), there is a lack of motivation to engage in agri-environmental programmes since their benefits and value often are only partly known or only indirectly connected to the main agricultural production and are therefore not captured in current business models to any large extent (Yang et al., 2017a).

Because of uncertainties connected to value capture from sustainability commitments, agricultural activities have mostly focused on short-term profit maximisation (Asare et al., 2022; Berg et al., 2017; Fernqvist et al., 2022; Sadovska et al., 2023; Ulvenblad et al., 2019). There is a lack of knowledge of what moderates WREM commitments that can be seen as more long-term modifications of farmland (e.g., constructing wetlands or adopt paludiculture) and how their effects on the business models will be perceived by the managers (Long et al., 2018; Martins et al., 2015; Van Tulder et al., 2013). Traditional valuation in agricultural business models mainly applies to food production, which indirectly captures value from ecosystem services such as soil quality, pollination, and pest control (Power, 2010). This value capture gives direct feedback on farm-scale practices and profits, which leads to visible, measurable, and comparable results within short time frames. WREMs, however, with effects on a more global scale, for example, on water regulation and climate, make the value capture more difficult to identify, which can hinder the initiation of changes and impede BMIpfS initiation (Dyllick and Muff, 2016; Rauter et al., 2017).

Moreover, innovation processes with a sustainability agenda face double externality problems, meaning that they need external support in the development phase (e.g., subsidies for R&D) and suffer from an additional externality in the diffusion phase, as costs to the adopters whose benefits are shared with other actors and society (Rennings, 2000). Moreover, innovations for sustainability often aim to fulfil the same purpose as other innovations, but with lower negative environmental impacts, and must thus compete with other innovations that produce negative externalities and that are established in mainstream markets (Kundurpi et al., 2021). Because traditional technology-push and market-pull factors alone are not strong enough to initiate innovations for sustainability (Polzin et al., 2016; Rennings, 2000), it is more difficult for innovations for sustainability to become established and compete on existing markets without governmental support. This is especially problematic as there is a generally increasing societal need for sustainable products and services

(Feser, 2023; Masuda et al., 2022; Miranda et al., 2023), and since innovations for sustainability in connection to WREMs and associated ecosystem services may lack clear market demand or profitability which can create resistance among agricultural business managers (Dockès et al., 2019; Kivimaa, 2014).

Capturing economic value through the delivery of environmental and societal benefits can be especially difficult in the case of WREMs and ecosystem services, since it is unclear how the delivery of environmental and social value can translate into profit and competitive advantage. Few studies have explored barriers and drivers as moderating factors to facilitate engagement in sustainability activities that currently lack clear market demand (Foss and Saebi, 2017; Geissdoerfer et al., 2018; Rauter et al., 2017). This emphasises the relevance of exploring barriers to and drivers of WREMs among agricultural business managers to understand how these can be used to incentivise sustainability activities that precede the BMIpfS (Foss and Saebi, 2017; Rauter et al., 2017; Ulvenblad, 2023). The value intention of business managers has particularly been developed as a concept describing the mind-sets and attitudes towards business model innovation in light of business sustainability (Barth et al., 2017; Sinansari et al., 2022; Ulvenblad, 2023). It particularly shows the potential to explore incentives for sustainability business commitments in agriculture since it considers the special circumstances of the businesses due to size, management, generational perspectives, and dependence on natural resources in certain areas (Björklund, 2018; Ulvenblad et al., 2019). The concept does, however, lack refinement regarding the aspects it entails, and more empirical research is needed to extend the understanding of the role value intention could play in the BMIpfS (Miranda et al., 2023).

Initiation of the BMIpfS is complex and will be affected by the value intention of the business manager (Baron, 2004; Malmström et al., 2015; Mitchell et al., 2004; Sinansari et al., 2022) as well as by public sustainability targets and agri-environmental programmes throughout the process (Girkin et al., 2023; Graversgaard et al., 2021). Moreover, the process overlooks strategic business decisions on issues such as value creation, stakeholder collaboration, and sales of products and/or services (Karlsson, 2019; Kennedy and Bocken, 2020). This complexity of value creation and capture based on sustainability activities can make it difficult for business managers to identify appropriate business models, which impedes their incentives for BMIpfS initiation. This is especially evident in the early phases of the BMIpfS of small businesses with less financial leeway, since the early innovation phases are considered especially uncertain and resource demanding (Amit and Zott, 2001; Chesbrough, 2010). Knowledge of the role of different phases in the innovation process is lacking, particularly in relation to the barriers to and drivers of high-effort sustainability measures such as WREMs, and how these can be supported to create incentives for BMIpfS initiation in small businesses (Bocken and Geradts, 2020; Geissdoerfer et al., 2018; Pan et al., 2023; Swaffield et al., 2019).

Local authorities, that could support the BMIpfS and high-effort WREM commitments (Gast et al., 2017; Kivimaa, 2014; Klerkx and Leeuwis, 2009) often lack both direction and mandate to address sustainability issues linked to individual businesses due to expectations of maintaining a neutral role that does not favour any specific business or sector (Graversgaard et al., 2021). This results in a gap between the need for support among agricultural business managers to develop sustainable business activities and the ability of the public sector, through government-affiliated intermediation, to provide the facilitation needed.

There is a lack of context-specific understanding of government-affiliated intermediation in relation to growing sustainability demands from governmental institutions and public policies (Feser, 2023; Masuda et al., 2022). This is especially the case for WREMs and other sustainability measures that may lack clear market demand, which can create resistance among private intermediation

organisations (Dockès et al., 2019; Kivimaa, 2014). It is also not clear how government-affiliated intermediaries can be organised to align WREM commitments and BMIpfS initiation with current food production to establish more sustainability commitments that diversify and broaden the value creation and delivery of agricultural businesses (Batterink et al., 2010; Kanda et al., 2018; Kivimaa, 2014; Klerkx and Leeuwis, 2009; Kundurpi et al., 2021).

1.2.1 Research aim

It is important to better understand how initiation of the BMIpfS can be facilitated. Specifically, there is a need to expand the knowledge of incentives, barriers, and drivers among agricultural business managers in the interest of initiating more high-effort and long-term WREM commitments. There is also a need to explore how the incentives align with the value intention of the business managers and how this can be used to facilitate the BMIpfS. Furthermore, there is a need to evaluate the impact of facilitation of WREM commitments on BMIpfS initiation and to understand how facilitation could be organised to align governmental agri-environmental targets with the ability of agricultural businesses to be part of meeting those targets.

Consequently, the overarching aim of this thesis is to explore how the facilitation of WREMs can support the BMIpfS through an improved understanding of (i) the value intention of agricultural business managers and (ii) how government-affiliated intermediaries can facilitate the process initiation. To fulfil the aim, this thesis poses the following research questions:

RQ1: What are the agricultural business managers incentives to take on more long-term and high-effort measures to maintain and provide ecosystem services associated with WREMs?

RQ2: What are the drivers and barriers, as perceived by agricultural business managers, for the initiation of the BMIpfS and sustainable value creation from WREMs?

RQ3: What impact could government-affiliated intermediaries that align business concerns of agricultural business managers with opportunities for sustainable value creation through WREMs have on sustainable business commitments?

RQ4: How can government-affiliated intermediation be organised to facilitate BMIpfS initiation including value capture from WREM commitments that align with societal sustainability targets?

In this thesis, the results from the comprising studies will be presented and discussed, and with this as a basis, a framework of BMIpfS initiation through facilitation of WREMs based on business managers' value intention prior to the initiation will be proposed.

2 Thesis research framework

In this chapter, current knowledge and relevant concepts from the literature are explained. This chapter also explains how the concepts relate to one another and how they are applicable to the facilitation of business sustainability and BMIpfS initiation. Lastly, the chapter presents a summary of the research framework to highlight the most applicable perspectives in relation to the thesis aim.

2.1 Ecosystem services and water-related environmental measures

Positive benefits provided to humans by ecosystems are defined as ecosystem services. Ecosystem services are characterised as provisioning (e.g., food or biomass production), regulating (e.g., pollination, climate control, and water quality and quantity), cultural (e.g., recreational, spiritual, and aesthetic), and supporting (e.g., photosynthesis and nutrient cycling). Their significant contributions to human welfare make them a valuable part of the global economy (Costanza et al., 2017; Porter et al., 2009). Agricultural businesses are both providers and consumers of different types of ecosystem services (Wratten et al., 2013). Agriculture provides substantial value to society through the utilisation of ecosystem services mainly through food production or by producing energy crops, which depend on ecosystem services such as pollination and nutrient cycling. Through WREMs, agriculture can also help the ecosystems provide services such as flood alleviation, water purification, and climate control in connection with farmland (Costanza et al., 1997; Malinga et al., 2018). Two examples of such WREMs are constructed wetlands and paludiculture.

Constructed wetlands capture agricultural run-off from fertilisers and pesticides, a primary reason for global water quality issues such as algal blooms and eutrophication (Dupas et al., 2015; Erisman et al., 2013). Constructed wetlands whose main purpose is tackling eutrophication are considered most cost-effective when created in areas with high nutrient concentrations, such as productive farmland (Djodjic et al., 2022). Moreover, constructed wetlands provide a wide range of other hydrological, biogeochemical, and ecological ecosystem services, e.g., water storage, flood alleviation, biodiversity protection, carbon sequestration, and recreation (Graversgaard et al., 2021; Martens et al., 2021; Pedersen et al., 2019).

Paludiculture is the cultivation of perennial crops on wet or rewetted peatlands. It was introduced as a way to restore previously drained farmland and integrate multiple ecosystem services of peatlands, such as carbon sequestration and flood control, while maintaining productive land use (Jordan et al., 2020; Vroom et al., 2018; Wichtmann et al., 2016). Peatlands are natural parts of the agricultural landscape and are important sinks for atmospheric carbon, counteracting climate change through the conservation of carbon stored in organic material (Girkin et al., 2023; Gorham, 1991). However, drainage and agricultural activities on the peatland leads to its degradation and results in release of the stored carbon. Paludiculture can thus decrease the negative climate effects but requires the radical change of farmland activities through rewetting peat soils with a water level in line with the surface. It impedes food production but enables the production of wetland plants, which can be used for fodder or bioenergy, at the same time as greenhouse gas emissions are limited due to the re-establishment of wet soil conditions (Martens et al., 2021; Ren et al., 2019; Wichtmann and Joosten, 2007).

Over the last 100 years, human activities have resulted in the loss of more than half of the world's wet inland areas, and this degradation has increased in recent decades (Davidson, 2014). In Sweden,

more than 65% of naturally occurring wetlands have been lost, counteracting the environmental benefits of wetland ecosystems (Franzén et al., 2016). One of the main factors influencing this decline has been, and still is, the draining of farmland for increased crop production (Graversgaard et al., 2021), making agriculture one of the largest anthropogenic sources of nitrogen and phosphorus for Swedish water bodies (Ejhed et al., 2016). The alteration of farmland has put stress on ecosystems and led to a decline in their services and the value that they can provide (Costanza et al., 2014), and eutrophication has become a major environmental challenge in Swedish water bodies and in the Baltic Sea (Swedish Agency for Marine and Water Management, 2022). Moreover, agricultural practices have contributed to the degradation of ecosystem services through e.g., fertiliser and pesticide use, soil subsidence, and nutrient run-off (Daily, 1997; Zhang et al., 2007). In turn, the degradation of ecosystem services can pose a threat to agricultural businesses that depend on them for functioning crop production (Dale and Polasky, 2007; Tilman et al., 2002). These services and disservices that agriculture brings (Power, 2010; Zhang et al., 2007) highlight the key position that agricultural business managers have for their own future business prospects (Franzén et al., 2016; Smith and Sullivan, 2014) as well as for societal well-being, in shaping both the supply of and demand for ecosystem services (Hernández-Blanco et al., 2022; Zhang et al., 2007). However, current agricultural business models do not reflect the value impact of the wider range of ecosystem services (Smith and Sullivan, 2014) and thus, the challenge of the BMIpfS in this context is to develop business models that enable the capture of economic value through delivering environmental and societal benefits in connection with WREMs and associated ecosystem services (Bocken and Geradts, 2020; Schaltegger et al., 2012).

In recent decades there has been growing awareness of the importance of WREMs and their connection to climate effects and water quantity and quality issues (Graversgaard et al., 2021; Jenkins et al., 2010; Li and Gao, 2016; Semeraro et al., 2015). Business activities must align with the capacity of ecosystems to maintain functional life support systems in order to keep and restore the ecosystem's abilities to provide the services needed (Porter et al., 2009; Smith and Sullivan, 2014). As a result, the rewetting of farmland through different WREMs has become an important part of agri-environmental management strategies and environmental policies, both nationally and through EU directives (e.g., EU Habitats Directive, Water Framework Directive, and Nitrates Directive) and the EU Common Agricultural Policy (Alvarez et al., 2016; Hefting et al., 2013; Jepsen et al., 2015). Agri-environmental measures based on the applicable policies and directives are often structured as financial payment programmes to incentivise agricultural business managers to voluntarily commit to WREMs. These programmes are typically handled by a governmental public body in which a joint contract is established to, partly or fully, financially compensate agricultural business managers for their commitment to WREMs during a given period of time.

Agricultural business managers have a strong sense of autonomy regarding their business decisions (Emery and Franks, 2012), and most agri-environmental programmes are based on voluntary participation (Macdonald and Johnson, 2000; Toma and Mathijs, 2007). The voluntary focus puts an emphasis on the agricultural business managers' incentives to participate in agri-environmental programmes (Graversgaard et al., 2021; McKenzie et al., 2013; Van Herzele et al., 2013; Wilson and Hart, 2000). The business managers' financial considerations related to WREMs will influence their participation and be associated with both direct costs and loss of income (Defrancesco et al., 2008; Sattler and Nagel, 2010), such as cost reductions and increased sales with visible, measurable, and comparable results. Business activities that provide direct financial feedback within short time frames are thus more frequently implemented by businesses (Baumgartner and Ebner, 2010; Dyllick and Muff, 2016). Agri-environmental measures, however, which aim to produce economic, social, and environmental value for the common good from a long-term perspective (e.g., climate and water

regulation), can be more difficult to justify and implement in the business model (Karlsson, 2019; Nelson et al., 2009; Power, 2010), especially as, in this context, it is unclear how the delivery of environmental and social value can translate into profit and competitive advantage (Schaltegger et al., 2012). Local authorities often lack both the direction and mandate to support individual businesses in addressing sustainability issues in terms of implementation or profitability, due to expectations of maintaining a neutral role that does not favour any specific business or sector (Graversgaard et al., 2021). Moreover, there is a perception among business managers of the unclear benefits of agri-environmental policies and programmes, regarding both environmental contributions and business advantages connected to addressing sustainability challenges (Franzén et al., 2016; Wilson and Hart, 2000). This causes hesitation towards agri-environmental policies and programmes, leading to more inefficient governmental tools and resulting in societal needs for sustainability measures becoming partly dependent on agricultural business managers' incentives to adopt proposed measures. Furthermore, the business managers' incentives to participate are also affected by non-financial factors that may make some agri-environmental measures more attractive than others, despite being less financially rewarding (Howley, 2015). Such concerns are, for example, social and moral values (Vanslembrouck, 2002), generational perspectives and the interests of successors, strong environmental interest (Lokhorst et al., 2011), trust in governmental initiatives (Polman and Slangen, 2008), and loss of autonomy (Emery and Franks, 2012).

Consequently, creating and capturing value from WREMs and associated ecosystem services can be rather complex, resulting in an inability of business managers to identify appropriate business models, impeding the initiation of the BMIpfS (Amit and Zott, 2001; Chesbrough, 2010). This is especially evident due to the long-term perspective on value capture and the unclear market demand for many sustainability measures, meaning that more knowledge is needed about how to find a balance between the goals of profit maximisation, the considerations of agricultural business managers, and public sustainability targets (Graversgaard et al., 2021; Pan et al., 2023; Testa et al., 2022). For successful WREM implementation aiming at sustainable value creation, there is a need to better understand business managers' financial and non-financial barriers, drivers, and incentives that precede the BMIpfS (Foss and Saebi, 2017; Rauter et al., 2017; Ulvenblad, 2023).

2.2 Business models

Business models are used to explain how a business defines its competitive strategy through the development of products or services it offers to its market. This includes how it charges for the products or services and what they cost to produce. It also includes how the business differentiates itself from other businesses through the value it proposes, and how the business integrates its value chain with value chains in other businesses into a value network (Rasmussen, 2007). Business managers are of key importance for the quality of business models, since they greatly impact the success of business models through their capabilities, i.e., their ability to acquire, combine, and utilise valuable resources in ways that create, deliver, and capture value to customers and other stakeholders (Beltramello et al., 2013; Bocken et al., 2014).

The theoretical concept of the business model emerged with the digital economy and e-commerce in the mid-1990s to understand the firm-level management of resources and activities as a response to increasingly complex environments and global markets (Foss and Saebi, 2017; Goyal et al., 2017; Nielsen and Lund, 2014). The digital era with its dynamic and globalised markets disrupted traditional ways of doing business, leading to new ways of creating value (Nielsen et al., 2018). Since the beginning of the 2000s, the business model concept has evolved along with the constantly changing business landscape as a concept with implications for business strategy and innovation (Lambert and Davidson, 2012; Magretta, 2002).

The research development of business models can be divided into three interlinked branches of interpretation, i.e., the business model as: (i) the empirical attributes of businesses, (ii) a cognitive or linguistic schema, and (iii) a formal conceptual representation describing the activities of a business (Massa et al., 2017). A business model can be described as the logic for creating, delivering, and capturing value within a business (Geissdoerfer et al., 2018), traditionally with a focus on economic value creation (Osterwalder et al., 2005; Teece, 2010). Business models can be viewed as cognitive structures that generate ideas and stimulate higher-level thinking about change decisions and business redesigns (Doz and Kosonen, 2010; Täuscher and Abdelkafi, 2017). The business model is more of a conceptual, rather than a financial, model of a business (Teece, 2010) and integrates a variety of academic and functional disciplines (Chesbrough and Rosenbloom, 2002). Business models thus describe the way businesses do business (Magretta, 2002; Zott and Amit, 2010) and how they turn resources and capabilities into economic value (Teece, 2010).

The business model is used as one of the fundamental aspects to create, maintain, and expand competitive advantage, especially since it enables a business to make modifications and adaptations according to the dynamic external environment (Foss and Saebi, 2017; Morioka et al., 2017). It can be used as a conceptual tool that explains how business activities are structured and conducted to clarify business logics (Boons and Lüdeke-Freund, 2013; Chesbrough and Rosenblom, 2002; Osterwalder, 2004). It can also be used to analyse, compare, and assess performance, management, communication, and innovation (Osterwalder et al., 2005). Furthermore, it can be used to identify value offerings and define target segments as well as in setting up value chains for value creation and delivery, identifying cost and revenue streams, and positioning the business and its competitive strategy (Chesbrough, 2007). Morris et al. (2005) divides the business model into two parts: an operational view focusing on current value creation and value capture, and a strategic view focusing on the future viability and sustainability of the value creation and capture. This means that a business model can be used to provide implicit assumptions about customer needs, revenues, costs, and competitors (Teece, 2010).

Using business models to clarify business logics could be viewed as an activity-based interactive approach to how businesses do business (Zott and Amit, 2010). In such an approach, a system of interrelated activities answering to the occurrence of what, how, and who in relation to the value creation is evaluated. The system content refers to the selection of activities (what), the system structure describes linkages between different activities (how), and the system governance refers to the actors performing the activities (who). In contrast to this, and in focus in this thesis, is the notion that the business model could be viewed as a set of holistic elements describing how businesses produce economic value from existing or new business ventures: (i) the value proposition – describing product and service offerings, customer segments, and customer relationships; (ii) the value creation and delivery – referring to activities, resources, partners, and distribution channels; and (iii) the value capture – dealing with cost structures and revenue models (Osterwalder et al., 2005; Osterwalder and Pigneur, 2010; Richardson, 2008; Teece, 2010).

Without a well-developed business model, there is a risk of failure in the value proposition, creation and delivery, and capture, and consequently a business model needs constant adaptation in line with the changing business landscape to achieve renewal and growth and maintain its competitiveness (Chesbrough and Rosenbloom, 2002; Chroneer et al., 2015; Lambert and Davidsson, 2012; Malmström and Johansson, 2017; Nielsen et al., 2018; Teece, 2010). The business model itself does not imply change; however, when connected to innovation, the business model can become an important tool for realising new business opportunities and identifying new ways to create and capture value and mitigate risk (Demil and Lecocq, 2010; Malmström et al., 2015). Without a well-

developed business model, innovators can fail in the endeavour to deliver or capture value from innovations (Teece, 2010). The potential of business model innovation to improve performance makes it a topic of interest in itself (Lambert and Davisson, 2013), and since this thesis explores the prerequisites of business change, it will focus on the innovation process that precedes business model changes.

2.3 Business model innovation

Innovation refers to the implementation of ideas that result in the introduction of new or improved products or services. Innovation has been discussed from several angles and there are different interpretations of what defines innovation, especially in terms of novelty, improvement, and commercialisation. This thesis takes the stand of Schumpeter (1934), who regards innovation from a broad perspective as comprising products, processes, and organisational change. This view does not limit innovation to new discoveries, but includes existing ideas introduced into new contexts or in new combinations. This view is defined by the identification of five types of innovation (Schumpeter, 1934): (i) introduction of new products, (ii) introduction of new methods of production, (iii) opening of new markets, (iv) development of new sources of supply of raw materials or other inputs, and (v) creation of new market structures in an industry. Based on these, Schumpeter (1934) concludes that innovation can be measured by commercial or economic gain achieved through new or improved products or methods, changes in the economic production systems, or expanding distribution networks. Moreover, Schumpeter (1934) identifies business managers as drivers of the continuous innovation process, since it is based on the managers' business decisions and actions (Ülgen, 2015; Śledzik, 2013).

Innovation can be classified according to its impact on the economy and society. Incremental innovation defines the view of innovation as an ongoing process and refers to continuous changes that build on existing products or services (Freeman and Perez, 1988). Innovation could also be classified as radical, implying that it is unattainable by means of incremental changes. Further classifications refer to innovation as new technological systems with impacts on certain sectors, or as new techno-economic paradigms, referring to revolutions with effects on entire economies and societies.

Considering innovation from a broad perspective, as products, processes, and incremental organisational changes, this thesis focuses on innovation connected to business models. The focus on business models has been part of a shift in recent decades. The discourse of innovation management has shifted the focus from products and services, corporate resources, capabilities, and revenue models, towards more strategic and comprehensive views of business models, guided by the notion that the business model can incorporate several of the previous focal aspects (Baden-Fuller and Morgan, 2010; Wirtz et al., 2016). In this way, business model innovation has become a significant topic in the academic business literature (Boons and Lüdeke-Freund, 2013) as it can lead to efficient and long-term competitive advantages through changes in how business creates, delivers, and captures value (Amit and Zott, 2010). Some business managers also favour business model innovation over traditional product and service innovation. They argue that product innovation alone is insufficient to produce sustained competitive advantage and growth, and that service innovation, which takes a broader customer value perspective into account, still lacks the organisation of different resources that are included in the business model (Shelton, 2009).

Business model innovation can be defined as the discovery of a fundamentally different business model within an existing market (Adams et al., 2016; Markides, 2006) or as the search for new business logics and new ways to create and capture value for customers or other stakeholders

(Casadesus-Masanell and Zhu, 2013). In discovering a fundamentally different business model, the innovation is viewed as an outcome, i.e., the design of a new business model (Foss and Saebi, 2017). However, since businesses need constant adaptations and refinements of business logics and operations to survive in dynamic markets worldwide (Amit and Zott, 2010; Teece, 2010), this thesis focuses on the business model innovation processes of existing business models (Berends et al., 2016; DaSilva, 2018; Demil and Lecocq, 2010). This thesis follows the research view of business model innovation as processes of organisational change, referring to the development and reconfiguration of the value proposition, value creation and delivery, and value capture (Foss and Saebi, 2017; Mitchell and Bruckner Coles, 2004).

The innovation process is often multi-dimensional with overlapping, iterative activities (Frankenberger et al., 2013) that can be divided into different phases. The division into phases is helpful for a theoretical understanding and of practical help to policymakers and business managers since it eases the identification of particular barriers and drivers at particular stages (Hartley, 2006; Mitchell and Bruckner Coles, 2004; Osterwalder and Pigneur, 2010; Teece, 2010). Frankenberger et al. (2013) coherently divide the innovation process into four manageable phases, identified as the 4I framework. These phases are: (i) initiation (system analysis, need for innovation); (ii) ideation (generation of new ideas, solutions, and alternatives); (iii) integration (business model development); and (iv) implementation (new business model realisation, marketable solutions).

The variety of activities in the different phases makes the innovation process dynamic and interactive but adds complexity and makes the process more unpredictable (Klein and Rosenberg, 1986). Changes in or the redesign of individual activities can affect the entire business model due to their interdependent and dynamic relationships (Sosna et al., 2010). Thus, changes affecting these relationships may advance the interactivity and efficiency of the business model innovation but add unpredictability and complexity, leading to hesitation among business managers to initiate the process (Bucherer et al., 2012). To reduce unpredictability, the business model innovation process needs appropriate capabilities, leadership, and learning mechanisms (Foss and Saebi, 2017). However, the literature improving our understanding of the capabilities (e.g., managerial practices), leadership (e.g., decision-making), and mechanisms (e.g., management structures) that precede business model innovation has mainly been descriptive rather than explanatory and focused on adaption to external aspects, such as business managers adjusting to intense global competition (Doz and Kosonen, 2010), competitive pressure (Johnson et al., 2008), and major and unpredictable changes in the business environment (Voelpel et al., 2004). These aspects are however not only known to precede business model innovation but also other strategic business measures. This creates a need for more research that can clarify and explain aspects that precede business model innovation in particular and how these aspects can be used to incentivise change decisions among business managers (Foss and Saebi, 2017; Rauter et al., 2017; Ulvenblad, 2023).

Moreover, most research related to incentives for business model innovation has been conducted in light of adjusting to current markets or accessing new available markets, for example, by increasing sales, reducing costs, and optimising processes (Chesbrough and Rosenbloom, 2002; Osterwalder et al., 2005; Teece, 2010; Zott and Amit, 2010). However, fewer studies have empirically explored the possible effects of different drivers as moderating factors to facilitate engagement in business model innovation that includes activities for which there is currently no clear market demand, as in the case of many sustainability measures (Barth, 2017; Foss and Saebi, 2017; Geissdoerfer et al., 2018; Rauter et al., 2017; Ulvenblad, 2023). Business sustainability focuses on broader value perspectives and more long-term commitments that go beyond the creation of economic and shareholder value (Pan et al., 2022; Santa-Maria et al., 2021) to encompass business models that also take account of value

for society and the environment (Freudenreich et al., 2020). Consequently, the incentives to engage in sustainable business model innovation leading to sustainable business models merit further exploration.

2.4 Business models for sustainability

Business models can be developed and studied in light of different sectors or goals, all with the aim of creating and capturing value. One such example is business models innovated to maximise financial value from digital technologies, such as Industry 4.0 and the Internet of Things (Ancillai et al., 2023; Mostaghel et al., 2022; Sjödin et al., 2023). Another is the perspective of creating and capturing sustainability value and going beyond the limits of purely profit-oriented business models (Dyllick and Muff, 2016; Kiron et al., 2013; Schaltegger et al., 2016).

Value can be described as the satisfaction of the needs of individuals or organisations (Almquist et al., 2016). It is a subjective concept with varying interpretations depending on the context. This means that the value perceived by a business manager can be different from the value perceived by different stakeholders with various needs (Freeman, 1984). Businesses need to consider the interests of all their stakeholders when creating value, since these individuals or groups support their survival (Peloza and Shang, 2011; Stubbs and Cocklin, 2008). The long-term success of a business depends on the customers who buy its products and services, the employees who produce those products and services, the suppliers who deliver raw materials and other resources, the investors/creditors who provide the funding, and the society that supports all the aforementioned business activities (Hörisch et al., 2014).

In business research, the concept of value, which often implies economic growth, is of central importance (e.g., Osterwalder et al., 2005; Teece, 2010). As a result, traditional business models have primarily focused on economic profit that results from the commercialisation of products and/or services (Teece, 2010) while overlooking the indirect (and potentially negative) effects that the production, distribution, and consumption of some products and/or services can cause (Bocken et al., 2014; Dyllick and Muff, 2016; Stubbs and Cocklin, 2008). However, looking beyond value as the basis of monetary exchange and focusing on the recognition that products and services offer different value to different stakeholders (Upward and Jones, 2016) enables a view of value that can include all three dimensions (i.e., ecological, social, and economic) of sustainability (Freudenreich et al., 2020).

Business value is defined by its stakeholders, and when stakeholders have different needs, their interpretations of value differ (Freeman, 1984). When strong sustainability is in focus, the commercial connotations of value change and the view of value expands to include environmental and social views of value (Yang et al., 2017a). This results in a view of value as being created directly in products and services, and indirectly via effects on people and society (Stubbs and Cocklin, 2008). Such an expanded view of value can help businesses realise that their products and services offer commercial value to their customers as well as sustainable value to all stakeholders (Freudenreich et al., 2020; Schaltegger et al., 2016; Yang et al., 2017a).

Identifying, categorising, and managing stakeholder relationships is crucial, as reflected by the emergence of its own field (e.g., Freeman, 2023; Freeman et al., 2010; Friedman and Miles, 2002; Laplume et al., 2008; Phillips et al., 2003), and these aspects have become increasingly relevant with an increasing sustainability focus as stakeholders play a particularly important role in sustainable business practices (Hörisch et al., 2014). Their diverse skills, expertise, and resources are especially needed at the initiation of innovation processes aiming at increased business model sustainability (Bocken and van Bogaert, 2016). Business managers and employees are internal stakeholders who

will be concerned with how sustainability issues affect job security, generate cost savings, and improve the business reputation. Value chain stakeholders, such as suppliers, retailers, and customers, will be concerned with how to distribute the value created throughout the value chain. Lastly, societal stakeholders, such as governments, municipalities, and public interest groups, will be concerned with subsidies, grants, mass media, public protests, and campaigns intended to support or influence sustainable business practices (Vilchez et al., 2017).

Sustainable business models give structure to sustainable value proposition, creation and delivery, and capture (Geissdoerfer et al., 2018). They are a way for business managers to reframe the business purpose by integrating sustainability in production processes, value chains, and customer relationships (Schaltegger et al., 2016). A sustainable business model preserves the environment while continuing to improve the quality of human life (Garetti and Taisch, 2012). It does this by creating competitive advantage through increased customer value, which contributes to sustainable development for the business and society (Lüdeke-Freund, 2010). It builds on the triple-bottom-line approach in defining the business purpose and performance by explicitly considering the environment and society as key stakeholders (Stubbs and Cocklin, 2008).

To define the strong sustainability ambition of these business models, they are sometimes referred to as business models for sustainability, a term that is becoming more frequently used (e.g., Abdelkafi and Täuscher, 2016; Bocken et al., 2014; Boons and Lüdeke-Freund, 2013; Karlsson et al., 2018; Lüdeke-Freund, 2010; Preghenella and Battistella, 2021; Schaltegger et al., 2016; Schneider and Clauß, 2020). The reason for making a distinction between a sustainable business model and a business model for sustainability is to define that the latter is developed based on business activities with sustainability as their purpose, not just as an add-on to the current business model. This means that the key challenge is to design a business model that creates economic success through, and not just along with, environmental and social value creating activities (Preghenella and Battistella, 2021; Schaltegger et al., 2012). Thus, a business model for sustainability is a description of a business model that goes beyond simply adding sustainability aspects as value propositions to current business, instead it includes them in the value creation and capture (e.g., supply chains and infrastructure) and take a systems perspective to sustainability activities (Abdelkafi and Täuscher, 2016; Bocken et al., 2014; Roome and Louche, 2016). Schaltegger et al. (2016) describe how a business model for sustainability can be used as a tool to describe, analyse, manage, and communicate (i) the business's sustainable value proposition to customers and stakeholders, (ii) the creation and delivery of the value proposition, and (iii) the capture of economic value as natural, social, and financial resources are maintained or regenerated beyond the boundaries of the organisation.

A business that bases its activities on a business model for sustainability prioritises environmental concerns and effects as it incorporates positive societal impacts into its business structure (Engert and Baumgartner, 2016; Rauter et al., 2023) and addresses both short-term and long-term sustainability issues (Patala et al., 2016). By doing so, the business can broaden its economic emphasis to also include an environmental and societal focus (Joyce and Paquin, 2016), which can lead to business benefits such as cost savings and more long-term competitive advantage (Evans et al., 2017). To mark the strong sustainability ambition of the research in this thesis, it will henceforth refer to business models for sustainability.

Consequently, to become truly sustainable, businesses need to incorporate sustainability into the core of their business models and manage unsustainability at the source rather than as an add-on to reduce the negative outcomes of business. The different levels of sustainability integration can be described through a typology of business sustainability ranged on a gradient extending from

business-as-usual to “Sustainability 3.0” (Dyllick and Muff, 2016). Business-as-usual refers to the current economic paradigm based on typical economic concerns, such as access to cheap resources, efficient processes, and the strive for a strong market position. The aim is to produce profit as well as market and shareholder value. The first step towards a more sustainable business is “Business Sustainability 1.0”, which concerns refined shareholder value management. This approach recognises new business challenges outside current markets, often based on environmental or societal concerns presented by external stakeholders such as NGOs or governments. These concerns create economic risks and opportunities for businesses that can be integrated into existing processes and practices without changing the basic business premises. In this way, sustainability concerns become part of decision-making and actions, but the business objectives remain focused on the creation of shareholder value. “Business Sustainability 2.0” means applying a broader stakeholder perspective and pursuing a triple-bottom-line approach. This means going beyond shareholder value and also including social and environmental value in deliberately defined and measurable goals and programmes targeting specific sustainability issues or stakeholders. Finally, “Business Sustainability 3.0” or true sustainability means reflecting on how the business can contribute, via its products and services, to resolving pressing sustainability issues in society and how it can use its resources, competencies, and experiences to address some of the big economic, social, and environmental challenges that society is facing, such as climate and water issues, migration, corruption, and financial instability.

According to the typology, a true or strong sustainability ambition in business models will require an extended definition of value in the context of sustainability (Bocken et al., 2013; Stubbs and Cocklin, 2008) and will challenge the understanding of business models and their design requirements (Breuer et al., 2018; Upward and Jones, 2016). This is especially the case since business models designed for sustainability may not initially be economically viable due to their long-term perspective on value capture and the lack of market demand (Bocken et al., 2014). As a result, the achievement of a business model for sustainability becomes complex, and although many business managers address sustainability issues in their activities, fewer have significantly altered their original business models. Sustainability is often added to the value proposition without changing the value creation and capture (Bocken et al., 2014), leading to sustainability improvements without any effects on the supply chains, organisation, or business infrastructure (Roome and Louche, 2016).

To overcome the lack of sustainability implementation in value creating and capturing activities, businesses need to become aware of new business opportunities in relation to sustainability. The concept of value uncaptured offers a way to think about where and how value is captured in the business model and where additional value might be created and captured (Yang et al., 2017a). The identification of uncaptured value can improve the understanding of value opportunities connected to sustainability and lead to business models that capture economic, social, and environmental value. The value uncaptured perspective offers differentiating, but connected, perspectives on value (Broccardo et al., 2023), value surplus, value absence, value destroyed, and value missed. Surplus value indicates that the value is not necessary for the current business model and absent value means that the value necessary for the business model does not exist. Destroyed value refers to the negative consequences for the business model and, finally, missed value refers to existing value that remains unused (Yang et al., 2014, 2017b). The identification of missed value from a value uncaptured perspective can lead to an improved understanding of value opportunities connected to sustainability and can stimulate business model changes in a sustainable direction (Bocken et al., 2013; Yang et al., 2017a). More specifically, businesses in unsustainable conditions with financial constraints can develop a positive attitude towards business sustainability measures as a result of improved awareness and knowledge of how such measures can be integrated with existing business

models, contributing to profit maximisation in a long-term perspective (Amit and Zott, 2012; Battershill and Gilg, 1997; Kiron et al., 2013, Porter, 1991).

The typology of business sustainability (Dyllick and Muff, 2016) and the value uncaptured perspective (Yang et al., 2017a) confirm that truly sustainable businesses reflect on questions that go beyond those so far considered and need business managers with strong sustainability ambitions who focus on maximising societal and environmental benefits, rather than only prioritising economic gain (Bocken et al., 2014; Dyllick and Muff, 2016). This emphasises the necessity of further understanding incentives among business managers to commit to business models for sustainability, as coherence between business incentives and the business model for sustainability is an important driver of the development of business models for sustainability (Rauter et al., 2017).

The need to clarify the incentives of business managers to recognise sustainability opportunities in business has recently been identified as the value intention of the business manager (Barth et al., 2017; Sinansari et al., 2022). The value intention concept has been developed particularly to describe the mind-set or attitudes towards business change in light of business sustainability (Ulvenblad, 2023). Due to its recent development, the value intention concept shows promise for expanding our understanding of business managers' intentions for the development of business models for sustainability and their alignment with societal sustainability targets (Preghenella, 2022). The concept would, however, benefit from refinement regarding the aspects it entails, and more empirical research is needed to better understand the role value intention could play in the innovation process (Miranda et al., 2023).

2.5 Business model innovation for sustainability

The ability of businesses to change and adapt existing business models to efficiently deal with sustainability issues is affected by the dynamics that surround the businesses, such as aspects of the market economy, legislation and regulations, stakeholder relations and demands, producers, customers, and consumer choice, as well as practical support (Amit and Zott, 2010; Chesbrough, 2010; D'Amore et al., 2022; Di Vaio et al., 2020). All these overlapping activities, involving a variety of actors, are best understood as a dynamic process of continuous business change and making up the basis of sustainable business model innovation (Amit and Zott, 2012; Demil and Lecocq, 2010; Laasch, 2019; Wirtz and Daiser, 2018). Sustainable business model innovation is similar to the understanding of conventional business model innovation and is seen as a process of business model exploration, adjustment, improvement, redesign, revision, creation, development, adoption, and transformation (Geissdoerfer et al., 2018), but with the aim of effecting changes that result in new ways of creating sustainability value for customers and users (Boons and Lüdeke-Freund, 2013; Mitchell and Bruckner Coles, 2004). This means that sustainable business model innovation focuses on broad value perspectives and long-term commitments that go beyond the creation of economic and shareholder value (Pan et al., 2023; Santa-Maria et al., 2021). More specifically, sustainable business model innovation bases its activities on stakeholder interest and focuses on the creation and delivery of a balance of economic, ecological, and social value by solving environmental and societal issues through a wide range of activities, both with and for stakeholders such as suppliers, retailers, and customers (Karlsson et al., 2018; Klein et al., 2021).

One of the key challenges of sustainable business model innovation is to develop business models to enable the capture of economic value through delivering environmental and societal benefits (Schaltegger et al., 2012), especially since it is not always clear how the delivery of environmental and social value can translate into profit and competitive advantage. However, increased attention is being paid to sustainable business model innovation since it is regarded as an efficient way for

business managers to identify opportunities to maintain competitive advantage in a changing business environment, due to e.g., climate change effects, resource supply constraints, regulations, and shifting societal pressures (Pan et al., 2023).

As previously explained, there are different views of how frequent and comprehensive business model innovation processes should be (Foss and Saebi, 2017), which also applies to sustainable business model innovation. In light of sustainability, business model innovation can occur to different extents at different stages, and Geissdoerfer et al. (2018) divide sustainable business model innovation into four types: (i) sustainable start-ups, referring to new organisations in which sustainable business models are created; (ii) sustainable business model transformation, meaning that a current business model is changed into a sustainable business model; (iii) sustainable business model diversification, meaning that the existing business model stays in place and an additional sustainable business model is established; and (iv) sustainable business model acquisition, which refers to an additional sustainable business model being identified, acquired, and integrated into the organisation.

This thesis applies the perspective that business model innovation is an incremental process of identifying changes in or redesigning current activities. This results in a view that efforts to improve profitability and productivity greatly depend on the implementation of business strategies that support continuous change (Girotra and Netessine, 2013), which is particularly important in research on sustainable business model innovation since it explains how businesses develop over time to include an increasing level of sustainability in their business model components and activities (Carayannis et al., 2015). Accordingly, the purpose of sustainable business model innovation is to design business models that support sustainable development and processes that produce positive (or reduce negative) environmental effects on society and require businesses to apply long-term perspectives to their business strategies and goals, aiming for prosperity for businesses and their stakeholders throughout the value chain (Geissdoerfer et al., 2018; Schaltegger et al., 2016).

Business model innovation processes apply the same distinction as business models, between sustainable business model innovation and business model innovation for sustainability, with the latter marking a strong sustainability purpose, not just as an innovation leading to a sustainability add-on to current business models (Preghenella and Battistella, 2021). This thesis will henceforth refer to the business model innovation process for sustainability (BMIpfS). A business model innovation qualifies as a BMIpfS when it aims for: (i) sustainable development or positive and/or reduced negative impacts on the environment, society, and the long-term prosperity of the organisation and its stakeholders; or (ii) the adoption of solutions that incorporate sustainability in its value proposition, creation, and capture, as well as in its value network (Bocken et al., 2014; Boons and Lüdeke-Freund, 2013; Geissdoerfer et al., 2016; Loorbach and Wijsman, 2013; Roome and Louche, 2016; Schaltegger et al., 2016; Yang et al., 2014). These definitions combine the business model innovation with sustainability considerations (Geissdoerfer et al., 2018) and highlight the important role of the business managers' sustainability concerns in the BMIpfS. They emphasise the importance of understanding the value intention behind the BMIpfS among business managers (Barth et al., 2017) and the role value intention plays in recognising sustainability opportunities in business (Sinansari et al., 2022).

However, Chesbrough (2010) stresses that business model innovation often does not take place because of business managers' inability to identify the appropriate business model. This is especially evident in the early phases of the business model innovation process, since these phases are considered the most resource demanding and can thus prevent businesses from utilising value creation opportunities (Amit and Zott, 2001). Bocken and Geradts (2020) emphasise that these

barriers are even stronger in regard to sustainability since shareholder pressures can prevent the BMIpfS and the venture into new or undeveloped markets (as is often the case for sustainability measures) where shareholders will question the possibility of attaining desired, often short-term, profitability. Consequently, the barriers perceived by business managers can cause them to miss opportunities to make business model changes due to either not recognising the opportunities at hand or creating reluctance to make the needed business model changes (Engelken et al., 2016).

Barriers to BMIpfS can be internal (related to human factors such as leadership and cognition) and external (related to the business environment such as the behaviour of competitors, customers, and governments) (Sandberg and Aarikka-Stenroos, 2014). They can also be viewed as contextual in the sense that they can arise from unclear policies, regulations, markets, or customer and stakeholder demands (Björklund, 2018; Laukkanen and Patala, 2014). Bocken and Geradts (2020) call for more research on how barriers and drivers can be used to enable BMIpfS in different contexts, since the field is still in its exploration phase. Geissdoerfer et al. (2018) emphasise this need in relation to sustainability in particular, identifying an opportunity to further study what challenges businesses are presented with when undertaking different phases of the innovation process, aiming to create business models for sustainability. Pan et al. (2023) further define the need to study drivers and barriers in businesses of different sizes and in different industries, and how these interact with the BMIpfS.

Consequently, this emphasises the need to better understand business model innovation processes that explicitly consider barriers to and drivers of sustainability aspects and unclear market demands. This also highlights the opportunity to build on the 4I framework of Frankenberger et al. (2013), which concerns the different phases of business model innovation and uses them to consider sustainability in the business model innovation process. As articulated by Hartley (2006), the definition of the process phases can help policymakers and business managers identify certain barriers to and needs of facilitators at particular stages of the process. This is especially the case in the early phases of the business model innovation process, as also shown by Karlsson (2019), who added a pre-phase to the BMIpfS to deal with internal and external antecedents that enable the initiation phase when strategic business decisions are made concerning issues such as sustainable value creation, stakeholder collaboration, and sales of products and services.

Because larger businesses may have greater success in overcoming barriers due to having more resources, including access to industry knowledge (Lüdeke-Freund et al., 2016), it is important to study the initiation of BMIpfS in smaller businesses in which the expertise needed to innovate might be lacking. For example, smaller businesses can find it challenging to market sustainable products and services beyond existing markets (Swaffield et al., 2019) and they might lack proper systems for structuring and managing environmental and sustainability issues (Hjelm and Lindahl, 2016; Keskin et al., 2013). Thus, these businesses will particularly benefit from external support to address challenges and facilitate the initiation of innovation processes for sustainability (Klein et al., 2021).

2.6 Facilitating business model innovation for sustainability

The BMIpfS can create opportunities to capture previously uncaptured sustainability value but can also be viewed by managers as business risks, due to uncertainties of how to innovate business models to realise uncaptured value (Chesbrough, 2010; Yang et al., 2017a). Depending on their awareness of business opportunities in relation to sustainability, business managers will take different approaches towards BMIpfS (Pan et al., 2023). They will understand and structure their businesses based on previous experiences and link choices of actions with the subsequent impact of those actions on outcomes (Gavetti and Levinethal, 2000). This means that managers will use both

conscious and subconscious thought structures in their evaluation of business activities (Kaplan, 2011; Laasch, 2019). The effect of business managers' thought structures is particularly crucial in smaller businesses, such as, in many agricultural businesses, where managers are more likely to be in a position to directly affect the business agenda (Rauter et al., 2017). The thought structures are values based to varying extents and will link to perceptions of cost benefits and profits as well as the approach to the development of organisational structures (Kiron et al., 2013).

This is exemplified by Long et al. (2018) and Van Tulder et al. (2013), who distinguish between inactive, reactive, active, and proactive approaches. Business managers who take an inactive approach regard sustainability as a governmentally enforced task, disconnected from business benefits. A reactive approach applies to business managers who act in response to stakeholder pressures for sustainability to achieve a positive business reputation rather than creating their own strategies. The active approach means viewing sustainability as a market opportunity and a driver of innovation of products or services, whereas the proactive approach integrates business activities with sustainability challenges. The proactive approach refers to creating business opportunities by using resources, competencies, and experiences to address economic, social, and environmental issues that society faces, to meet sustainability challenges such as climate change and sustainable food production (Dyllick and Muff, 2016). The proactive approach is the most challenging but also the most desired when aiming for strong sustainability in business models. To realise development towards a proactive approach, business managers need to be supported and motivated to innovate current businesses. Thus, facilitation in line with the motivation of business managers is needed to incentivise increased sustainable value creation and capture, i.e., the integration of economic, environmental, and social value creation for and with stakeholders in business models (Brown et al., 2018; Schaltegger et al., 2016).

Motivation for the BMIpfS among business managers can be grouped into three main categories: macroenvironmental drivers, strategic drivers, and human drivers (Pan et al., 2023). The macroenvironmental drivers include ecological and technological aspects relevant to facing environmental issues, such as air pollution and natural resource depletion. Finding solutions to such problems can incentivise managers to make business model changes that, for example, focus on improving waste recycling, resource efficiency, and renewable energy use (Karami and Madlener, 2021; Santa-Maria et al., 2021). Additionally, government policies linked to solutions to environmental issues can incentivise managers to implement BMIpfS (Sinkovics et al., 2021). Strategic drivers of the BMIpfS consist of activities that support shared value creation and collaborative innovation with stakeholders, affecting value proposition, creation and delivery, and capture in line with sustainable development (Keskin et al., 2013; Klein et al., 2021). Aligned with this, human drivers include sustainability-oriented leadership and external pressure from stakeholders, through which managers are required to incorporate societal interests in decision-making processes to fulfil societal responsibilities and propose sustainable projects in which stakeholders are willing to invest (Macellari et al., 2018).

The categorisation of drivers and how they can be addressed highlights the coherence between business managers' value intention and the business model for sustainability (Barth et al., 2017; Rauter et al., 2017; Sinansari et al., 2022). The perceptions of business managers create cognitive structures that will affect the managerial decisions and boundaries of the business, for example, concerning how to create and capture value, approach different or new markets, and relate to other actors in the value chain (Doz and Kosonen, 2010; Martins et al., 2015; Yang et al., 2017a). Moreover, to overcome perceived risks and become aware of new business opportunities in relation to sustainability, the motivations of business managers can be aligned with the enablers of sustainable

business model innovation at the macro, meso, and micro levels (Sinkovics et al., 2021). The macro level involves ecological, economic, and political aspects and the need to align political and legislative agendas with wider ecological and developmental issues in striving for increased sustainability. The meso level refers to the industry level and addresses the importance of identifying aspects related to the nature and complexity of a given industry in a country or a region, as well as the global distribution of the industry activities. Lastly, the micro level encompasses aspects related to organisational and individual factors such as visions, goals, and leadership among business managers, as well as their access to available financial resources and relevant capabilities. Such enablers of innovation are often facilitated by intermediaries, identified as organisations or persons that act as agents or brokers between two or more parties in any aspect of the innovation process (Howells, 2006).

Intermediaries can support businesses in accessing resources and expertise by creating arenas for learning and knowledge exchange and facilitating links and relations to other actors with whom networks and partnerships can be established (Polzin et al., 2016). Moreover, the relational work of intermediaries effectively identifies common problems and relevant issues for multiple local projects, connects relevant actors to address them (Hargreaves et al., 2013), and links actors involved in situations where direct interaction is difficult due to perceived risks or challenges connected to e.g., costs, communication problems, cultural differences, and lack of incentives or knowledge (Kivimaa et al., 2019). In previous research, there has been a common view of the intermediary as an actor with a relatively impartial third-party position, often organised on a not-for-profit basis (Gould and Fernandez, 1989; Mantel and Rosegger, 1987). Earlier and parallel innovation literature has used different terminology to refer to intermediaries, such as bridgers (Bessant and Rush, 1995; McEvily and Zaheer, 1999), brokers (Hargadon and Sutton, 1997; Provan and Human, 1999), information intermediaries (Popp, 2000), superstructure organisations (Lynn et al., 1996), and intermediary firms (Stankiewicz, 1995), all with a similar overall purpose as the general definition of an intermediary (Howells, 2006).

Intermediaries are actors, individuals, and organisations mandated specifically to undertake an intermediary role, rather than performing that role as a by-product of their principal activities (Batterink et al., 2010; Kanda et al., 2018; Kivimaa et al., 2019). Research on intermediaries has largely evolved from concepts used in research on innovation systems, which is an overarching concept comprising relations between economic, social, political, organisational, and institutional factors that influence the development, diffusion, and use of innovations (Edquist and Johnson, 1996; Lundvall, 2016; Nelson, 1993). The emphasis of the research has been on intermediaries that facilitate innovation in networks, analysing the roles of different nodes and links in the innovation process (Howells, 2006) and mainly focusing on the formulation of options and market demands, the alignment of actors and collaboration possibilities, support in learning, and competitive relationships (Van Lente et al., 2003; Winch and Courtney, 2007). Intermediaries can catalyse innovation by bringing together actors who would not necessarily otherwise be connected and facilitating their interactions. Thus, intermediaries can bring great added value to innovation networks with divergent organisations, especially in inter-organisational cooperation between small and medium-sized businesses (Batterink et al., 2010). Intermediaries can develop as public, private, or non-profit organisations (McCauley and Stephens, 2012) and sometimes they apply a triple helix approach, meaning that they channel support from universities and governmental institutions into business challenges and act as the centres of innovation systems (Barrie et al., 2017; Kivimaa et al., 2019). Intermediation has also focused on providing support through business incubators, accelerators, and mentorships to facilitate the flow of resources and knowledge, access to social networks, and connections with funding sources (Eberhart and Eesley, 2018).

2.6.1 Intermediaries in the innovation processes for sustainability

There is diverging research on intermediaries' role in innovation, either (i) as actors facilitating innovation who carry out their intermediation without altering the transferred knowledge or resources, or (ii) as actors facilitating innovation processes who shape the entities transferred in order to facilitate system change, such as translating scientific knowledge into new usable entities in specific contexts (Kivimaa et al., 2019). Since the intermediation of innovation processes is used to help businesses obtain important and novel ideas, resources, and expertise (Kivimaa et al., 2019; Matschoss and Hesikanen, 2017), it is the most relevant view for this thesis. Intermediaries' role in facilitating innovation processes has been studied in several contexts, for example, in transitions of technology and sustainability (Gliedt et al., 2018). For this thesis, it is important to distinguish between intermediation for innovation processes in general and intermediation to positively influence innovation processes for sustainability (Kivimaa et al., 2019). The latter needs to consider a much broader part of the system in which it operates since there is a need to link actors, skills, and resources around new collaborations and markets to disrupt dominant unsustainable systems or networks (Van Lente et al., 2020). Consequently, innovation processes for sustainability require specific intermediation roles compared with non-sustainability-oriented innovation because innovation processes for sustainability often aim to fulfil the same purpose as other innovation processes but with lower negative environmental impact, and must compete with other innovations that produce negative externalities and are already established in mainstream markets (Kundurpi et al., 2021). The role of intermediation varies but can involve a wide range of internal activities as well as the formulation of expectations and visions, learning processes, networking, and resource provision (Kivimaa, 2014; Sovacool et al., 2020). According to Kanda et al. (2018), intermediation in sustainable innovation processes targets the validation of the environmental benefits to which the sustainable innovation contributes. More specifically, building legitimacy, branding, market formation, and facilitating commercialisation of the sustainable innovation through testing and demonstrations that allow measurement, validation, and communication of environmental benefits to key stakeholders are particularly important activities in innovation processes for sustainability (Kanda et al., 2019). Because of the complexity of BMIpfS, e.g., connected to unclear costs and risks, Kivimaa et al. (2019) stress that the need for intermediation is most crucial in the initial phases of the innovation process, although it also is required over the long-term perspective since sustainability changes take time to become established.

Due to the complexity of innovation processes aiming at increased sustainability, researchers have deployed a multi-level perspective to outline different analytical levels of the innovation system (Loorbach et al., 2017). The multi-level perspective distinguishes between three analytical levels with increasing temporal stability (Kivimaa and Kern, 2016): (i) the niche level, which is flexible and fluid, where various technical, social, and organisational innovations are created and tested; (ii) the regime level, which comprises semi-stable structures of e.g., technologies, infrastructure, institutions, practices, behavioural patterns, markets, and industry formations; and (iii) the landscape level, referring to the slow societal processes that provide context for the regime to either remain stable or change, such as macroeconomic and political trends or substantial environmental and demographic changes (Fischer and Newig, 2016). Traditionally, actors on the regime level have formed powerful coalitions to push forward agendas for change that fit the interests of incumbent regimes, or even downplayed the need for change. However, niche actors focus on knowledge development and diffusion, vision articulation, entrepreneurial activities, market formation, resource mobilisation, legitimacy creation, and overcoming resistance to change. The challenge facing the innovation process towards sustainability is thus to create circumstances that allow a bottom–up perspective in which niche-level innovations can be scaled up and change the regime (Wittmayer et al., 2017). This

emphasises the role of intermediaries who can provide and distribute necessary information, services, and mediation to connect niche-level activities with regime-level institutions and increase the diffusion speed of new technologies and practices (Fischer and Newig, 2016). It also highlights the important role intermediaries can play in accelerating the BMIpfS, especially if the intermediaries are established to target new collaborations, ideas, and markets within and across certain niches (Brown et al., 2018; Geissdoerfer et al., 2018; Kivimaa et al., 2019).

The important act of directing intermediaries to particular areas or niches to accelerate innovation processes for sustainability can be used to successfully target specific challenges in developing new products, services, and business models (Brown et al., 2018; Feser, 2023). There is, however, a need for more empirical and context-specific research to understand future needs for intermediation, especially in relation to the growing sustainability demands from governmental institutions and public policies (Feser, 2023), such as in food production and transport (Brown et al., 2018). The importance of linking intermediation to local governments in order to facilitate innovation processes for sustainability is further stressed by Masuda et al. (2022), who connect the establishment and diffusion of activities by local governments with the adoption of long-term sustainability perspectives and measures. Gustafsson and Mignon (2020) also call for more research to clarify the role of intermediation between business and the global Sustainable Development Goals operationalised by local governments, and to continuously analyse the changing roles that local governments can play since their goals could change, due to e.g., changes in political agendas. Furthermore, many intermediary functions have emerged due to practical demands, unknowingly of the effect they had on the innovation process or what would have happened in their absence (Kivimaa, 2014). This emphasises governmental strategies to guarantee that intermediary functions are carried out, and not just left to develop on their own in the innovation system. This is especially important in innovation processes for sustainability, where lack of clear market demand or profitability from WREMs and associated ecosystem might create resistance among private intermediation organisations (Dockès et al., 2019; Kivimaa, 2014).

2.6.2 Government-affiliated intermediaries

Some studies have explored the linkage of sustainability intermediation with local governmental organisations, defining these as government-affiliated intermediaries (Ehnert et al., 2022; Kivimaa, 2014; Kivimaa et al., 2019; Mignon and Kanda, 2018). The actions of government-affiliated intermediaries are not driven by profit and fall between traditional public and private actors, for example, by providing help in identifying and managing business opportunities based on the implications of EU, national, and/or regional policies (Ehnert et al., 2022). These intermediaries can be government-owned businesses or quasi-autonomous organisations such as municipalities or authorities (Kivimaa, 2014) and are generally established to support commitments or investments that benefit the common good (Dockès et al., 2019), e.g., infrastructure development and the expansion of renewable energy production. Government-affiliated intermediaries primarily help businesses adopt and implement environmentally and sustainability-oriented innovation activities, such as improving material and energy efficiency and subsequently lowering costs (Mignon and Kanda, 2018). Furthermore, government-affiliated intermediaries support businesses by linking together different actors, such as banks or industry associations, and helping businesses write applications for financing the implementation of sustainability innovation projects. Government-affiliated intermediaries can thus be used to promote BMIpfS (Kivimaa et al., 2019; Loorbach and Wijsman, 2013) that requires support, innovative thinking, and clarified business concerns (Schaltegger et al., 2016; Karlsson et al., 2017).

Government-affiliated intermediaries have the benefit of neutrality over actors that must carry their own costs. This neutrality helps government-affiliated intermediaries gain trust and encourage different parties to enter into new networks (Kivimaa, 2014; Masuda et al., 2022). Their neutrality also makes them more unbiased towards different alternatives of business model innovation, at the same time as they uphold a strong sustainability agenda, which is positive for their legitimacy in promoting overall sustainable development (Yao et al., 2022). However, such a strong sustainability agenda could affect the intermediation by making it normative, which could reduce autonomy and flexibility among business managers and thus constrain their ability to innovate. Therefore, government-affiliated intermediaries could have either a positive or negative effect on innovativeness. So far, however, limited attention has been paid to examine how the government-affiliated intermediaries can act upon drivers and barriers of business managers to organise their facilitation and choose which activities to include in order to have the desired effect on sustainable business commitments and business models (Brown et al., 2018; Feser, 2023; Yao et al., 2022).

2.7 Summary of research framework

The overarching aim of this thesis is to explore how the facilitation of WREMs can support agricultural business managers in the BMIpfS. Through its aim, this thesis puts agricultural business managers in focus, since they greatly impact the success of the business model (Beltramello et al., 2013; Bocken et al., 2014) and drive innovation through their decisions and actions (Schumpeter, 1934; Śledzik, 2013; Ülgen, 2015). The thesis also focuses on business models and business model innovation with sustainability as their purpose, making the key challenge designing them to create economic success through, and not just along with, environmental and social value creating activities (Boons and Lüdeke-Freund, 2013; Foss and Saebi, 2017; Preghenella and Battistella, 2021; Schaltegger et al., 2012). The BMIpfS requires an extended definition of value that includes products and services with commercial value to customers as well as sustainable value to all stakeholders (Freudenreich et al., 2020; Schaltegger et al., 2016; Stubbs and Cocklin, 2008; Yang et al., 2017a), and it is based on stakeholder interests in order to efficiently deal with sustainability issues (Boons and Lüdeke-Freund, 2013; Mitchell and Bruckner Coles, 2004).

In particular, this thesis aims to improve the understanding of the value intention among agricultural business managers and how government-affiliated intermediaries can facilitate BMIpfS initiation. Value intention has been developed to describe mind-sets and attitudes towards business change in light of business sustainability (Barth et al., 2017; Sinansari et al., 2022; Ulvenblad, 2023), but the concept needs refinement to be utilised in understanding underlying barriers and drivers as moderating factors for the initiation of the complex BMIpfS (Bocken et al., 2014; Miranda et al., 2023; Pan et al., 2023). This is especially relevant due to the long-term perspective of the BMIpfS on value creation and capture, and since few studies have explored the effect of different drivers to facilitate engagement in business models for sustainability based on activities that currently lack clear market demand (Foss and Saebi, 2017; Geissdoerfer et al., 2018; Rauter et al., 2017). A main challenge of business model innovation for sustainability is to develop business models that enable the capture of economic value through the delivery of environmental and societal benefits (Schaltegger et al., 2012), especially if it is unclear how the delivery of environmental and social value can translate into profits and competitive advantage. The complexity of value creation and capture based on sustainability activities results in business managers' inability to identify appropriate business models, which impedes BMIpfS initiation. This is especially evident in the early phases of the BMIpfS of small businesses, which have less financial leeway as the early innovation phases are considered the most uncertain and resource-demanding phases (Amit and Zott, 2001; Chesbrough,

2010). This highlights the importance of supporting business managers overcome perceived business risks related to profits and unclear markets.

Intermediaries in the innovation processes for sustainability link actors, skills, and resources around new collaborations and markets to disrupt dominant unsustainable systems or networks (Van Lente et al., 2020). Intermediation to foster the development of new products, services, and business models in the complex innovation processes for sustainability is most crucial in the initial phases of the innovation process (Kivimaa et al., 2019). This is particularly relevant in relation to growing sustainability demands from governmental institutions and in public policies (Feser, 2023; Masuda et al., 2022), since innovation processes for sustainability with unclear market demand or profitability can create resistance among private intermediation organisations (Dockès et al., 2019; Kivimaa, 2014). So far, however, limited attention has been paid to how government-affiliated intermediaries can act upon drivers and barriers of business managers to organise their facilitative activities to achieve the desired effect on BMIpfS initiation, sustainable business commitments, and business models (Brown et al., 2018; Feser, 2023; Yao et al., 2022).

3 Methodology

This chapter presents the research approach of the thesis and the research design based on the research questions. Moreover, it presents the motivation for the choice of established methods for data collection and analyses. Based on this, it provides a description of the data collection and the use of interview methods and the survey method. It also describes the analysis of gathered data. Finally, this chapter concludes with a discussion of research quality assurance and ethical considerations.

3.1 Research approach

The researcher's understanding of knowledge (ontology) and how it is acquired (epistemology) affects the research process and is important for research to be independent of bias (Lewens, 2016). The research presented in this thesis explores knowledge from the perspective of critical realism. At an ontological level, critical realism assumes that the objective world exists with its natural laws, mechanisms, physical objects, and events independently of knowledge and beliefs (Bhaskar, 2013). Furthermore, critical realism applies a constructivist epistemology, which means that knowledge of the world is constructed based on subjective perspectives and impressions (Danermark, 2019). Consequently, a critical realist makes subjective interpretations of the objective world and should, as a researcher, be aware of not confusing impressions of the studied objects with the actual objects themselves, since objects are not always as the researcher perceives them.

The basis of a constructivist epistemology of critical realism makes it impossible to be purely objective, leading to the understanding of that knowledge will never be complete or infallible, but always partial and subject to revision (Maxwell, 2012). A critical realist interacts with the world with the aim of understanding the underlying structures and mechanisms that are the causes of different events (Maxwell, 2012). This makes critical realism a useful philosophical framework for social science research, since it can be used to identify and understand mechanisms, processes, and interactions between different individuals and groups in society (Bhaskar et al., 2017). However, conclusions drawn based on these mechanisms, processes, and interactions are not generalisable and predictable to the same extent as are results emerging in natural science, since social perceptions and structures are changeable and vary among humans across cultures, groups, and individuals.

The systematic gathering of data and the enrichment of previous understandings and knowledge can be done through different scientific approaches. This thesis uses a combination of inductive (i.e., moving from particular to general) and deductive (i.e., moving from general to particular) reasoning (Robson and McCartan, 2016). It starts inductively with observations and an exploration of empirical phenomena, allowing theoretical propositions to be derived. Using the empirical findings of the first and second study as a basis, the third study applies a more deductive approach that involves drawing conclusions based on known theory, phenomena, or expected patterns (Creswell and Creswell, 2017). At the end, the fourth study evaluates the emerging findings of this thesis from the perspective of the evaluation of applicability as well as in terms of practical impacts and implications (Marczyk et al., 2010).

With these approaches, this thesis applies a process perspective in its investigations while exploring the BMIpfS and facilitation of more long-term sustainable business commitments, since they include different activities, phases, and sequences that unfold over time (Boons and Lüdeke-Freund, 2013).

Innovation processes often involve a variety of actors, resources, and activities linked together in complex ways (Bucherer et al., 2012). Because innovation processes are multifaceted and complex, studies of such processes in connection with sustainability-oriented business changes can benefit from the use of diverse research methods (e.g., Lüdeke-Freund and Dembek, 2017; Schaltegger et al., 2016). Therefore, this thesis deploys a mixed-methods approach in which qualitative interview studies are complemented with a quantitatively framed survey. Combining qualitative and quantitative methods allows for both deep and broad understandings of the research problem and leads to a more complete understanding, with the weaknesses of qualitative and quantitative methods, respectively, counteracting each other (Creswell and Cresswell, 2017). Mixed-methods research designs can take various forms, but should include two main components, a core component and a supplemental component (Morse and Niehaus, 2009). In this thesis, qualitative in-depth interview explorations of the research problem are complemented with a quantitative survey to determine its scale, thereby demonstrating its wider relevance; this combined approach is particularly relevant to research aiming for practical impact or change.

Qualitative research methods take on the perspective of the participants to improve the understanding of phenomena in specific contexts, often through interviews or observation studies (Robson and McCartan, 2016). Qualitative methods are in general flexible, allow exploration, and allow for interaction between the researcher and participants. Due to the complexity of data collection and specific settings, qualitative studies tend to include fewer participants and produce less generalisable results than do studies using quantitative research methods. Quantitative research methods, such as surveys, allow for larger and broader study samples that create distance and objectivity between the researcher and the participants (Bell et al., 2022). The data collected through these methods often focus on what the participants do or say regarding the studied subject, while the circumstances around the actions or statements can be harder to comprehend. It is often less complicated to replicate or follow up quantitative studies since they in general are less context dependent and explore causal relationships among concepts and variables that can be statistically analysed and compared.

3.1.1 Overall research design

This thesis builds on four main sequential studies, all conducted within external research projects that provided the empirically explored phenomena. By applying the business model innovation for sustainability perspective to these phenomena, the studies connect perceptions of WREMs among agricultural business managers with BMIpfS initiation through government-affiliated facilitation (Figure 1). The figure shows how the studies were derived, applying an inductive approach (studies 1 and 2) and a more deductive and explorative approach (studies 3 and 4).

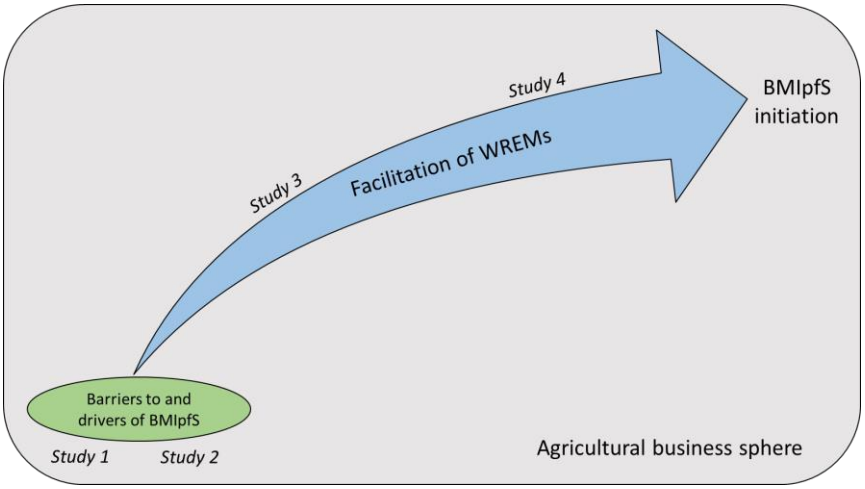

Figure 1. *Thesis research design showing how the studies are interrelated, applying an inductive approach (studies 1 and 2) and a more deductive and explorative approach (studies 3 and 4).*

The first study is a qualitative interview study that inductively explores agricultural business managers' incentives for taking on more long-term and high-effort WREMs and committing to value capture of sustainability-related measures. The second study builds on the first by broadening the business perspective on WREMs in an agricultural business setting, investigating drivers of and barriers to sustainable value creation and their connections to BMIpfS initiation. The third study is quantitative and was conducted through a survey that more deductively explores how opportunities for sustainable value creation and business model innovation through WREMs could be facilitated to align with the agricultural business concerns that emerged in the first two studies. Finally, the fourth study is a qualitative interview study taking a more applied approach to better understand how the facilitation of WREMs can be structured and organised to promote BMIpfS initiation in agriculture, including more long-term value capture that is aligned with societal sustainability targets.

3.2 Data collection and analysis

The primary data for this research were collected through four separate studies: three interview studies and one survey study. Secondary data, such as research studies, reports, observations of meetings, field visits, newspaper articles, and websites, complemented and validated the primary data (Creswell and Creswell, 2017). The data collection is summarised in Table 1.

Table 1. *Summary of data collection for the thesis.*

Data source	Data type	Data collected	Topic analysed
Open-ended interviews	Recorded audio material, transcribed	15 interviews – 690 minutes in total	Business managers' incentives for wetland construction on agricultural land
Semi-structured interviews	Recorded audio material, transcribed	10 interviews – 275 minutes in total	Business managers' barriers and drivers for initiating the BMIpfS in relation to WREMs
Baseline and follow-up questionnaire	Completed questionnaires	255 completed baseline questionnaires, and 136 completed follow-up questionnaires	The facilitative role of government-affiliated intermediaries in WREMs and BMIpfS initiation
Evaluative interviews	Recorded audio material, transcribed	22 interviews – 1095 minutes in total	Strategic aspects of government-affiliated intermediation for the facilitation of WREMs

3.2.1 Interviews

Sustainability-oriented business changes, such as the BMIpfS, are complex phenomena that often require an inductive and qualitative research approach (Lüdeke-Freund and Dembek, 2017; Schaltegger et al., 2016). Interviews often lead to empirical findings based on deep interactions with respondents, which can be of particular relevance when business sustainability is in focus (Bocken and Bogaert, 2016; Geissdoerfer et al., 2018). To make sense of the data, the analysis should simultaneously accurately represent the respondents and the settings where the interviews are performed, as well as convey meaning to other researchers and stakeholders in society (McCusker and Gunaydin, 2015). To make the results available to others, qualitative data analysis uses numerous processes to produce meaningful and representative content from the collection of real-

world data about respondents' views and situations (Bernard et al., 2016). Usually, these processes first involve transforming observations, conversations, and experiences into text (Robson and McCartan, 2016). Guided by the aim of the study, the second step is to find meaning in the material by categorising the data, identifying repeated patterns, and coding the material to reflect certain aspects, such as opinions, expressions, habits, or actions (Bernard et al., 2016). Finally, after comprehensive coding, the qualitative data analysis often results in conceptual models or categories of higher meaning that represent the key aspects of the overall findings. These representations often also highlight the interrelations among presented concepts, the connections to known theory, and the usefulness of the results in a broader setting (Creswell and Creswell, 2017).

Interview 1

The first interview study was conducted with open-ended interview questions to allow for a wide range of possible answers and to encourage the respondents to provide in-depth answers (Bell et al., 2022). Such an open approach can lead to new understandings, here based on the business managers' own stories, and is suitable when new perspectives are needed in a research area (Dellve et al., 2002). In such a way, the interviews allowed the business managers, without being influenced by preconceptions, to describe their incentives to commit to WREMs and construct wetlands on their agricultural land. The respondents were chosen using strategic sampling to ensure that a variety of business managers' experiences were captured and a comprehensive set of data obtained (Bell et al., 2022). The interviews were analysed consecutively and constant comparisons were made across the data and notes throughout the process, sequentially developing and verifying the emerging models. The study was closed when saturation was reached, i.e., when new data did not give further insights (Goulding, 1998).

The interviews, which were audio recorded, were all conducted by the same researcher. The material from each interview was transcribed and coded, i.e., important concepts and statements were identified. The coding was performed by the interviewing researcher and one additional researcher, working separately. The separate codings were compared, and the meaning of the codes discussed jointly. After seven interviews, an initial model with categories emerged from the coded material (Dellve et al., 2002). These categories were tested through five additional interviews. After the coding of the additional five interviews, categories were developed and modified until they reflected the complete interview material. To verify the model and confirm that saturation had been reached, three additional interviews were performed. Six categories connected to business managers' incentives were identified from the analysed material and presented in a model of preconditions leading to WREM commitments.

Interview 2

In the second study, data were collected through semi-structured telephone interviews. The respondents were selected using strategic sampling and the interviews featured topics that addressed drivers of and barriers to BMIpfS initiation through sustainable value creation from WREMs (Bansal, 2003; Rauter et al., 2017). The semi-structured questions included informative questions about, e.g., farm size and farming activities, complemented by questions allowing respondents to talk freely about the topics they perceived to be most relevant (Galletta, 2013; Marshall and Rossman, 2016). Telephone interviews, rather than face-to-face interviews, were used due to the geographic distance between the interviewing researcher and the managers. In addition, telephone interviews enable "mobile interviewing", which are interviews conducted with respondents who are on the move. This less formal way of performing interviews is intended to encourage the respondent to speak more freely (Brown and Durrheim, 2009). All interviews were digitally recorded and transcribed verbatim.

A qualitative thematic content analysis (Elo and Kyngäs, 2008; Graneheim et al., 2017) was used to identify patterns, similarities, and differences in the agricultural business managers' perceptions of drivers and barriers connected to BMIpfS initiation. This analytic method is used to interpret data at different levels of abstraction (Graneheim, 2004; Kondracki et al., 2002): the manifest level (i.e., the content aspect of the text that describes visible and obvious components) and the latent level (i.e., the relationship aspect that involves the interpretation of underlying meanings of the text). Using stepwise replication (Anney, 2014), the interviewing researcher and a fellow researcher independently analysed the data to enhance the research credibility. In the analysis, meaning units (i.e., words, sentences, and paragraphs) that had the same meaning, content, and context were identified. From this, a holistic organisation of latent meanings into categories and themes emerged from the interview data (Stemler, 2000).

Interview 3

The third interview study aimed to better understand how facilitation through government-affiliated intermediation can be structured to promote BMIpfS initiation, including more long-term value capture from WREM commitments. Due to the need to identify structural aspects related to the introduction and practice of the intermediation, this interview study was performed using an evaluative research approach. An evaluative approach is common when new innovations, policies, and practices are introduced and experiences of their introduction need to be gathered and assessed (Robson and McCartan, 2016). Respondents from three stakeholder groups were strategically sampled, and they participated in several interviews distributed over a period of one year. The interviews were digitally recorded and based on semi-structured questions, allowing the interviewees to talk freely and the researcher-interviewer to ask clarifying follow-up questions (Galletta, 2013).

The empirical data material was analysed using qualitative content analysis to identify patterns, similarities, and differences in the interviewees' perceptions of the introduction and working structure of the government-affiliated intermediaries (Elo and Kyngäs, 2008; Kvale and Brinkman, 2014). Important concepts and statements were identified for each interview and stakeholder group, which then were merged to create a holistic organisation of the results. To enhance the research credibility, the results underwent member checks (Anney, 2014; Lincoln and Guba, 1985). Member checks are commonly used to process qualitative data and means that the "data and interpretations are continuously tested as they are derived with members of the various audiences and groups from which data are solicited" (Guba, 1981, p. 85). The government-affiliated intermediaries and the project management group took part in analysing the results, discussing interpretations to avoid misinterpretations of the data material. They were also able to further nuance some of the results until five aspects emerged of special importance for the facilitation of WREMs through government-affiliated intermediaries.

3.2.2 Survey

Surveys are generally used to investigate certain aspects or characteristics of a population, or to test hypotheses or statements about relationships in a population (Creswell and Creswell, 2017). The aim of a survey is to find representativeness in a sample of people who are assumed to have relevant information about a specific topic and can represent a whole population (McCusker and Gunaydin, 2015). This means that surveys are particularly useful for studying large populations in which, for practical reasons (e.g., time and resource restraints), it becomes impossible to include all members in a study (Robson and McCartan, 2015). Data collection from large populations is commonly performed using questionnaires (McCusker and Gunaydin, 2015). Questionnaires are lists of different types of formal questions or statements directed to a selected sample population of a study. Open-

ended questions ask the respondents to freely dictate their answers, and qualitative data analysis is often applied. Closed-ended questions urge the respondents to select among multiple choices or to rank their responses on different scales, and these answers are often processed and compared using various descriptive or inferential statistical analyses (Robson and McCartan, 2015). Questionnaires can reduce researcher bias, since the researcher is less likely to influence the answers and, unlike in interviews, the respondents can take their time and consider their answers (Barnham, 2015).

Questionnaire

In this thesis, a questionnaire was used to better understand how opportunities for sustainable value creation through WREMs could be facilitated to align with the business concerns of agricultural business managers. A questionnaire was chosen as a suitable data collection method since a fixed design that could be distributed to over 600 business managers was required. The sample population was selected through purposive sampling, guided by the aim of the study (Robson and McCartan, 2015). A key advantage of purposive sampling is that generalisations are more easily created than from a random sample as long as there is awareness of possible selection biases that can challenge representativeness (Creswell and Creswell, 2017). The questionnaire consisted of questions in different formats, i.e., ranking, open-ended, and multiple-choice question/statement formats (Robson and McCartan, 2015). It was carried out as a longitudinal study, with a baseline questionnaire and a one-year follow-up. To strengthen validity and increase the clarity of the questions/statement formulations in this study, three individuals reviewed the final draft of the baseline questionnaire and provided feedback on the content (Taherdoost, 2016).

The data were analysed statistically; the researcher and one additional researcher conducted independent analyses of the data and performed stepwise comparisons to increase research reliability (Anney, 2014). The results from satisfactorily completed and returned questionnaires from the sample (i.e., respondents who took part in the study both before and after the intervention) were analysed in IBM SPSS Statistics 24 software. The questions used different types of scales (i.e., nominal, ordinal, and continuous) with different properties (i.e., binary, normally distributed, and not normally distributed), determining the treatment of the data and the choice of statistical methods (Field, 2018). The main outcome variable, i.e., whether the respondent planned to implement any WREMs within the next five years, was divided into three categories depending on degree of commitment (i.e., short-term, semi-term, and long-term commitment) and was treated as binary (i.e., not planning/planning). Perceptions of possible motives for WREMs and perceived needs for support were measured using several items responded to with 5-point ordinal scales. Principal component analyses with Varimax rotation were used to identify dimensions, and Cronbach's alpha tested the internal reliability of the items comprising each dimension. Paired t-tests were used to test changes between baseline and follow-up. Logistic regressions were used to explore the impact of factors identified as relevant to the likelihood of WREM implementation in the respondents' plans for the next five years.

3.3 Assessing the research quality

In research, it is important to achieve trustworthy results of high quality. Analytical errors and researcher bias should be avoided to ensure a fair representation of the studied phenomena. Quantitative research is often validated through repeated replication in which the validity and reliability of the research can be confirmed or questioned based on the success of the replications (Robson and McCartan, 2015). The trustworthiness of qualitative research can, however, be more difficult to assess. This is partly because it is in the nature of qualitative research to look for meanings, explanations, and patterns rather than measurable results. Consequently, there is no general agreement on how to ensure that qualitative data analysis methods can produce the right

answers (Marshall and Rossman, 2014). Moreover, qualitative studies are difficult to replicate due to the ever-evolving perceptions of respondents and changes in the settings that surround them. The likelihood of respondents from an original study saying the exact same thing if asked again later is considered weak (Marczyk et al., 2010). In critical realism ontology, the results of research will always have a certain bias depending on worldviews, cultural experiences, and personal backgrounds (Danermark, 2019). However, there are various methodological aspects a researcher can conform to in making the data collection and analysis as structured and replicable as possible, and able to withstand the evaluation of quality and trustworthiness. This thesis uses four research evaluation criteria: credibility, transferability, dependability, and confirmability (Lincoln and Guba, 1985).

3.3.1 Credibility

The credibility of a study addresses the link between the respondents' views and the researchers' representation of these views (Lincoln and Guba, 1985) – in other words, the confidence in the research findings. There are several actions that a researcher can take to increase the credibility of their research, for example, peer debriefing, researcher triangulation, and member checks. Peer debriefing means that the researcher gets feedback on their research from other researchers. One example of peer debriefing connected to this thesis is the continuous supervision in which the study design, data analyses, and results have been discussed and scrutinised; another is feedback from and discussions with scholars and stakeholders about results presented at national and international conferences, as well as through review processes. Researcher triangulation means that two or more researchers who are working on the same study perform multiple analyses and/or reach separate conclusions that are then compared and merged (Nowell et al., 2017). This was done in the first two interview studies, in which the researcher and one additional researcher independently performed the analyses using stepwise comparison until a holistic result emerged. Another example is member checks which is based on confirmation of the data interpretation from the respondents (Lincoln and Guba, 1985). Member checks were used in the last study and allowed the respondents to take part in interpreting the preliminary results of their interviews and discuss interpretations to avoid misinterpretations of the data material.

3.3.2 Transferability

Transferability refers to the level of applicability of results in other contexts with other respondents (Anney, 2014). It is used to judge whether and, if so, to what extent the results of a study are applicable in other contexts, circumstances, and settings. To strengthen this, the researcher is responsible for providing thick descriptions of the research method, data collection, and analysis. In this way, other researchers who seek to transfer the results to different settings can make a judgment about whether they are likely to apply in other possible contexts (Nowell et al., 2017). The papers that are included in this thesis all provide thorough descriptions of the issues studied, methods used, context, and participants. Moreover, the use of strategic sampling, as in all the present interview studies, ensured a representative and diverse range of participants who could offer different perspectives and experiences (Lincoln and Guba, 1985). By capturing a broad range of views and contexts in the studies, the potential for transferability to other contexts and settings increases.

3.3.3 Dependability

Dependability indicates the consistency of a study. Through logical, traceable, and clearly documented research processes, a study becomes repeatable by other researchers and its dependability can be judged (Creswell and Creswell, 2017). Dependability also refers to the stability and consistency of the research over time, if it is repeated by the same researcher examining the same phenomenon on several different occasions (Lincoln and Guba, 1985). Dependability is

confirmed if the data collection and the interpretations support the findings. Audit trails and stepwise replications are two ways to ease evaluation of dependability (Nowell et al., 2017). An audit trail provides documentation of the decisions and choices made by the researcher regarding theoretical and methodological issues throughout the study. Based on this documentation, it is possible to trace the data collection and analysis process to ensure that no alternative interpretations were left unexamined and that no biases had avoidable influence on the results (Tobin and Begley, 2004). Moreover, stepwise replication done by several researchers in parallel processes can be used to confirm a study's dependability. Stepwise replication was used in three of the studies of this thesis. These were complemented by discussions in the research group in which the research process was continuously reflected on and discussed. The discussions encouraged a self-critical view of the entire research process, and discussions of values, interests, and insights enabled awareness of personal reflections and possible bias (Lincoln and Guba, 1985).

3.3.4 Confirmability

The confirmability of a study indicates its objectivity or the degree to which its findings are influenced by the respondents rather than by the researcher's motivations or interest (Nowell et al., 2017). In other words, confirmability is a way to establish that the researcher's interpretations and findings are derived from the data, which requires the demonstration of how conclusions and interpretations have been reached (Tobin and Begley, 2004). Presentations of theoretical, methodological, and analytical choices throughout the research process will also improve the understanding of how and why research decisions were made. Guba and Lincoln (1989) state that confirmability is established when the three previous evaluation criteria – i.e., credibility, transferability, and dependability – are all achieved. Several measures were taken to ensure objectivity in this thesis. All interview questions were tested on individuals with rich knowledge of, but not participating in, the studies. The questionnaire underwent rigorous tests in which experts in the field commented on the questions before they were tested in a pilot study. Member checks were used in the last study, which allowed the respondents to take part in interpreting preliminary results and discuss interpretations to avoid misinterpretations of the data material. All these processes strengthened the collected data material and the confirmability of the findings.

3.4 Ethical considerations

Before each study, the intended participants were sent written information about the purpose of the study, their voluntary participation, how the collected data would be treated, and how the results would be presented. Prior to each interview, all interviewees were informed about the purpose of the study, that their participation was voluntary, that all data would be anonymised, and that they could decline participation before or during the data collection. At the time of data collection, the information was repeated, and the participants were told that they could withdraw from the interview at any time. Afterwards they were invited to take part in presentations and read reports of the results. With the questionnaires, each respondent received a letter explaining the purpose of the study, that their participation was voluntary, and that all data would be anonymised. Through their participation and by returning completed questionnaires, the participants were assumed to have agreed to participation. They could, however, call and withdraw from participation before the data analysis commenced. At the end of the study, the participants were invited to take part in presentations and read reports of the results.

All data were treated confidentially. Participants were assigned identification numbers, which were used in all interview transcriptions and survey analyses to ensure anonymity.

4 Results

This chapter summarises the findings of the four appended papers that make up the foundation of this thesis. It explains how the papers relate to one another and how their integration contributes to the main findings of this thesis. The main findings are synthesised in a framework that concludes this chapter.

4.1 Summary of appended papers

Paper 1. Landowners' incentives for constructing wetlands in an agricultural area in south Sweden

Published in Journal of Environmental Management, 2012, No. 113, pp. 271–278.

This paper responds to the first research question: What are the agricultural business managers incentives to take on more long-term and high-effort measures to maintain and provide ecosystem services associated with WREMs?

In Sweden, the eutrophication of the Baltic Sea has led to the initiation of government schemes aiming to increase wetland areas in agricultural regions and thereby reduce nutrient transport to the sea. Landowners play a significant role as providers of this ecosystem service and are currently offered subsidies to cover costs of constructing and maintaining wetlands. Legislation and regulations are common societal tools with which to direct agriculture towards pro-environmental activities. However, previous studies have found a strong demand among agricultural business managers for self-regulation, and external regulations are commonly not supported, especially not for measures such as wetland construction that are perceived as beyond taking care of one's own pollution. Agri-environmental schemes with the aim of encouraging agricultural business managers to create wetlands on their land have led to an increase in the number of constructed wetlands, but the creation rate needs to intensify significantly to meet environmental targets.

The drive for increased wetland creation, and the need to find landowners willing to make long-term commitments, together with the lack of verifiable knowledge of landowners' motives for making such large changes, initiated the study presented in this paper. Its objective is to describe reasons for taking high-effort actions to provide ecosystem services asked for by society. More specifically, the study aims to identify landowners' incentives to construct wetlands on private land in agricultural areas.

Empirical data were collected through 15 interviews with landowners. Landowners with a minimum property holding of 5 hectares participated in the study. Strategic sampling was used to ensure that a variety of landowners' experiences were captured, and owners of both large and small properties, with or without constructed wetlands, participated. The interviewer used a checklist to confirm that all topics were discussed. The transcribed material from each interview was coded, i.e., important concepts and statements were identified and analysed consecutively, subject to continuous comparison. The coding was performed by the interviewing researcher and one additional researcher, acting separately. The separate codings were compared, and the meanings of the codes discussed jointly. Categories emerged that were tested against additional interviews until new data did not yield further insights.

Six categories connected with landowners' motives for constructing wetlands emerged from the analysed material, and "land management in the best possible way" dominated the landowners' reasoning about factors that could lead them to create a wetland on their land, or not. The results show that adequate subsidies, additional services that the wetland could provide to the landowner, local environmental benefits, sufficient knowledge, and peers' good experiences could encourage landowners to construct wetlands. Perceived hindrances were burdensome management, deficient knowledge, time-consuming application procedures, and unclear effectiveness of nutrient reduction. The main reason for not creating a wetland, however, was that the land was classified as productive by the landowner, i.e., suitable for food production. Their perception was that wetlands could only be considered if the land is unsuitable for food production.

However, creating wetlands only on land now considered unprofitable for agricultural production is probably not enough to meet environmental targets. Although current pro-environmental schemes pay for the construction of a wetland and in some cases also for maintenance, they do not provide a profit, making them unable to compete with food production. This encourages the proposal that schemes directed towards landowners with the aim of providing society with ecosystem services (e.g., nutrient retention by creating wetlands) should not appeal primarily to landowners as individual citizens by referring to the public good and offering only financial compensation. Instead, it would likely be more cost effective if landowners were paid for the amount of nutrients removed by their wetlands, rather than receiving subsidies to cover the costs of wetland construction and maintenance. In other words, it would be beneficial to move from a practice-based approach to a performance-based approach. Therefore, this paper concludes that agri-environmental subsidy systems should turn away from the view of the landowner as an ordinary citizen (i.e., individual landowner) towards a view of the landowner as a professional business manager contracted based on the value that the constructed wetland provides. Specific requirements and a tendering process on regular market terms could give landowners a fair basis for their decisions.

Author contributions

As the first author, I took an active role throughout the research process that led to this paper. Jointly with my two co-authors, the conception and design of the study was formed. I performed most of the material preparation and all the data collection through interviews. The analysis was carried out by me and one co-author, and the results and contributions were discussed among all three of us. I wrote the main parts of the manuscript draft and the co-authors commented on and added aspects to the manuscript, which was finally read and approved by all three authors.

Funding

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Paper 2. Barriers and drivers for sustainable business model innovation based on a radical farmland change scenario

Published in Environment, Development and Sustainability, 2022, pp. 1–24.

This paper responds to the second research question: What are the drivers and barriers, as perceived by agricultural business managers, for the initiation of the BMIpfS and sustainable value creation from WREMs?

The agricultural sector often faces competing pressures: to operate financially profitable businesses, and to create, maintain, and benefit from ecosystem services in their operations. The ecosystem services' significant contributions to agricultural production and human welfare in general make them a valuable part of the global economy, and their valuation could play an important part in securing societal needs for long-term-functioning ecosystems. However, current arable production systems tend to favour value capture from food production at the cost of providing other ecosystem services. This is partly because of a lack of full-cost accounting incorporating the value of ecosystem services linked to their ability to provide public goods or services for which there is no clear market demand, due to their intangibility and long termism. Consequently, agricultural business managers associate the inclusion of sustainability-oriented ecosystem services in business models, as mandated by climate regulations, with uncertain incomes, which can have a negative effect on their decision-making about the provision of ecosystem services that extend past food production. Paludiculture is one example of an activity that can deliver valuable ecosystem services from arable land. It involves the rewetting of peat soils to prevent greenhouse gas emissions and changing to crops that are suitable for wet soil conditions. It exemplifies a radical business activity that allows the provision of ecosystem services previously not captured in agricultural business models, but that might require comprehensive business model changes for their capitalisation.

Sustainability-oriented business model changes can be realised through the BMIpfS. The BMIpfS requires business managers to make strategic decisions related to markets and customers, and to value proposition, creation and delivery, and capture, in order to optimise social and environmental value creation. Through business model changes supported by the BMIpfS, paludiculture could become a sustainable value creating activity for agricultural businesses and their stakeholders (e.g., customers, suppliers, and retailers) by creating financial value from ecosystem services while simultaneously preserving the climate regulating services of the ecosystems, but only if the business managers are willing to commit to the proposed changes.

The intentions of business managers can describe both their current and future business plans for financial success through producing, marketing, and selling goods and services. Business managers base their decisions on cognitive knowledge structures that are used for the assessment and evaluation of business opportunities, and ultimately for business decision-making. They draw conclusions based on perceived barriers and drivers to recognise and seize new sustainable business opportunities. In the context of ecosystem services associated with paludiculture, it can be especially relevant to comprehend their prerequisite of BMIpfS initiation to realise sustainable business activities that require radical changes in current business models.

Greater understanding is needed of business drivers in relation to managerial cognition, behaviours, and decision-making regarding BMIpfS initiation. The aim of this paper is accordingly to further the understanding of barriers and drivers, as perceived by agricultural business managers, for initiating the BMIpfS based on the case of paludiculture. An improved understanding of the interplay between managerial cognition and business decisions, in relation to the inclusion of ecosystem services in

business models, can provide important insights into how to initiate the BMIpfS and support business model changes for increased sustainable value creation.

To address this knowledge gap, a semi-structured interview study was performed among ten agricultural business managers with farmland suitable for paludiculture in southern Sweden. The participants were strategically sampled to meet the inclusion criteria, i.e., agricultural business managers with cultivated peat soils and farmland suitable for paludiculture. The data comprised ten interviews, which were recorded and transcribed. Qualitative thematic content analysis was used to identify patterns and similarities, and these were coded and categorised using stepwise replications.

The analysis of the business managers' willingness to initiate the BMIpfS revealed concerns connected to the inclusion of new ecosystem services in agricultural business models. These business concerns were at their core based on financial considerations that acted as either drivers of or barriers to the initiation of the BMIpfS depending on whether the managers viewed the inclusion of new ecosystem services as business risks or as opportunities. Realising potential value, which has yet to be captured as a driver, and avoiding financial risks as a barrier were reportedly the two factors with the strongest effects on the managers' willingness to initiate the BMIpfS. The results were converted into a conceptual model of factors moderating BMIpfS initiation in an agricultural business context.

The paper contributes to the literature by identifying barriers and drivers that moderate the initiation of the BMIpfS. Although the managers acknowledge the importance of long-term, sustainable social and environmental value creation, they have grave doubts about the profitability of activities connected with the preservation of peat soils and associated ecosystem services. These managers would benefit from taking a more proactive, long-term approach to business model changes for sustainability and from acquiring more knowledge about market demand for sustainability-oriented ecosystem services. The successful facilitation and implementation of knowledge transfer and government subsidies that support ecosystem services could improve profitability based on sustainable value creation. Overcoming cognitive constraints as well as the successful facilitation and implementation of knowledge transfer and government subsidies that support the valuation of ecosystem services could improve the willingness to initiate the BMIpfS even if the change is perceived as radical.

Author contributions

As the first author, I took an active role throughout the research process that led to this paper. Jointly with my three co-authors, the conception and design of the study was formed. I performed most of the material preparation and all the data collection through interviews. The analysis was carried out by me and one co-author, and the results and contributions were discussed among all four authors. I wrote the main parts of the manuscript draft and the co-authors commented on and added revisions to the manuscript, which was finally read and approved by all four authors.

Funding

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Paper 3. Facilitation of water-related environmental measures to support business model innovation for sustainability in agricultural business

Submitted

This paper responds to the third research question: What impact could government-affiliated intermediaries that align business concerns of agricultural business managers with opportunities for sustainable value creation through WREMs have on sustainable business commitments?

As part of sustainability efforts, agricultural businesses can combine efficient food production with sustainable value creation through the implementation of WREMs, such as wetland construction. WREM implementation can be supported through the BMIpfS, which aims to develop business models for sustainability that can capture financial and environmental value from WREMs. Consequently, there are opportunities to develop agricultural business models towards sustainability alongside the creation and maintenance of WREMs for wider benefits and diversification of agricultural business through long-term profitable and sustainable practices.

Agricultural business managers have previously reported that they perceive lack of relevant governmental and advisory support for how to capture value from WREMs and other ecosystem services, which can impede the BMIpfS. There is a gap between the demand for support among agricultural business managers to develop sustainability value creating activities and the ability of the public sector to provide the facilitation needed to make WREMs attractive business commitments. Previous studies show that local governments and municipalities could facilitate the reconfiguration of existing agricultural practices.

To address the motivations and needs for support among agricultural business managers to take on the BMIpfS, the aim of this study is to investigate the facilitative role government-affiliated intermediaries can have in agricultural business plans, motives, and needs to implement WREMs. Furthermore, based on their impact on identified plans, motives, and needs, the aim is also to determine how intermediaries can develop their facilitative activities to support WREM commitments and associated ecosystem services to promote the BMIpfS. By doing so, this study will add new insight into how government-affiliated intermediaries can align the needs of business managers with societal sustainability targets.

Two water management coordinators were recruited as government-affiliated intermediaries in an agricultural area of 85,800 hectares in southwestern Sweden. A baseline and a one-year follow-up questionnaire were used to collect data from 255 agricultural business managers. The questionnaires measured four main aspects – i.e., previously implemented WREMs, planned WREMs, motives for implementing WREMs, and the need for support in realising the planned implementation of WREMs – using ranking as well as open-ended and multiple-choice question/statement formats. The results, which were analysed statistically, indicated that government-affiliated intermediaries can facilitate business model innovation for sustainability by linking and acting upon identified motives and needs of agricultural business managers for committing to more long-term WREMs.

The intermediation seemed to have a positive impact on the willingness of business managers to plan for measures with longer time frames, since the follow-up showed a significant increase in planned semi-long-term WREMs. The importance of intermediation was further emphasised by that previous experience of semi-term measures decreased the likelihood of plans for short-term measures, indicating that once the initiative for WREMs over a longer time frame had been facilitated, managers were more likely to continue committing to more extensive measures. This implies that intermediaries can raise the level of business commitment for sustainable investment, and in

particular promote such initiation to those who do not perceive the benefits of sustainability measures such as WREMs. This means that intermediaries can facilitate the development of business models for sustainability to different extents, that businesses that plan short-term measures can assimilate and integrate sustainability goals into existing business models, while businesses that plan semi-term and long-term measures can adapt and improve existing business models to encompass sustainability principles.

By ranking business managers' motives for committing to WREMs deriving from this study, the intermediation can be rendered more precise. Improved environment was reported as the strongest motive, and a continuous focus on environmental activities should be emphasised, as businesses with an improved environment as their primary motivation for adopting WREMs were more likely than others to plan for future long-term measures with greater societal sustainability value. However, the ranking of needed support shows that governmental support connected to economic, political, and legal aspects (e.g., writing applications for environmental approval and government financing) was ranked much higher in terms of relevance by business managers. This indicates that governmental structures act as important forms of support facilitating new marketable sustainability solutions among agricultural businesses. Such supporting structures could advantageously be developed to align with the financially and operationally driven motives reported by business managers, and intermediaries could support the BMIpfS by fostering an improved understanding of how WREMs could be part of future business models for sustainability.

This paper concludes that facilitation through government-affiliated intermediaries can play an important role in the realisation of WREMs and in promoting the BMIpfS among business managers. Government-affiliated intermediaries can act as a link between marketable solutions created by agricultural businesses and the overarching government structures aimed at both improving the environment and contributing to the global Sustainable Development Goals.

Author contributions

As the first author, I took an active role throughout the research process that led to this paper. Jointly with my four co-authors, the conception and design of the study was formed. I performed most of the material preparation and data collection through surveys. The analysis was carried out by me and one co-author, and the results and contributions were discussed among all five of us. I wrote the main parts of the manuscript draft and the co-authors commented on and added aspects to the manuscript, which was finally read and approved by all five authors.

Funding

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Paper 4. Structuring government-affiliated intermediation to facilitate water-related environmental measures in agricultural businesses

Submitted

This paper responds to the fourth research question: How can government-affiliated intermediation be organised to facilitate BMIpfS initiation including value capture from WREM commitments that align with societal sustainability targets?

Ecosystem services and WREM commitments on agricultural land have an integral role as resources for business and society. They can improve conditions for food production through flood control and irrigation storage, at the same time as they improve the conditions for climate control, eutrophication, and biodiversity. The significant contributions of ecosystem services through WREMs to human welfare make them a valuable part of the global economy. The value provided by ecosystem services from WREMs can be captured directly in agricultural business models through on-farm measures such as wetland construction on farmland for water regulation and irrigation purposes, in order to improve yields and revenue. They can also be valued at an off-farm societal level, as WREMs in most cases improve conditions for ecosystems, biodiversity, and climate control. Due to the diverse values of WREMs, the implementation pace needs to increase. However, the interest among business managers in implementing WREMs does not correspond to the implementation needs. Part of the explanation is that agricultural business managers perceive the benefits connected with WREM commitments as unclear both regarding their environmental contributions and as business advantages, especially since they also connect WREMs with burdensome management, time-consuming application processes, and impeded food production.

Current agri-environmental programmes have mostly focused on compensation to cover costs related to practical WREM implementation, such as construction costs. Future support could be more successful if it highlighted the long-term business benefits of WREM commitments, such as improved water management for increased crop production or reduced nutrient leakage. In this way, the business managers could become more aware of the positive effects WREMs could have on their production and of how WREMs can be integrated with food production and thereby in value creating and capturing activities in their business models. The concept of intermediation is often used to help business with innovation processes to obtain important and novel ideas, resources, and expertise to promote sustainability actions. Governments are in a favourable position to assess the local situation, identify needs and resources, and develop partnerships with stakeholders. Through intermediation, they can efficiently identify common problems and relevant issues for local projects and help to manage business opportunities based on the implications of national and regional policies.

Research is, however, scarce on government-affiliated intermediation of WREM commitments, especially in connection with financial business aspects, and the novelty means that there is a need to gather experience from the work structures and practices of such intermediation initiatives. To fill this knowledge gap and advance our understanding of the structures and roles of government-affiliated intermediation, this study evaluates the introduction of intermediaries appointed to facilitate high-effort WREM commitments in agricultural businesses. The aim is to identify structural aspects of efficient government-affiliated intermediation intended to facilitate the development of sustainable agri-environmental business activities through WREMs.

The study was performed using an evaluative research approach within a project for the local promotion of WREMs in southwestern Sweden where a project management group appointed two government-affiliated intermediaries to promote various WREM commitments to agricultural

business managers. A qualitative method based on a total of 21 interviews divided among three different groups (i.e., project management, two government-affiliated intermediaries, and ten agricultural business managers) over one year was used to collect the data. The data were analysed using qualitative content analysis to explore higher meanings and give a representation of key aspects of the overall findings. The method involved the identification of patterns, similarities, and differences among the interviewees' perceptions, which resulted in the identification of five key aspects of the structure and practice of the government-affiliated intermediation. The first two aspects comprised the way the intermediation was developed and structured as "intermediation in synergistic teams" and working with "stakeholder cooperation and networking". The third aspect was a "knowledge-sharing platform" to gather and share knowledge and experience with other intermediaries and stakeholders for WREM implementation from a long-term perspective and on different societal levels. The last two aspects comprised the practice of facilitation and the importance of "support from idea to implementation" and of adopting a "needs-based approach".

The evaluation of the structural aspects of the government-affiliated intermediation in this paper shows that it played an important role in facilitating WREMs, throughout the implementation process and beyond. By providing support and knowledge matching the needs of agricultural business managers, the intermediation allowed business managers to make well-informed autonomous decisions based on the assessment of environmental efficiency and business considerations. The intermediaries' working structure displayed great potential to support the development of a market for on-farm benefits as well as off-farm societal benefits obtained through performance-based outcomes of and payments for ecosystem services from WREMs. Such a development would address the business managers' concerns about how off-farm sustainability benefits can be created and captured as value in agricultural business models, acting as a strong incentive for the increased implementation of high-effort WREMs in the future.

This paper concludes that for successful government-affiliated intermediation, it is important to support and develop structures that enable: (i) WREMs that include synergy between environmental and business aspects from a long-term perspective on value creating and capturing activities; (ii) flexible approaches adapted to business managers' needs, that promote autonomy, trust, and a sense of control; and (iii) structured collaborations and networks for knowledge exchange between stakeholders on different societal levels.

Author contributions

As the single author, I formed the conception and design of the study and discussed it with my research group. I performed the material preparation and data collection through interviews. The analysis was carried out by me and then discussed both in my research group and with the participants in the study. I wrote the manuscript on which I received feedback from my research group.

Funding

This study was partially funded by the LEVA initiative (Local Engagement for Water in Halland 2018–2021) financed by the Swedish Agency for Marine and Water Management, Grant 1:11 Measures for sea and water environment.

4.2 Integration of main results

The results of this thesis show how WREM commitments and the initiation of the BMIpfS could be facilitated to promote sustainable agricultural business activities that align business managers' value intention with societal sustainability targets.

4.2.1 Value intention in a pre-initiation phase

By identifying incentives for WREM commitments in the first paper, a foundation for the understanding of the value intention prior to the initiation of the BMIpfS was created. The incentives for more high-effort and long-term WREMs are clearly connected to the business aspects of agriculture. The business managers identify as producers of value mainly based on food production supplemented with some, often more low-effort or short-term, environmental efforts outside the core of the business models. If WREM commitments are to be considered to a greater extent, they need to be incentivised through business aspects that connect to or become part of the core business, such as creating and capturing value by maintaining sufficient yields over dry periods using irrigation water from wetlands. A main outcome of the first paper was the importance of business managers themselves as well as authorities and other stakeholders identifying agricultural management regarding WREMs and other ecosystem services for the common good as part of the core business, i.e., as value creating and capturing activities in the business model. In such a way, the identity of the business managers as producers can be met while also evolving to include sustainability value.

The results of the second paper advance the understanding of business managers' incentives through the exploration of barriers to and drivers of WREM commitments in light of business model innovation for sustainability. It presents moderating factors that can support or undermine the initiation of the business model innovation process. The identified barriers and drivers shed light on the pre-initiation phase of the BMIpfS, showing how it affects the value intention towards the BMIpfS among the agricultural business managers. Moreover, they bring clarification as to how business managers recognise WREM commitments' role in realising uncaptured value for diversifying and strengthening the value proposition, as well as the importance of taking responsibility for the long-term sustainable management of natural resources. However, the results also show how the managers have grave doubts about the profitability and practical benefits of activities connected to WREM commitments and associated ecosystem services. Furthermore, they highlight the reactive approach taken by many business managers, who are cautious about changes in revenue streams and prefer to maintain business-as-usual. Consequently, the business managers need support to actively respond to long-term sustainable value creation and capture value from these activities.

4.2.2 Facilitation of value intention towards BMIpfS initiation

The impact of the identified support needs of business managers prior to BMIpfS initiation is evaluated in the third paper in terms of the facilitation of more proactive and more long-term WREM commitments. This adds to the understanding of the government-affiliated intermediaries' role in facilitating sustainable business changes, and thus in the process of business model innovation for sustainability. For one year, the government-affiliated intermediation provided expert advice, knowledge transfer, and resource mobilisation, which were connected to the business managers' value intention explored in the first two papers. The facilitation resulted in more long-term and high-effort WREM commitments by meeting motivations for achieving, e.g., an improved environmental profile to contribute to societal environmental needs, increased income, decreased costs, and expansion of the production and value proposition to increase competitiveness. Even though the facilitation resulted in more planned WREM commitments, the results also showed that business

managers still associated WREMs with marketable value creating activities to a lesser extent than with positive societal or practical environmental activities. This emphasised the need to further explore and identify structural aspects of efficient government-affiliated intermediation intended to facilitate the development of sustainable agri-environmental business activities through WREMs.

Following on the findings of the first three papers, the fourth paper focused on how the facilitation through government-affiliated intermediation could be structured and developed to increase business sustainability. By identifying structural aspects of special importance for the intermediation it gives a contextual understanding of facilitation that could lead to new marketable sustainability activities in the BMIpfS. The results conclude that the intermediation should include synergies of environmental and business aspects from long-term perspectives, allow flexible approaches adapted to business managers' needs, promote autonomy and value creating activities, and aim for structured collaboration and networks for knowledge exchange between stakeholders on different societal (local, regional, national) levels. The need for flexibility that emerged in these results highlights how the facilitation established through intermediation between the business managers' incentives and the business development in line with societal sustainability targets develops in iteration. The facilitation thus affects and is affected by both the structural aspects as well as the desired outcomes of the process, and through these constant adjustments, government-affiliated intermediaries could maintain and increase sustainability commitments among business managers.

4.2.3 Framework

A framework (Figure 2) has been developed to illustrate the connections among the results of this thesis. The results can be divided into two main findings that address the aim of exploring how the facilitation of WREMs can support the BMIpfS through an improved understanding of (i) the value intention of agricultural business managers and (ii) how government-affiliated intermediaries can facilitate the process initiation.

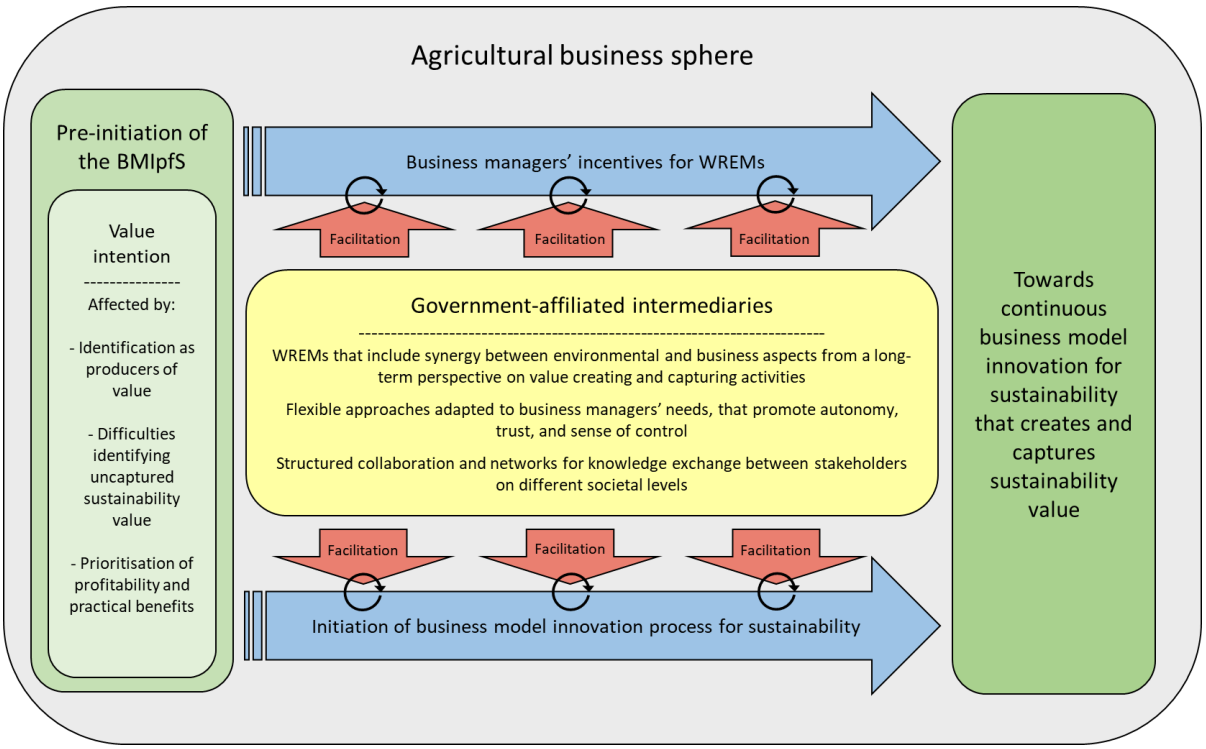

Figure 2. *A framework of BMIpfS initiation through facilitation of WREMs based on business managers' value intention prior to the initiation.*

Pre-initiation of the BMIpfS

First, the framework illustrates how business managers' incentives for sustainability activities are part of the pre-initiation conditions of the BMIpfS through the value intention of business managers. The pre-initiation of BMIpfS include the value intention clarified as (i) identification as producers of value, (ii) difficulties identifying uncaptured sustainability value, and (iii) prioritisation of profitability and practical benefits.

These results emphasise the importance of an improved understanding of value intention as part of pre-initiating conditions for the BMIpfS. The value intention can act as a foundation on which agricultural business managers base their initiation of the BMIpfS. Part of the value intention comprises incentives for sustainability business activities (e.g., WREM implementation) among business managers and is affected by perceptions of various barriers to and drivers of sustainability business change decisions.

Facilitation through government-affiliated intermediaries

Second, the framework illustrates how facilitation through government-affiliated intermediaries, with the value intention of business managers as a foundation, could support BMIpfS initiation if aligned with business managers' incentives for sustainability activities. The government-affiliated intermediation is explained as comprising structures and activities to promote: (i) WREMs that include synergy between environmental and business aspects from a long-term perspective on value creating and capturing activities; (ii) flexible approaches, adapted to business managers' needs, that promote autonomy, trust, and sense of control; and (iii) structured collaboration and networks for knowledge exchange between stakeholders on different societal levels.

These results advance the understanding of the role of facilitation in sustainability business change decisions. They emphasise how facilitation that adapts and evolves iteratively in line with the needs of business managers (illustrated by circular arrows in the framework) can act as a catalyst for the BMIpfS. This results in a simultaneous process that links the incentives of business managers and BMIpfS initiation together through facilitation that is continuously adjusted to promote activities that create and capture sustainability value from WREMs in alignment with societal sustainability targets.

5 Discussion

In this chapter the main findings of the thesis are discussed in relation to the research aim and previous knowledge. The chapter also presents the main contributions of the thesis to the literature and practice and offers suggestions for future research. At the end, this chapter gives some concluding remarks that position the findings of this thesis from a more general perspective.

The overarching aim of this thesis is to explore how the facilitation of WREMs can support the BMIpfS through an improved understanding of (i) the value intention of agricultural business managers and (ii) how government-affiliated intermediaries can facilitate the process initiation. The results of this thesis highlight the role of value intention as part of the pre-initiation of the BMIpfS. It also shows that the barriers and drivers that precede the adoption of sustainability activities are important parts of the value intention concept, creating pre-initiating conditions for the BMIpfS. Based on the value intention of business managers, the facilitation of WREMs and associated ecosystem services can be structured to align business managers' concerns with opportunities for sustainable value creation and capture. It especially highlights the impact of government-affiliated intermediaries on more long-term sustainable business commitments and how intermediaries could be structured to facilitate WREMs in order to support BMIpfS initiation.

The results are discussed based on the two main findings, as they are connected in the framework of BMIpfS initiation through the facilitation of WREMs based on business managers' value intention prior to the initiation (Figure 2). In section 5.1, the results are discussed from a pre-initiation perspective of the BMIpfS, with a focus on aspects that make up the value intention of agricultural business managers' sustainable business change decisions through an exploration of incentives, barriers, and drivers. In section 5.2, the discussion continues by addressing the facilitation of sustainable value capture to support innovation processes, especially facilitation structured as government-affiliated intermediation of BMIpfS initiation through activities that align the incentives of business managers with societal sustainability targets.

5.1 Value intention as part of the pre-initiation of the BMIpfS

The discussion of value intention as part of the pre-initiation of the BMIpfS responds to the first and second research questions:

RQ1: What are the agricultural business managers incentives to take on more long-term and high-effort measures to maintain and provide ecosystem services associated with WREMs?

RQ2: What are the drivers and barriers, as perceived by agricultural business managers, for the initiation of the BMIpfS and sustainable value creation from WREMs?

Incentives for more high-effort and long-term WREMs are clearly connected to business aspects and opportunities for value creation and capture identified by the business managers, as shown by the results reported in the first paper. Business managers mainly identify as producer of value based on food production, emphasising the need to apply a business perspective to environmental sustainability activities on privately owned farmland, as previously explored by e.g., Franzén et al. (2016) and Nebel et al. (2017). The agricultural business managers view WREMs as unprofitable add-ons and have doubts about both the profitability and practical benefits connected to them. These

results further demonstrate the importance of identifying opportunities for sustainable value creation and capture (e.g., combining the provision of ecosystem services such as nutrient retention and climate mitigation in wetlands with the irrigation of crops to increase yields), as previously called for (Johansson et al., 2015; Swaffield et al., 2019; Yang et al., 2017a). The importance of identifying value opportunities in connection with sustainability is further emphasised by uncertainties about how to capture value from WREMs in agricultural business models. These uncertainties impede the managers' production- and profit-related incentives, causing a reactive approach to WREM implementation. This enhances their view of WREMs as an add-on and not a core business activity and, as shown by Long et al. (2018), this could lead to business managers implementing WREMs without consciously altering their business models. Furthermore, the reactive approach implies that the agricultural business managers are more likely to act in response to external support than create their own sustainability strategies (Van Tulder et al., 2013), which emphasises the need to offer such support for sustainable business change decisions.

The second paper clarifies the barriers to and drivers of WREM commitments that could be used to support agricultural business managers' sustainable business change decisions and thus promote BMIpfS initiation. Financial risk avoidance by a continuous focus on business-as-usual was identified as the main barrier. It was complemented with barriers connected to the unclear sustainability benefits of business changes and to restrictions based on the desire to focus on traditional value creation through food production. The main driver of business sustainability relates to the realisation of uncaptured value. This driver was complemented with drivers that entail taking wider business responsibility beyond food production, diversifying the business model, and preserving natural resources through sustainability activities.

The identification of barriers and drivers answers the call of Testa et al. (2022), who identified a gap in the knowledge of what internal factors are the most important to drive business managers towards innovation with a sustainability focus, particularly when the aim is to first initiate the innovation process. The findings especially add to the research on sustainable business model innovation of Bocken and Geradts (2020), who identified barriers to uncertainty avoidance that concern a focus on maximising profits and avoiding financial risks. Since they apply a shareholder perspective, the findings of this thesis add new insights from the perspective of small business, in which business managers and owners are often the same persons, which removes the pressures of external shareholders. They also identified drivers reflecting the need to look beyond shareholder value and include societal needs as a way to embrace organisational resilience. Those drivers are further nuanced by the drivers reported here, which illustrate considerations regarding a more generational business responsibility, specifically in relation to the area-specific natural resources that primary production, such as agriculture, depends on.

The barriers and drivers bring a new understanding of how sustainable businesses activities can be incentivised to agricultural business managers. This makes the barriers and drivers part of the value intention, which has been identified to explain the intention of business managers in conducting business, i.e., the intention of the business model (Barth et al., 2017; Sinansari et al., 2022). The results answer a call for more knowledge of what aspects constitute the value intention among agricultural business managers and of the role value intention could play in the BMIpfS (Bocken et al., 2014; Miranda et al., 2023; Pan et al., 2023). The value intention concept is nuanced by the results of this thesis, which adds three overarching aspects that are included in the value intention, clarified as: (i) identification as producers of value, (ii) difficulties identifying uncaptured sustainability value, and (iii) prioritisation of profitability and practical benefits, as illustrated in Figure 2.

First, the value intention concept emphasises the importance of addressing agricultural business managers in a way that aligns with their identification as producers of value, not just adopters of agri-environmental programmes, as implied by current systems. This is supported by Ulvenblad (2023) and Björklund (2018), who explain the concept as addressing the entrepreneur, not just the farmer. This means that WREMs and other sustainability activities should be motivated through their abilities to deliver financial value to the business, as a complement to the ecological and societal benefits the agri-environmental programmes target.

Second, the value intention stresses the difficulties of agricultural business managers in identifying uncaptured sustainability value, which emphasises that the managers need support to understand how value connected to WREMs and other ecosystem services can be captured in their business models. Without such support, they can miss value opportunities and primarily consider short-term sustainability measures with smaller impacts on the business, resulting in small advances towards societal sustainability goals, as shown by previous research (Alvarez et al., 2016; Broccardo et al., 2023; Graversgaard et al., 2021; Hefting et al., 2013; Yang et al., 2017b). Furthermore, long-term measures can be regarded as barriers poorly aligned with the managers' value intention due to the financial risk avoidance connected to the perceived uncertainties of those measures. Since agricultural business managers have a strong sense of autonomy and voluntary measures thus have proven most successful with them (Emery and Franks, 2012; Macdonald and Johnson, 2000; Toma and Mathijs, 2007), it is important that long-term measures become aligned with their value intention and that the managers are supported in market development for a wide range of sustainability value.

Third, the value intention concept clarifies the business managers' prioritisation of profitability and practical production-related benefits over measures performed for the greater good. The findings show that many business managers have a positive view of sustainability and perform various smaller sustainability measures, but are more reluctant to make long-term commitments. To achieve desired long-term business initiatives with greater sustainability impacts, as called for by Freudenreich et al. (2020), i.e., initiatives such as WREMs that can affect water quality and quantity and can mitigate climate change, there is a need to direct the sustainability activities as business opportunities so that they can be aligned with the value intention of business managers.

Previous studies conclude that the value intention is of special relevance to sustainable business models, for agricultural businesses in particular, due to the circumstances they operate in, with often generational family businesses that depend on natural resources obtained from their particular farmland (Björklund, 2018; Miranda et al., 2023). The findings of this thesis connect to previous findings of Barth et al. (2017), Sadovska et al. (2023), and Ulvenblad (2023) showing that the value intention can be used as an additional building block of the traditional value proposition, creation and delivery, and capture elements of the business model (Osterwalder et al., 2005; Richardson, 2008) when aiming for sustainable business model development. However, this thesis views and applies the value intention concept from the process perspective, specifically as a starting point for initiating the BMIpfS. With the view that the value intention is operationalised in business models through the BMIpfS, the value intention will affect the process and most likely the outcome of the business model. This nuances the role of the value intention and highlights its importance for the continuation of the process and its potential outcomes in the form of business models for sustainability.

Moreover, the results concerning the value intention in this thesis expand the use of the concept as a way to distinguish between the value intention of traditional business model innovation and of business model innovation for sustainability. All businesses could be assigned a value intention

depending on the way they do business. Traditionally, it would have a strong focus on the return on investment, profits, and shareholder value (Dyllick and Muff, 2016). This means that the value intention of the business model innovation process can consist of other things than the value intention of a BMIpfS. The value intention of traditional business model innovation could be expected to mainly consider return on investment, financial growth, and shareholder perspectives, whereas the value intention of business model innovation for sustainability could be expected to apply a wider perspective on value capture and stakeholders, in line with what has previously been concluded about business model innovation with a strong sustainability purpose (Boons and Lüdeke-Freund, 2013; Mitchell and Bruckner Coles, 2004). The value intention perspective in a traditional business model innovation context might lack applications since it implies rather well-known and constant profitability perspectives of innovation processes. However, if and when these businesses consider taking on sustainability endeavours, the value intention concept could be introduced as a starting point. The value intention can be useful in a sustainability context, making the business models and innovation processes more complex than in a traditional business model innovation context, for example, due to uncaptured value, wider stakeholder considerations, and lack of market demand.

The view that the value intention is operationalised in business models for sustainability through the BMIpfS emphasises its role in the innovation process for sustainability. The 4I process identified by Frankenberger et al. (2013) focuses on traditional business model innovation processes and starts with an initiation phase. The initiation phase is based on the identification of external pressures and drivers, such as understanding the needs of customers and suppliers, and acting upon change drivers based on, for example, technology or regulatory changes. This leaves the value intention, based on more internal drivers of the business managers, outside the innovation process. As previously clarified, the initiation phase of the 4I framework can be seen as the natural point of departure for traditional business model innovation when the value intention is clearly focused on financial growth (Teece, 2010; Zott and Amit, 2010). However, since innovation processes for sustainability are more complex than traditional innovation processes, and the processes are harder to initiate, they would benefit from the inclusion of value intention into the process.

Based on its results, this thesis advocates the inclusion of the value intention as part of the pre-initiation of the business model innovation process, and the inclusion of a pre-initiation phase in the 4I framework to clarify the value intention of the BMIpfS. The pre-initiation phase can be used to understand the sustainability ambitions of business managers and how they commit or want to commit to sustainability activities (following, e.g., Dyllick and Muff, 2016). This in turn can affect the actions taken in the BMIpfS and how the elements of the business model (i.e., value proposition, creation and delivery, and capture) will be structured. These findings are supported by Karlsson (2019), who concludes that the BMIpfS needs a pre-phase due to the special characteristics of an innovation process for sustainability, which needs to take other things into consideration – in this case, a stronger stakeholder focus. The results of Karlsson (2019) emphasise that a pre-initiation phase of the BMIpfS can include more aspects than those presented here and will need further exploration. Such a realisation stresses that pre-initiation is not a fixed but rather a dynamic state in itself, which can change as circumstances around the business change. This means that BMIpfS initiation can be facilitated if the right incentives are provided, which in this thesis means finding alignment between the value intention and the business activities that can promote business development as well as societal sustainability goals.

5.2 Facilitating sustainable value capture to support BMIpfS initiation

The discussion of how the facilitation of sustainable value capture through WREMs, especially structured as government-affiliated intermediaries, can support BMIpfS initiation responds to the third and fourth research questions:

RQ3: What impact could government-affiliated intermediaries that align business concerns of agricultural business managers with opportunities for sustainable value creation through WREMs have on sustainable business commitments?

RQ4: How can government-affiliated intermediation be organised to facilitate BMIpfS initiation including value capture from WREM commitments that align with societal sustainability targets?

The findings of this thesis explore the role of government-affiliated intermediaries in WREM commitments and show how BMIpfS initiation can be facilitated through the alignment of value intention among business managers and sustainable business activities, such as WREM commitments, if the right incentives are provided. The results of the third paper reveal that agricultural business managers regard environmental aspects as the strongest motivating factor for WREM commitments, before and after the facilitation. This result indicates that governments and advisory services for farmers have previously succeeded in communicating the environmental importance of WREMs, and that the facilitation will not have its strongest impact on environmental concerns. These results are in line with the understanding that agricultural business managers perceive WREMs as part of taking on their environmental responsibility, as presented in the review of Graversgaard et al. (2021). However, their main business change drivers are primarily motivated by economic incentives rather than environmental ones (Lazaridou et al., 2019), as emphasised by the results of the second paper. This is highlighted in the third paper by the finding that facilitation by government-affiliated intermediaries seemed to have significant impacts on the motives for WREMs related to increased income, expansion of production and value propositions, increased competitiveness, and stakeholder relations. These findings clarify that facilitation through government-affiliated intermediaries can expand the motives of WREM commitments from merely environmental concerns, and align them with business managers' value intention (i.e., emphasising the identification of producers of value, the need to realise uncaptured sustainability value, and the prioritisation of profitability and practical production aspects). The impact of government-affiliated intermediaries on financial and operational business aspects of WREMs presented here adds knowledge of how these intermediaries can be used to target specific challenges when the aim is to develop new products, services, and business models, as called for by several previous studies (Brown et al., 2018; Feser, 2023; Kivimaa et al., 2019; Loorbach and Wijsman, 2013).

Intermediaries can also have an important role in accelerating the BMIpfS (Fischer and Newig, 2016; Kivimaa et al., 2019), illustrated in this thesis by the observation that once the business managers have adopted a measure, they are more likely to plan for a similar commitment again to the same or a greater extent. These results bolster claims about how small business model changes can act as catalysts for bigger changes with greater environmental impact in the future (Dyllick and Muff, 2016; Roesch-McNally et al., 2018). Moreover, business managers who have initiated more complex changes that demand longer time frames seem less likely to return to smaller activities on shorter time frames. These results indicate that the intermediaries can have a positive impact on business managers' WREM commitments, both at the time of their initial initiation and later in the process.

As an answer to the call for more empirical and context-specific research on future needs for intermediation (Brown et al., 2018; Feser, 2023, Kivimaa, 2014; Klerkx and Leeuwis, 2009), the findings of this thesis expand the understanding from the perspective of agricultural business

managers. The results clarify the needs of business managers to engage in WREMs and show how these needs are mainly linked to government-related support (e.g., writing applications for environmental approval and government funding) and, to some extent, to practical support (e.g., practical knowledge and access to suitable equipment). However, market-related support (e.g., creating market demand and finding customers) was not perceived as necessary among the business managers. Consequently, the strong view of WREMs as mainly environmentally motivated measures seems to impede the ability of business managers to view them as marketable products or services, and not as activities that could become part of the production and business model (Pan et al., 2023; Testa et al., 2022; Welsh et al., 2018).

The results also showed a negative relationship between market aspects and long-term WREM commitments before the introduction of the intermediaries. Business managers stated that intermediation regarding market-related aspects would probably decrease the likelihood of WREM commitments, emphasising their reactive approach to sustainable business commitments. However, after the introduction of intermediaries, this negative relationship disappeared. This indicates that the intermediaries had a positive impact on the realisation of market opportunities, contrary to the business managers' initial expectations. Through the findings regarding value intention in this thesis, one possible explanation for these results is that the intermediaries helped the business managers to realise uncaptured value opportunities, as previously explored by others (Dockès et al., 2019; Kivimaa et al., 2019; Matschoss and Hesikanen, 2017), here in connection with WREMs (e.g., the possibility of improving yields through irrigation from wetlands). Such a realisation seems to have made the WREM commitments better aligned with the managers' value intention, and thus more positively perceived from a business perspective, not just as environmental concerns. Since there is a need to increase business engagement in WREMs to meet agri-environmental targets and directives (Thorsøe et al., 2022), these findings imply that intermediation can have an important part in better aligning WREMs and associated ecosystem services with the value intention of agricultural business managers.

Government-affiliated intermediaries can have a direct impact on the adoption of WREMs, as clarified by the results of the third paper, showing a significant increase in the number of managers willing to commit to more long-term WREMs after their introduction. This puts further emphasis on government-affiliated intermediaries and their ability to align value intention with sustainability business changes to ease the innovation processes. Government-affiliated intermediation seems especially important in the case of WREMs and associated ecosystem services, since the lack of markets for these measures will most likely impede private intermediary organisations, which depend on profit, from facilitating WREMs, as previously described by Kivimaa (2014). For business activities within established markets, the demand for certain activities or measures can facilitate business model innovation (Brown et al., 2018). But for the case examined in this thesis, in which a market for the created social and environmental value from WREMs is lacking, the facilitation through government-affiliated intermediaries can be especially important for BMIpfS initiation. The government-affiliated intermediaries can thus have a crucial role in facilitating BMIpfS initiation through sustainable value capture from WREM commitments in line with the value intention of the agricultural business managers.

Research on government-affiliated intermediaries' explicit role in facilitating BMIpfS through sustainable business activities has previously been rather limited (Ehnert et al., 2022; Kivimaa, 2014; Kivimaa et al., 2019; Klerkx and Leeuwis, 2009; Masuda et al., 2022; Mignon and Kanda, 2018), and there is a call for more research to clarify the role government-affiliated intermediation could have to make sustainable business activities and societal sustainability goals more tangible to business

managers (Gustafsson and Mignon, 2020). The fourth paper in this thesis brings a contextual understanding to structures of government-affiliated intermediation, and its findings emphasise three overarching aspects of government-affiliated intermediation, aiming to create and capture sustainability value from WREMs, as presented in Figure 2. These are: (i) WREMs that include synergy between environmental and business aspects from a long-term perspective on value creating and capturing activities; (ii) flexible approaches adapted to business managers' needs, that promote autonomy, trust, and sense of control; and (iii) structured collaboration and networks for knowledge exchange between stakeholders on different societal levels.

First, the findings emphasise that government-affiliated intermediaries should aim for WREM commitments that include synergies between environmental and business aspects from a long-term perspective on value creating and capturing activities. In this way, the intermediaries can align the value intention of business managers in the pre-initiation phase with the business activities preceding the BMIpfS. This can create simultaneous learning and teaching opportunities, for both managers and intermediaries, about a wide range of aspects connected to the innovation process for sustainability (Mignon and Kanda, 2018). Moreover, through iteration and modifications, it can lead to the development of government-affiliated intermediation that is continuously adapted and improved based on actors' needs.

Second, the findings advocate flexible intermediation approaches adapted to promote agricultural business managers' desire for autonomy and to avoid uncertainties connected to the sustainability business changes. They emphasise the importance of facilitating a wide range of WREM commitments, since even small changes can increase the incentives of business managers to make more complex business model changes in the future, as previously reported by Dyllick and Muff (2016) and Roesch-McNally et al. (2018). Moreover, flexible government-affiliated intermediation could support the call for the local implementation of EU or national sustainability objectives (Gustafsson and Mignon, 2020; Kivimaa et al., 2019; Klerkx and Leeuwis, 2009; Masuda et al., 2022) and lead to improved results due to adaptations in line with local circumstances. A flexible approach adapted to local circumstances could be an important aspect of government-affiliated intermediation since it can avoid the concern stressed by Yao et al. (2022) that intermediation with a clear sustainability agenda could become normative and constrain the business managers' ability to innovate.

Third, the findings highlight the importance of structured collaboration and networks for knowledge exchange between intermediaries and stakeholders on different societal levels. The findings conclude that the government-affiliated intermediaries use cooperation and networks to exchange experiences, knowledge, and future goals among stakeholders, enabling the alignment of multiple motives and measures (i.e., a multipurpose view of WREMs and associated ecosystem services), which have impacts not only on individual businesses or BMIpfS, but also on entire value chains and networks. Neither the stakeholder nor the value chain perspective was the main focus of this thesis, and their crucial roles in the BMIpfS (Freeman, 1984; Freudenreich et al., 2020; Schaltegger et al., 2016) need to be further studied in this context. However, the context-specific collaborations surrounding WREMs seem to support a multipurpose view of WREMs and associated ecosystem services throughout large catchment areas. In light of BMIpfS, this gives an indication that the government-affiliated intermediation could support the involvement of all stakeholder interests in a catchment area that can be part of identifying uncaptured value opportunities for value creation and capture in business models for sustainability.

Consequently, through synergies, flexibility, and collaboration, facilitation through government-affiliated intermediaries can be adapted to the different facilitation needs of different business

managers, regardless of the current sustainability level of their business models. This thesis focuses on the pre-initiation of BMIpfS, and such early facilitation displays potential for increasing the business sustainability already at the initiation of the innovation process, resulting in a more sustainable business model, following, for example, the reasoning of true sustainability by Dyllick and Muff (2016). However, and outside the scope of this thesis, it is also possible that government-affiliated intermediaries could play an important role further into the innovation process and base their facilitating activities on the challenges presented in the subsequent phases (i.e., initiation, ideation, integration, and implementation), as presented by Frankenberger et al. (2013) and the corresponding ongoing and post phases by Karlsson (2019), thus increasing the level of sustainability commitments among business managers throughout the BMIpfS.

5.3 Contributions

This thesis adds to the literature on business model innovation with sustainability in focus, as it proposes the inclusion of the pre-initiation phase to add to the innovation process phases (i.e., initiation, ideation, integration, and implementation) previously identified by Frankenberger et al. (2013). The pre-initiation phase answers the call of Geissdoerfer et al. (2018) to explore the phases in focus when an organisation undergoes the BMIpfS. The thesis complements the results of Karlsson (2019), who presents activities in a pre-phase of the BMIpfS based on a stakeholder perspective. By adding the business managers' perspective to the pre-initiation phase, this thesis fosters a holistic understanding of BMIpfS initiation. The pre-initiation phase includes the value intention of business managers. Adding value intention to the pre-initiation phase gives a better understanding of how to support process initiation and promote more long-term and high-effort sustainability commitments among business managers.

Through identifying the barriers and drivers that constitute part of the value intention, this thesis builds on the research of Pan et al. (2023) by giving insight into what aspects are the most important to business managers when aiming to promote BMIpfS initiation and adds clarification of barriers and drivers in the context-specific agricultural setting as called for by Testa et al. (2022). It gives insights into the importance of directing sustainability activities to business managers as a way to create and capture value, with a focus on production and the positive practical implications for current business activities. Furthermore, the thesis builds on the research of Miranda et al. (2023), who call for empirical exploration of what aspects the value intention of agricultural business managers can include. This is done by emphasising the importance of value intention for innovation processes targeting previously uncaptured value. It also helps fill the knowledge gap identified by Broccardo et al. (2023) about deeper knowledge of the value uncaptured perspective, in order to meet the special challenges connected to the implementation of sustainability activities, especially those that currently lack market demand, such as WREMs and associated ecosystem services.

Through its contributions, this thesis advances the understanding of how to use the realisation of uncaptured value to promote BMIpfS initiation through facilitation directed towards business managers. It contributes to the literature on the facilitation of innovation processes by proposing how government-affiliated intermediation can be structured to ease BMIpfS initiation by aligning the value intention of business managers with societal sustainability goals. It answers the calls of, e.g., Ehnert et al. (2022), Kivimaa et al. (2019), and Masuda et al. (2022) to clarify the role of government-affiliated intermediation connected to the BMIpfS by proposing intermediation structures that will align sustainability and business aspects with long-term value creating and capturing activities that are flexible and adapted to business managers' needs and that lead to structured collaborations and knowledge exchange.

Through findings regarding the structural aspects of government-affiliated intermediation, this thesis builds on Sadovska et al.'s (2023) research on how to support business model innovation targeting agricultural business managers. It provides insight into opportunities that can be created through intermediation to promote the capture of sustainability value in agricultural business models by aligning sustainability issues with revenue streams, profit, and market issues. These insights can be of practical use as they can ease the implementation of WREMs, and thus be part of meeting national and international implementation targets for improved water quality and climate mitigation. The thesis also contributes knowledge of business managers' incentives to participate in agri-environmental programmes, as called for by Girkin et al. (2023) and Graversgaard et al. (2021). This can yield important insights into how to balance the role agriculture plays in economic growth, environmental conservation, and rural development, against agriculture's role in causing greenhouse gas emissions, water pollution, and loss of soil fertility.

Government-affiliated intermediation structured according to the findings of this thesis and based on the value intention identified to encourage the BMIpfS initiation could be part of promoting the simultaneous realisation of business value and societal value. Such intermediation could lead to more diversified and resilient agricultural business models based on more long-term and high effort sustainability measures to complement and improve food production. As the research on business model innovation for sustainability in agriculture is in its early stages (Miranda et al., 2023), this thesis contributes to the advancement of sustainable business activities as future competitive advantages in agriculture, especially highlighting the role governments have in helping business managers realise uncaptured value from sustainability measures, such as WREMs.

5.4 Limitations and suggestions for further research

This thesis proposes a pre-initiation phase to the BMIpfS and explores the role value intention has in process initiation. There are several research opportunities to elaborate on the pre-initiation phase and better understand how to promote BMIpfS initiation. Managing stakeholder relationships is particularly relevant to sustainable business practices (Freudenreich and Lüdeke-Freund, 2020; Hörisch et al., 2014; Schaltegger et al., 2016), and different stakeholders have different needs (Freeman, 2023). Thus, it is expected that stakeholders could act as both barriers to and drivers of the innovation process depending on their sustainability agendas. Since this thesis focuses on agricultural business managers, future studies could focus on stakeholders, exploring their influence on the value intention and providing more knowledge of their impact on the facilitation of BMIpfS initiation. Policies, regulations, and financial support are other aspects that could influence the value intention and are only partly studied here. Future studies could explore the effects that different regional, national, and international agri-environmental programmes and policies can have on the value intention of business managers. This research agenda could benefit from longitudinal studies to capture the impact that the fast-changing political landscape has on business managers' trust in programmes and policies (Graversgaard et al., 2021), and how these fluctuations affect the value intention of business managers. Furthermore, more studies are needed to complement the value intention concept in relation to the BMIpfS. For example, insights from different contexts and into different types and sizes of businesses would increase the robustness of the framework development. Additionally, future studies could explore the value intention of business managers with different sustainability approaches, i.e., inactive, reactive, active, and pro-active approaches (Long et al., 2018; Van Tulder et al., 2013), to make the facilitation even more applicable and effective. For example, how would facilitation differ between a case when the business manager has low or no sustainability ambitions, and when the manager is high achieving and already strongly committed to sustainable business activities?

Through synergies, flexibility, and collaboration, this thesis proposes a framework of facilitation through government-affiliated intermediaries that aligns the value intention of business managers with WREMs and associated ecosystem services to promote BMIpfS initiation. Future studies could build on the framework by further exploring the role of facilitation in other circumstances. These studies could investigate how the need for facilitation changes throughout the innovation process, as the different innovation phases will present different challenges (Frankenberger et al., 2013; Karlsson, 2019). Future research could explore whether the need for facilitation remains throughout the process or whether business managers become more independent, perhaps supporting each other in the networks that the intermediaries create. WREM commitments currently lack clear markets or market demand for the services they provide, but other sustainable business activities might have existing markets or market demand, creating further research opportunities connected to the role of facilitation in the BMIpfS. Sustainable business activities and ecosystem services for which there is market demand might attract private intermediaries or even create competition between different intermediaries, taking attention away from their intermediation activities (Kivimaa et al., 2019). Therefore, future studies could evaluate how different intermediaries affect the speed and efficiency of the innovation process, as well as the strong sustainability ambition of present government-affiliated intermediation. In cases in which there is clearer market demand, the intermediation activities might need adaptation; for example, in the case of biogas production in agriculture, the market demand for energy is strong, but competition from large-scale energy producers depresses revenues, causing many managers to hesitate to begin production (Karlsson et al., 2018). Future research could therefore evaluate the role of intermediation in different settings, either applying a greater value chain focus or supporting the development of, for example, industrial symbiosis (Schlüter et al., 2022).

As research on circular economy has rapidly expanded in recent years, a research stream examining circular business models has developed (Dagevos and Lauwere, 2021; Santa-Maria et al., 2021). This research stream has yielded emerging knowledge of barriers to and drivers of the circular business model innovation process as well as a call for more knowledge of moderators that can act as enablers of the innovation process (Geissdoerfer et al., 2023; Hina et al., 2022). Although a circular business model will focus mainly on resource extraction, waste streams, and emissions, it shares similarities with the BMIpfS. This suggests that future research applying the framework developed here but in the context of circular business model innovation, in agricultural or other settings, could create conditions for strengthening the social dimension of the circularity view from a sustainability perspective.

5.5 Concluding remarks

Despite agriculture's important role in creating and capturing financial and social value from various natural resources and ecosystem services, agricultural business managers tend to favour food production at the cost of providing other ecosystem services. This is due to the lack of full-cost accounting and unclear market demand for ecosystem services, which creates doubts among the managers about how to capture value from ecosystem services that extend past food production.

To meet this challenge and incentivise agricultural business managers to commit to sustainable business activities, this thesis develops a framework for how to facilitate business model innovation towards sustainability and capture a wider range of value from ecosystem services. The findings derived from the framework show that it is possible to increase sustainable business commitments among agricultural business managers. Through facilitation, the innovation of business models towards sustainability can be promoted to realise currently uncaptured value that could drive business revenues and societal goals. However, the findings also stress that these processes will not

develop on their own to any great extent, for example, due to lack of monetisation and markets for many of the activities and ecosystem services.

Thereby, the framework proposes that the support to business managers should begin in a pre-initiation phase of the BMIpfS where government-affiliated intermediaries facilitate sustainable business activities, such as WREMS and associated ecosystem services, based on the identified value intention of business managers. The concept of value intention is clarified through the identification of barriers and drivers that precede the adoption of sustainability activities, and facilitation through government-affiliated intermediaries could align the value intention of agricultural business managers with opportunities for sustainable value capture. The framework also fosters insight into how government-affiliated intermediaries could be structured to support long-term sustainable business commitments and promote BMIpfS initiation.

Through applying the findings of this thesis, facilitation from government-affiliated intermediaries could help agricultural business managers to “get it off the ground” and create more diverse agricultural business models that include value creation and capture from various natural resources and ecosystem services in the agricultural landscape. For successful initiation of the BMIpfS, it is important to provide support adapted to the value intention of business managers and to increase the awareness of value opportunities throughout the value chain, as well as among policy makers. In this way, agriculture could continue to provide the world's population with food in line with the Sustainable Development Goals, but with an expanded approach so that food production becomes a base on which to build business activities that also improves the conditions for several other goals, such as protection of ecosystems and water resources.

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