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*Jönköping International  
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# When ability and willingness is not enough

A study of Swedish family farmers implementation of  
circular agriculture practices based on ability, willingness,  
awareness and the role of institutions

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# Bachelor Thesis in Business Administration

Title: When ability and willingness is not enough: A study of Swedish family farmers implementation of circular agriculture practices based on ability, willingness, awareness and the role of institutions

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## Abstract

**Background:** The agricultural industry has a damaging impact on the environment and great potential for sustainable development. The concept of circular agriculture (CA) is proposed as an answer to this challenge. However, the implementation of CA is dependent on the farmers since they are in control of implementing new farming practices. Furthermore, since family farmers operate 75% of the world's land, it is crucial to understand their specific characteristics, challenges, and opportunities. Researching family farmers could provide important implications for transforming the industry. This study investigates how Swedish family farmers' ability and willingness guide their actions through the ability and willingness paradox.

**Purpose:** This study aims to explore Swedish family farmers' ability and willingness to implement circular agricultural practices.

**Method:** The study follows an interpretivist approach through five case studies. Qualitative semi-structured interviews are conducted along with observations at the farms. The empirical data is analysed through a coding procedure, where themes emerge from the data both by semantic and a latent analysis approach. The research elaborates existing theory through an inductively inspired approach.

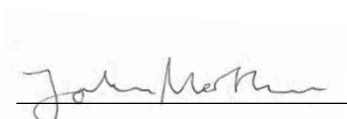
**Conclusion:** This study suggests that the theory of the ability and willingness paradox in the context of Swedish family farms might be inverted. This means that there is a high willingness to implement CA practices among the family farmers and ability is the factor that is preventing CA implementation. In addition to this conclusion, findings also suggest awareness and the role of institutions as influencing factors that both enforce and restrict CA implementation.

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John Marthinson



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# 1. Introduction

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*In this section, the reader is introduced to the key concepts through background, problem statement, and purpose. Research questions are presented as well as a terminology list of definitions used throughout this paper.*

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## 1.1 Background

The agricultural industry holds great potential for sustainable development since it is estimated to be responsible for 23% of the total human-induced greenhouse gas (GHG) emissions (IPCC report, 2019). The industry is the second-largest GHG emitter, only succeeded by energy use in industry. Agriculture is further damaging the planet through eutrophication, biodiversity loss and excessive freshwater use (Our World in Data, 2018). As the earth's population is projected to reach 9.8 billion in 2050 (UN, 2017), it is vital that the agricultural industry utilizes its potential to not only reduce its GHG emissions but also to sequester carbon and simultaneously produce more output.

Even though Swedish farmers only produced 50% of the total food consumption of Sweden (Lantbrukarnas Riksförbund, 2020), the agricultural industry was responsible for 14% of the country's total GHG emissions within Sweden's territorial boundaries in 2019. Out of ten industries, the agricultural industry was one of only two that increased their GHG emissions compared to the previous year. However, the Swedish statistics for the agricultural industry does not include GHG emissions from forestry (Naturvårdsverket, 2020).

The European Commission has identified strategies such as “*Resource efficiency, green chemicals, green growth and circular economy*” to decarbonise the agricultural and energy sectors to meet climate change goals (European Commission, 2021). The Swedish government also emphasises circular economy (CE) as a method to reach climate change goals. The government has declared it a national strategy to develop a CE for Sweden “*to become the world's first fossil-free welfare nation*” (Government offices of Sweden,

2020). CE aims at providing not only economic benefits but also natural and social benefits (Ellen MacArthur Foundation, 2021). There from, a new concept has emerged regarding the CE application in the agricultural industry – circular agriculture.

Circular agriculture (CA) is a concept that encompasses climate resilience, enhancing carbon sink and sequestration, improving soil health, improving crop-animal production, healthy nutrient cycling, and environmental protection. CA is also considered to be in line with the 17 Sustainable Development Goals (SDG's) formulated by the United Nations (UN) (Atinkut, Yan, Zhang, Qin, Gai and Lui, 2020). According to Wang, Li, and Wu (2014), circular agriculture is taking full advantage of environmental engineering and technology innovation to adjust and optimise agriculture to improve the usage and circulation of material and energy.

The practitioners of the agricultural industry, the farmers, are in control of innovating and adopting new, more sustainable farming practices (Siebrecht, 2020). Their actions and mindsets are directly affecting the transformation towards circularity. Additionally, family-owned businesses are more prone to address environmental and social issues (Berrone, Cruz, Gomez-Mejia and Larraza-Kintana, 2010; Block and Wagner, 2013). Statistics from Jordbruksverket (2020) show that Swedish farmers are family farmers in large majority. Hence, they are crucial for meeting the CE goals set up by the Swedish government. Therefore, Swedish family farmers provide the context for this study.

Research made by Chrisman, Chua, De Massis, Frattini and Wright (2015) suggests that family farmers may face difficulties when innovating for circular agriculture. Even though their research reveals that family-owned firms demonstrate a higher ability to innovate, they paradoxically demonstrate a lower willingness to do so than non-family competitors. This is in literature called the ability and willingness paradox and is discussed further in section 2.5. Assuming that the paradox applies to family-owned farms, many family farmers may fail to implement CA practices since they are restricted by the conditions of the ability and willingness paradox.



## **1.2 Problem discussion**

Circular agriculture is a relatively new concept and has to the best of our knowledge, predominantly been studied in China (Atinkut et al., 2020; Wang et al., 2014). This provides a research gap. No studies have been found in Sweden, despite the country's stated ambition regarding CE (Government offices of Sweden, 2020). According to one of the Chinese studies conducted by Zhu, Jia and Lin, (2019), CA can simultaneously improve a farms economic, environmental and social sustainability. Furthermore, the same study found that the pursuit of CA implementation is connected to farmers entrepreneurship. The importance of entrepreneurship connects to the ability and willingness paradox since the farmers themselves are in control of innovating and implementing CA practices. Their actions define the direction of the entire agricultural industry (Siebrecht, 2020).

Researching the ability and willingness to implement CA practices in the context of Swedish family farms will provide a clue to what might increase actions for sustainable development in the agricultural industry. This study aims to understand the family farmers willingness to implement CA practices and help tap the potency of the farmers assumed ability to do so. This will provide guidance to accelerate innovation for sustainability. Further research that considers ability and willingness simultaneously has been encouraged (De Massis, Kotlar, Chua and Chrisman, 2014) along with studies on how different industries and institutional contexts affect the paradox (Chrisman et al., 2015).

Recent work by Siebrecht (2020) also names lack of sustainability awareness and knowledge among farmers as one major issue slowing down transition towards CA. This is based on the condition that greater awareness leads to more adaptation of circular practices. He encourages further research to involve practitioners, in this case farmers, to develop theory and speed up CA transition. Also, since family firms have been observed to engage in environmental and social issues more often than non-family-owned businesses (Berrone et al., 2010; Block and Wagner, 2013), their ability will likely be focused on CA implementation.

In conclusion, this study will contribute to theory and knowledge about CA by researching the ability and willingness among family farmers in Sweden. It will answer Siebrecht's (2020) and Zhu et al.'s (2019) call for research to involve practitioners to broaden knowledge about sustainable agriculture. To gain an understanding of the relationship between the influencing factors of CA implementation, ability and willingness, it will elaborate on the existing literature and build on Chrisman et al.'s (2015) previous research on the ability and willingness paradox.

### **1.3 Purpose**

The purpose of this study is to explore Swedish family farmers' ability and willingness to implement circular agricultural practices. This will elaborate on existing theory on how these factors influence behaviours of family firms, in this case, family farms. This knowledge should aid the transition towards sustainable agriculture.

### **1.4 Research questions**

To meet the purpose of this study, the following research questions (RQ) have been formulated:

*RQ1: How does family farmer's ability and willingness to innovate affect their implementation of circular agriculture practices?*

*RQ2: What differentiates a family farm that invests in circular agriculture practices from a family farm that does not?*

### **1.5 Definitions**

Circular agriculture (CA) - A sustainability theory stemming from circular economy. A concept that encompasses climate resilience, enhances carbon sink and sequestration, improves soil health, improves crop-animal production, healthy nutrient cycling, and environmental protection (Atinkut et al., 2020).

Circular economy (CE) - A theory for sustainable development based on three pillars; 1) Design out waste and pollution, 2) Keep products and materials in use and 3) Regenerate natural systems (Ellen MacArthur Foundation, 2021).

Entrepreneurship – The process by which opportunities to create future goods and services are discovered, evaluated, and exploited (Shane and Venkataraman 2000).

Family farm – A farm managed by a single family that uses family members as a labour force (Lowder, Scoet and Raney, 2016).

Family firm - A family firm is a firm dominantly controlled by a family with the vision to potentially sustain family control across generations (Zellweger, 2017).

Sustainable development - *“The development that meets the needs of the present without compromising the ability of future generations to meet their own needs”* (Brundtland, 1987, p.16).

Sustainable Development Goals - The Sustainable Development Goals (SDG's) were adopted by all United Nations member states in 2015. It is a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030 (United Nations Development Programme, 2021).

## 2. Frame of Reference

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*The purpose of this chapter is to provide the theoretical background on the topic of circular agriculture in the context of family farms and how ability and willingness affect the implementation of circular agriculture practices. Firstly, the method of the frame of reference is presented.*

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### 2.1 Method of constructing the frame of reference

The following frame of reference is the result of a systematic search on the existing literature that aims to identify, evaluate and summarise it. To find the most relevant articles, some contours were necessary to be set for the search. Firstly, several keywords relevant to the topic were chosen, along with synonyms, as seen in Table 1. Secondly, these keywords were used on various search engines and databases - including Primo JU, Google Scholar and Scopus. Thirdly, after compiling an initial sample of articles, the assembled literature was skimmed through and evaluated to remove all articles that were not suitable for the topic. This amounted to a sample of 45 peer-reviewed articles and eight academic books. The search was mainly focused on recent work conducted over the last ten years. However, this rule allowed some exceptions: work older than ten years that other scholars have frequently cited. Since, frequently cited work helps increase the authority of arguments (Collis and Hussey, 2014).

*Table 1: Search parameters*

<b>Search parameters in frame of reference:</b>	
Sources	Academic Books, Academic Articles, Websites
Databases	Primo JU, Google Scholar and Scopus
Keywords	Sustainable agriculture, Scandinavian agriculture, Scandinavian sustainable agriculture, Agroecology + Scandinavia Circular agriculture, Circular practices in agriculture, Circularity methods, Circularity practices, Family firms, Family farms, Family firms + innovation Ability & willingness paradox

The following frame of reference aims to navigate the reader from the big picture to the narrow topic. The chapter then concludes with a review of gaps identified in the current literature along with calls for further research.

## **2.2 Sustainable development and agriculture**

The UN first introduced the concept of sustainability in the context of development through the Brundtland report in 1987. Sustainable development was defined as "*Development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Brundtland, 1987, p.16). Despite this, the UN has failed to reverse unsustainable development. In 2005, Foley et al. wrote that "*We face the challenge of managing trade-offs between immediate human needs and maintaining the capacity of the biosphere to provide goods and services in the long term*" in their frequently cited article Global Consequences of Land Use.

Furthermore, the word agriculture is used 118 times in the Brundtland report (Brundtland, 1987), highlighting the importance of sustainable development in the agricultural industry. It is essential to understand how and why unsustainable agriculture was pursued to reach an appreciation of sustainable agriculture (Saifi and Drake, 2008). The agricultural industry underwent a massive transformation after the Second World War, which increased overall productivity resulting in substantially more food produced and more financial profits for the farmers. This productivity boost was driven by fossil fuels, chemical fertilisers, pesticides and large-scale mechanisation (Trabelsi, Mandart, Le Grusse, Bord, 2016). The consequences of this productivity boom include massive biodiversity loss, undermining the capacity of our ecosystems to sustain food production and regulate air quality. It has been harmful to forests and freshwater resources and has been accelerating climate change (Foley et al. 2005).

The origin of the term "sustainable agriculture" dates back to the early 1980s before the Brundtland report defined the term "sustainable development" (Harwood, 1990). Sustainable agriculture is an umbrella term and does not have one universal definition. Hansen (1996) reflects upon various definitions used in the existing literature and discovers that the meaning of sustainable agriculture is found to have two different

meanings 1) Interpreting sustainability as an ability to meet a diverse set of goals and 2) Literal interpretations of sustainability as an ability to continue into the future. Furthermore, Hansen (1996) concluded that the best approach for guiding change in agriculture is to combine these two meanings. Since sustainability in agriculture is multi-layered and complex, it must be met by a holistic perspective. Agriculture must continue through time without degrading, and it must be measurable, comparable and flexible.

### 2.2.1 Sustainable agriculture in Sweden

Naturvårdsverket (2020) has identified high polluting activities in Swedish agriculture to include the release of methane from ruminants (mainly cows), CO<sub>2</sub> release from machines and nitrogen emissions from processes in the soil. Also, emissions from the use of limestone and mineral fertilisers, emissions from landfill waste and water waste management.

The current approach for reducing climate impact in the Swedish agricultural industry is to use climate advisors to guide farmers to change their practices. This approach has proven to be unsuccessful (Stål and Bonnedahl, 2015). The discussion between the farmers and the climate advisors moves away from discussing climate change – to discuss how the farmers feel accused by the media. Consequently, farmers often distance themselves from the problem and argue that the Swedish agricultural industry already is "climate-friendly" and that climate mitigation should be done by consumers and producers in other countries. This fuels a resistance among Swedish farmers to change their behaviour and reduce GHG emissions. The only dominative reduction target that both the farmers and advisors can agree on is to make the industry more efficient.

Stål and Bonnedahl's (2015) advice is to set a broad range of reduction targets. The current view of equating climate mitigation with efficiency improvements could prevent innovations, alternative ideas, and more fundamental changes in the agricultural industry (York and Rosa, 2003; Næss and Høyer, 2009). If more stakeholders are included in the political processes that decide the reduction targets, protection of biodiversity and other sustainability targets could also be pursued by the agricultural industry. This collaboration could build a common ground for a more holistic approach to climate mitigation (Stål and Bonnedahl, 2015).

## 2.3 Circular economy

Circular economy (CE) is defined as “*A framework for an economy that is restorative and regenerative by design*”. It is based on three principles: 1) Design out waste and pollution, 2) Keep products and materials in use and 3) Regenerate natural systems. The aim is to focus on positive society-wide benefits and build economic, social and natural capital powered by renewable energy sources (Ellen MacArthur Foundation, 2021). It is estimated that 8,6 % of the world's economy is circular, and 91,4 % is not (Circular Economy, 2021).

Several ideas have moulded the CE concept. However, recent literature uses the Ellen MacArthur Foundation’s definition by putting CE (grow-make-use-restore) in contrast to the linear economy (take-make-use-dispose). For example, Murillo, Salvador, Carlos de Franciso and Piekarski (2020) defines CE as “*A model that aims to maintain components, materials, and products at their highest utility to eliminate waste from a system*” with the Ellen MacArthur Foundation as their reference.

### 2.3.1 Circular agriculture

In line with CE principles, the concept of circular agriculture (CA) emerges (Jun and Xiang, 2011). CA practices like utilisation of renewable sources aim to reduce environmental pollution and help to improve soil quality, increasing food security. Also, CA aims to eliminate fossil material inputs, increase energy efficiency and adopt material circulation (Murillo et al., 2020). Furthermore, output from CA practices like biogas can be used to produce heat, clean energy or natural gas fuel (Antoniou et al., 2019). The suitability of adopting CE practices in the agricultural industry is emphasised by Jun and Xiang (2011) since agriculture is closely linked to nature. The industry is already exposed to the recycling processes of natural ecosystems that will be needed in CA.

In order to start implementing CA practices, Murillo et al. (2020) suggest analysing one's system inputs and outputs. This analysis lays a foundation for understanding by-products flow within the farms' system and gives a clear picture of material and energy flows. Other identified CA practices in the existing literature are the following:

### *1. Closing the loop*

Scholars who have published work on CA have emphasised practices that aim to close the loop on materials and resources within a system. The basic principle is to reduce non-renewable inputs and waste, reuse resources multiple times and recycle products that have served their purpose. Jun and Xiang (2011) provide examples of using wash water for livestock and poultry for irrigation since it will make the water also work as a fertiliser, as well as breeding fish in rice fields. The fish waste will naturally manure the field, and the fish will thrive in the environment that the rice field provides. Other scholars focus on waste management through processes like anaerobic digestion, pyrolysis and vermifiltration. These are three different methods that focus on turning biomass useful by converting it into a renewable fuel like biogas, organic fertiliser, sequester carbon, and purifying wastewater (Velden et al., 2021; Murillo et al., 2020; Fan et al., 2018; Antoniou et al., 2019).

### *2. Producing clean energy*

CA practices may result in producing biogas, which is considered a renewable low-carbon energy source. Also, in recent work, farms producing biomethane to fuel vehicles in the agricultural industry are regarded as a future business opportunity (Murillo et al. 2020). Several studies in China have investigated utilising pig manure through anaerobic digestion and turning it into electricity. It has then been used both inside the system of the farm and been sold to the government grid for an additional source of profit (Xu et al., 2020; Fan et al., 2018).

### *3. Social networks & collaboration*

Studies on CA have demonstrated that establishing partnerships with surrounding farms will bring further environmental and economic benefits. By regarding the sectors of the agricultural industry as closed ecological networks, pollution will be minimised, and waste will be used efficiently (Jun and Xiang, 2011). Close relationships with neighbours will make it easier to buy and sell resources generated from waste management and decrease the need of inserting new materials into the loop. One farm might produce waste that is sent to another farm that has a biodigester. In turn, that farm produces biogas which is later used as clean energy for all surrounding neighbours (Murillo et al. 2020).



## **2.4 Family firms & sustainability**

Zellweger (2017) defines a family firm as a firm dominantly controlled by a family with the vision to potentially sustain family control across generations. He reached this definition by considering Chua, Chrisman and Sharma's (1999) two identified features 1) Dominant control in the hands of family and 2) Transgenerational outlook.

Findings show that family firms generally demonstrate a higher performance of sustainability-related activities than non-family firms (Block and Wagner 2013; Berrone et al., 2010; Doluca, Wagner and Block, 2017). Further, the literature agrees on several common characteristics that family firms share that influences their environmental or sustainability activities.

Firstly, family firms are strongly motivated by socioemotional wealth (SEW) in contrast to non-family firms that are generally more motivated by financial goals (Block and Wagner 2013; Berrone et al., 2010; Doluca et al., 2017). SEW is defined as non-financial benefits of the firm (Gómez-Mejía, Haynes, Núñez-Nickel, Jacobson and Moyano-Fuentes, 2007). For family firms, this includes the perpetuation of the family dynasty, the ability for exercising family influence and using the family firm as part of identity creation. Block and Wagner (2013) have found that family firms place high emotional value in sustainability pursuits if it fits their family identity. Therefore, the pursuit of SEW motivates the family firm's adaptation to sustainability activities (Berrone et al., 2010; Block and Wagner, 2013).

Secondly, family firms usually prioritise long-term goals, and their long-term orientation highly influences their strategic decisions (Doluca et al., 2017; Miller and Le Breton-Miller, 2005). Literature provides two main reasons: 1) They pursue wealth for future generations and 2) They want to improve the family reputation (Doluca et al., 2017). Zellweger (2017) also argues that family firm's long-term orientation influences the family firm's adaptation to sustainability since it justifies high initial investment costs.

Thirdly, family firms are more risk-averse than non-family firms. Since family firms pursue socioemotional goals over financial goals and are concerned about transferring the family's wealth and reputation to future generations, they tend to act more conservatively

(Dolua et al., 2017). Literature suggests that family firms have a higher ability to innovate, but because of this risk-aversion, they are less willing to do so. This creates the ability and willingness paradox (Chrisman et al., 2015), further discussed in section 2.5. As opposed to the other two characteristics, risk-aversion among family firms negatively influences the firm's adaption to sustainability activities (Berrone et al., 2010; Doluca et al., 2017; Yoshida, Yagi and Garrod, 2020).

Additionally, empirical evidence shows that family firms have a stronger resilience and react more positively to institutional pressures. These pressures include both governmental sanctions and legal restrictions as well as social expectations. Family firms are more willing to go beyond legal compliance, specifically when reacting to pressures concerning sustainability. This is in line with the pursuit and conservation of SEW (Berrone et al., 2010).

#### 2.4.1 Family farms

The kind of family firms to be researched in this study are specifically family farms. Lowder et al., (2016) have found two commonalities from studying over 36 published definitions: 1) The use of family labour and 2) Family management of the farm. Fitz-Koch, Nordqvist, Carter, Hunter (2018) state that family farms distinguish themselves on being mainly motivated by social and lifestyle reasons and risk reduction when developing their business, in line with the characteristics of generic family firms. Also, entrepreneurial decisions might be influenced by life-cycle events. A marriage or divorce will generate new competencies, ideas and networks to the farm, which might change the direction of the business.

The agricultural industry consists mainly of family farmers who have operated their farms for several generations (Fitz-Koch et al. 2018). If following the most common definitions, over 90% of the world's farms are considered family farms, and they operate approximately 75% of the world's land (Lowder et al. 2016). Statistics from Jordbruksverket (2020) also shows that many Swedish farmers are family farmers. The number is below the international average, but 74% is still a clear majority.

#### 2.4.2 Family farms benefitting from circular agricultural practices

Literature shows that farms who have engaged in CA practices or other technology-based innovations have generated benefits, both in monetary terms and in SEW. For example, Fitz-Koch and Nordqvist (2017) have found that SEW can be translated into financial wealth. Hence, technological innovation might help a family firm stay competitive in the long term.

Moving to literature about specifically CA innovation, scholars have found it to generate monetary profit both for the farm that engages in it and its neighbours. Empirical findings from the Jiangxi Province in China (2019) show that economic sustainability can be improved by, for example, substituting chemical fertiliser with bio-fertiliser. As one of their CA practices, the farm made use of biogas and made energy savings. They also provided neighbouring families with manure for biogas production to be used for heating, lighting and cooking (Zhu et al., 2019).

A recent study conducted in Brazil by Velden et al. (2020) stated that a completely circular system is flexible and would only require minor alterations to be installed in different contexts. The authors are confident that other small-scale farmers outside Brazil could use it to increase the farms' resilience and income. While also working as a source of inspiration for surrounding farmers to engage in best practice for waste management.

#### **2.5 Ability and willingness paradox**

Existing literature suggests that family firms have a higher ability to innovate, but because of their general risk-aversion, they are less willing to do so. This is in the literature referred to as the ability and willingness paradox (Chrisman et al., 2015). This paradox applies to the implementation of CA since Chrisman et al. (2015) uses the definition of innovation from Drucker (1985) as the process by which entrepreneurs exploit opportunities to commercialise new products, services, processes, or business models. The researchers of this study argue that this applies to family farmers since implementing CA exploits opportunities to commercialise new processes and business models.

According to De Massis et. al. (2014, p.346) ability in family firms refers to the owner's "*discretion to direct, allocate, add to, or dispose of a firm's resources*". Several factors

have been identified to explain why the ability for innovation within family firms is higher compared to non-family firms. Alignment between owners and managers, low levels of formalisation and bureaucracy, greater discretion because of personalised control and long-term investment horizons are some of the factors identified.

The same authors define willingness in family firms as “*The disposition of the family owners to engage in idiosyncratic behaviour based on the goals, intentions, and motivations that drive the owners to influence the firm’s behaviour in directions diverging from those of non-family firms or the institutional norms among family firms*” (De Massis et al., 2014, p.347). The consequence is that family firms are less likely to pursue innovation (Chrisman et al., 2015) and family farmers less likely to implement CA practices. The identified factors found in the literature that argues why family firms tend to have a lower willingness to innovate include lack of necessary skills within the family and resistance to share control with non-family managers with such skills. Also, a hesitance towards external financing along with the already discussed risk-aversion (Chrisman et al., 2015). As a result of the paradox, question is raised how family firms survive despite their low willingness to innovate.

## **2.6 Accelerating factors for CA implementation within family farms**

Furthermore, recent literature in the field of sustainable and circular agriculture identifies three other highly influencing components that allow for and increase the speed of CA implementation:

### *1. A new role for farmers*

It is essential that farmers embrace themselves as entrepreneurs. This includes exploring new sources of income and developing new operational capabilities (Yoshida et al., 2020; Sumane et al., 2018). Especially Zhu et al. (2019) emphasise the importance that the farmers themselves drives CA through adding multiple profit-maximising activities to build an economically viable and sustainable business.

### *2. The importance of networking*

Engaging in social activities helps gain new knowledge, diversify the business and find partnerships. This includes informal networking with other farmers and formal networking with institutions that can operate as networking bridges (Sumane et al., 2018; Yoshida et al., 2020). According to Sumane et al. (2018), social skills among farmers have been neglected both in the literature and in education, preventing efficient networking. Farmers must utilize soft skills like networking, openness and team building to gain the advantages.

### *3. Support from governments, institutions and organisations*

Atinkut et al. (2020) argue that if governments provide monetary subsidies for CA practices, farmers are willing to invest. This is supported by Härrä, Levänen and Koistinen (2020) that found the lack of financial support from governments as one of the main reasons preventing CA implementation. Furthermore, other scholars urge institutions to educate and support family farmers on CA practices (Zhu et al., 2019; Yoshida et al., 2020). Therefore, being a facilitator of knowledge and idea exchange is another responsibility governments, institutions, and organisations must undertake to make CA implementation as efficient as possible (Sumane et al., 2018).

## **2.7 Gaps in the literature**

Recent work on CA has identified a general lack of empirical evidence with concrete examples, especially at the level of individual farms (Zhu et al., 2019). Other scholars agree that more studies need to be made involving the actual practitioners to speed up the transition towards CA practices (Siebrecht, 2020). The work that has been published with concrete examples have almost exclusively been conducted in China. The nation holds a unique institutional environment, and further research needs to be made in other socio-economic contexts (Zhu et al., 2019).

Regarding family firm's tendency to innovate, hence implementing CA practices, literature specifies that further research needs to simultaneously research ability and willingness. A specific call by De Massis et al. (2014) urges scholars to research sources that affect family firm's ability and willingness and how those, in turn, affect their strategic behaviours. It is known that variations in ability affect strategic decisions, but not how willingness to pursue socioemotional and family-centred goals interacts with the

fluctuating ability. Also, the same authors encourage research on how ability and willingness are affected by resources and capabilities and how they influence family firm's effectiveness. Also, Chrisman et al. (2015) emphasizes the heterogeneity among family firms and encourages studies on how different industries and institutional contexts affect the paradox. More recent work by Siebrecht (2020) states that awareness and knowledge are crucial for a family firm's implementation of CA practices. The current study will partly aim to find whether this too serves as a factor in farmers' strategic decisions on implementing CA practices.

## **2.8 Model of the probability of CA implementation – based on theory**

The identified factors in the literature affecting a family farms probability to implement CA practices are presented in Figure 1 below. Since Chrisman et al. (2015) argues why ability among family firms is high, there are no factors presented that specifically decrease ability.

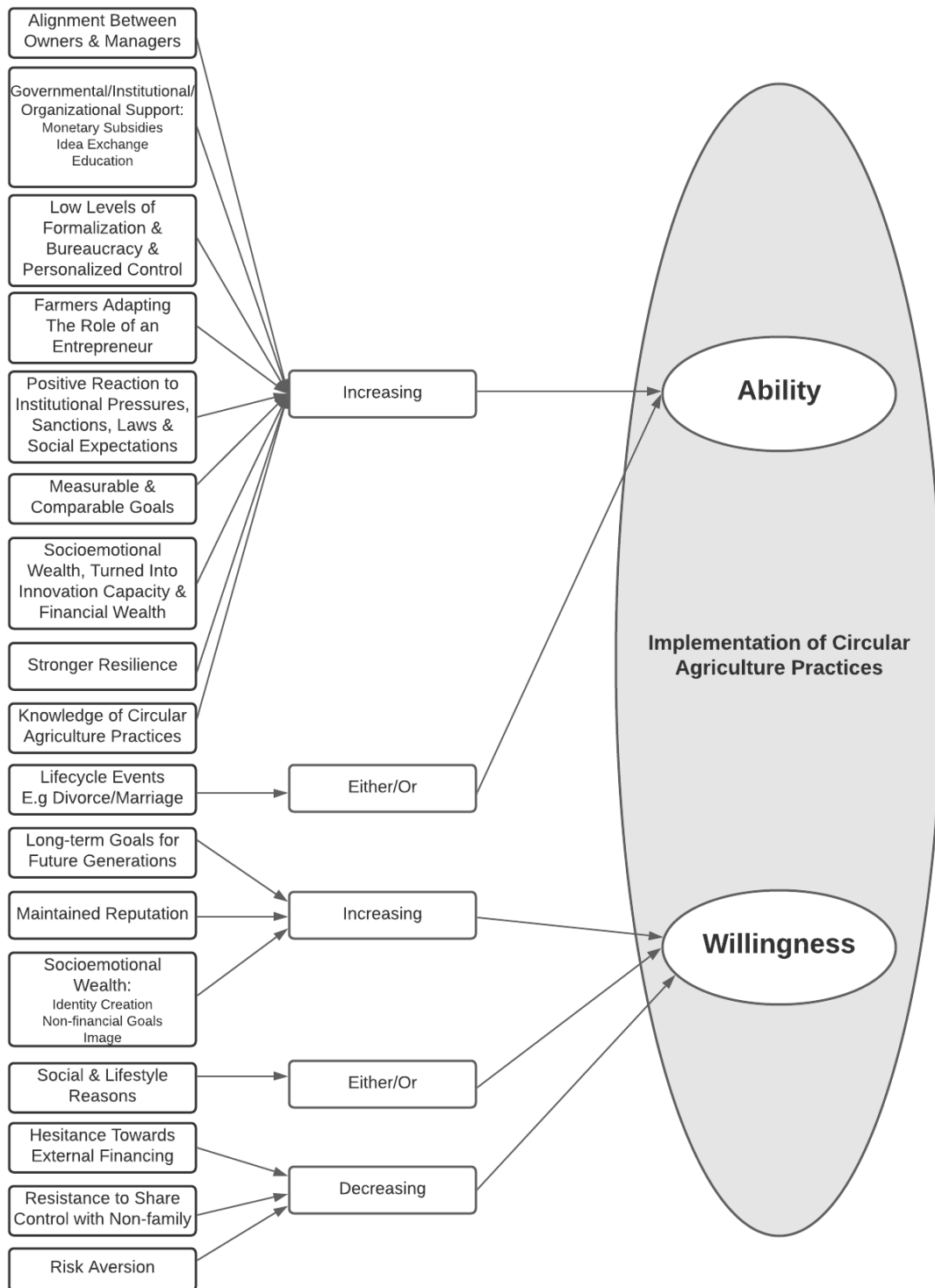


Figure 1: Model of the probability of CA implementation – based on theory

Note. Own figure based on the frame of reference.

### 3. Methodology & Method

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*In this section, the methodology and method of this research are presented. It begins with the methodology, which includes the research paradigm, research approach and the research design. Thereafter the chosen method is discussed by addressing the structure of the qualitative semi-structured interviews, the research's context, the sampling process and how the data was analysed. Finally, the chapter ends with a discussion on ethical considerations and trustworthiness.*

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#### 3.1 Research paradigm & approach

The interpretivism paradigm rests on the belief that social reality is not objective but is shaped by our perceptions, making it highly subjective (Smith, 1983). Farmer's unique relationship between occupation and identity (Fitz-Koch et al., 2018) causes subjectivity to influence the research conducted on the topic of CA considerably. In order to gain an understanding of the farmer's situation and the factors that guide the farmer's ability and willingness, the researchers found it suitable to investigate the social reality of the farmers through qualitative interviews and observations. Since qualitative methods are based on interpretation of the social world (Van Maanen, 1983).

By interpreting the empirical findings from the world of family farmers, this study aims to elaborate on Chrisman et al.'s (2015) theory of the ability and willingness paradox to answer the research questions presented in section 1.4. The researchers, therefore, argue that the study should be labelled as theory elaboration since they, based on new empirical evidence, build on the existing theory. The relative novelty of the topic suggests that this approach is more appropriate than a purely inductive approach since it allows for alterations in theory when new evidence is revealed (Fisher and Aguinis, 2017). Additionally, the lack of research in the context of Swedish family farmers makes it evident why the researchers have not used a deductive approach.



### **3.2 Research design**

The research design is in line with the interpretivism paradigm. It is qualitative and inspired by an inductive approach. Multiple exploratory case studies have been conducted, and the data has been analysed via the *general analytical procedure*, which is further explained in section 3.4. The researchers selected semi-structured interviews and observations as the data collection method. The following sections explain the rationale of these choices.

### **3.3 Method of data collection**

Yin (2009) defines a case study as an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context. This is usually applied when the boundaries between the phenomenon and context are not evident. This is applicable in the current study of CA because of the unique characteristics of family firms, in this case, family farms, and the ability and willingness paradox presented by Chrisman et al. (2015). The social reality guides the farmers' ability and willingness to implement CA practices. By studying the mindsets of the practitioners of the agriculture industry, findings will give guidance to what will influence the industry to head in a sustainable direction.

As previously explained, the study faces the challenge of subjectivity when researching the topic of CA. An important consideration when designing an interpretive study is to apply methods that will retain the integrity of the data (Collis & Hussey, 2014). When the data is understood only within its context, qualitative data collection is usually preferred (Collis & Hussey, 2014). The researchers have accordingly focused on designing a systematic and methodical data collection.

#### **3.3.1 Observations**

The researchers found it necessary to use the method of observations at the interviewees' farms to understand the context in which the phenomenon was being studied. According to Collis and Hussey (2014), a natural setting is preferred in an interpretive study because of the importance of context when studying a phenomenon. In practice, the observations were conducted through a guided tour of the farms where the interviewee described, explained and demonstrated how the farm was run, the operations and activities of the

farm, as well as possibilities and constraints. This also follows Yin's (2009) definition that a case study should be conducted in the real-life context of the phenomena.

### 3.3.2 Semi-structured interviews

Easterby-Smith, Thorpe and Jackson (2012) argue that semi-structured interviews should be used when it is necessary to understand the personal constructs used by the interviewee as a basis for his or her opinions and when the purpose is to develop an understanding of the respondent's "world" so that the researcher might influence it. The benefits of using semi-structured interviews as a data collection method are that it provides so-called "rich data" and is concerned with exploring "*data on understandings, opinions, what people remember doing, attitudes, feelings and the like, that people have in common*" (Arksey and Knight, 1999, p.2). It is, therefore, appropriate to use semi-structured interviews to accommodate the challenge of subjectivity and to understand the context from which interviewees build their answers upon.

To be consistent with the interpretively inspired study's concern of integrity, the semi-structured interviews consisted of five categories developed from the existing literature. This was to ensure that the data collection was systematic and methodical. The categories were, in order: 1) Introduction and background, 2) Sustainability awareness, 3) Sustainability willingness, 4) Sustainability ability, and 5) Circular agricultural practices.

The interviews typically started with a guided tour where the interviewee could control the situation. By allowing the interviewee to present the farm, the researchers noticed that the interviewee quickly became comfortable and communicative. By asking probing questions along the tour, the researchers could keep the interviewee on topic and gain a greater understanding of the farm's current activities. During this stage of the interview, the researchers found it sensible to ask classification questions since more sensitive questions would be asked later in the interview. This is in line with Collis and Hussey's (2014) recommended approach.

When the tour was completed, the interviews typically continued by sitting down at a quiet place. The researchers then followed the prepared categories to ensure a systematic and methodical collection of data relevant to the existing theory. This included the ability

and willingness paradox, Siebrecht's (2020) theory of how lack of awareness is a factor that is slowing down the transition to CA, and concludingly documenting the already existing CA practices on the farms. However, several of the prepared questions had usually been answered during the tour since the interviewee was allowed to describe and explain without the researchers interrupting. The interview structure in that way became influenced by the interviewee, according to how a semi-structured interview should be conducted to provide rich data (Arksey and Knight, 1999). The outline of the interview questions can be found in Appendix 1.

### 3.3.3 Context

The current study is compiled of eight interviews on five family farms in southern Sweden, a context that emerged naturally in the early stages of the research process. The literature review revealed the general lack of empirical work regarding CA transition (Zhu et al. 2019) and a call for involving actual practitioners to speed up said transition (Siebrecht, 2020). Farmers themselves became the apparent subject of the current study.

Furthermore, the study focuses on family farms because of the unique properties that family firms, in general, possess (Block and Wagner 2013; Berrone et al., 2010; Doluca, Wagner and Block, 2017; Zellweger, 2017; Miller and Le Breton-Miller, 2005). This suggests that family farms would be comparably more inclined to reflect on and pursue sustainable development, like CA. However, the most prominent reason is the ability and willingness paradox identified among family firms (Chrisman et al., 2015). Also, since family farms amount to over 74% of Sweden's farms (Jordbruksverket, 2020) the context provides a large and accessible population to draw a sample from.

Finally, the geographical context of southern Sweden was chosen for similar reasons. As the researchers are based in southern Sweden, it provides the opportunity to visit the sampled family farms and make observations along with the semi-structured interviews within a reasonable time frame. This also complies with Yin's (2009) definition that a case study should be conducted within a phenomenon's real-life context. Furthermore, a similar study has to the best of our knowledge, never been done in Sweden, even though such a study could be useful in reaching the nation's goals to pursue CE (Government offices of Sweden, 2020).

### 3.3.4 Sample procedure

The sampling process adopted the method of snowball sampling, or networking, as is appropriate when requiring experienced participants (Collis and Hussey, 2014). In practice, the researchers started by scanning their own network of family farmers. Initial contact was made by text messaging, phone calls and e-mail. In every conducted interview, the interviewee was asked to recommend other participants they believed to be suitable for the study.

Initially, the researchers feared this might result in a one-sided sample where farmers recommended another farmer with a similar business model and experience. However, the snowballing sampling resulted in a nuanced and rich sample, which will be further demonstrated in Chapter 4. In total, 16 candidates were asked to participate in the study, either by the researchers themselves or by interviewees who, via the snowball effect, asked on the researchers' behalf. Out of the 16 candidates, nine accepted, three declined, and four did not respond.

Following Guest, Bunce, and Johnson's (2006) arguments, the sampling was determined inductively. However, the researchers found it reasonable to set a minimum of six interviews of one hour in accordance with Rowley's (2012) advice on conducting research interviews. The new data supported the previous findings from the seventh interview and onwards, which fulfilled the theoretical saturation for the sample.

### 3.3.5 Sample

The sample criteria were outlined and defined by the Lowder et al. (2016) commonalities, that the farm was 1) Using family as a force of labour and 2) Had family management. This did not exclude farms that also use additional labour in their total workforce. No specific criteria were defined on how many generations the farm would have needed to be operated within the same family. Furthermore, in cases where the farm was currently operated by more than one generation within the same family, representation of several generations was encouraged. The final sample is presented in Table 2 below. Each studied farm has been given a letter from A-E in order to condition internal and cross-analysis. Even though all interviewees declined the proposition to be anonymous, the researchers decided not to publish the names of the farmers for their protection. This was based on

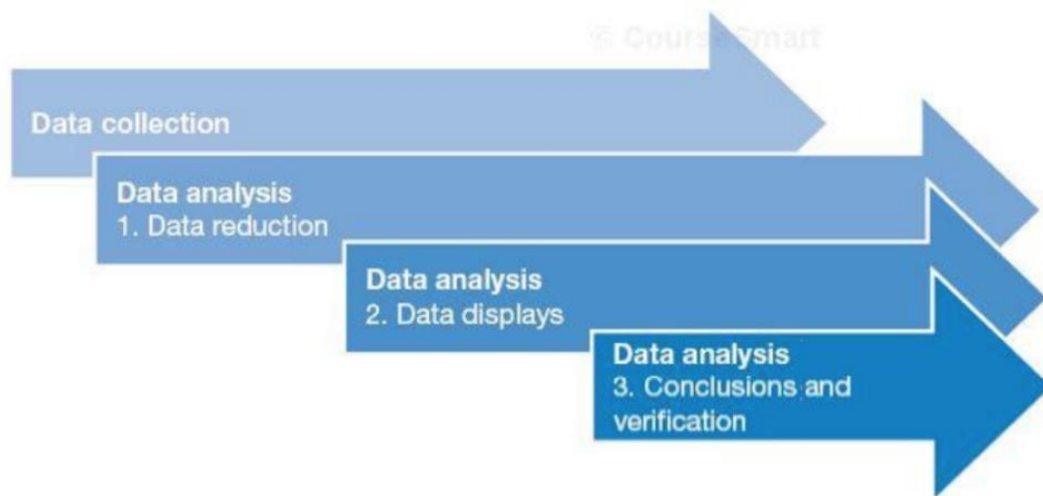
the farmers' description of working in the agricultural industry, especially their expressed concern for disparate opinions from non-farmers about the agricultural industry. Therefore, the names of the interviewees are replaced by the letter from their respective farms along with the number in order of interviews conducted at that farm. The date and duration of each interview are also presented. The final column details whether the interview included a tour of the farm, where the researchers could make observations.

*Table 2: Sample of interviewees*

<b>Farm:</b>	<b>Alias:</b>	<b>Date of interview:</b>	<b>Duration of interview:</b>	<b>Observations:</b>
A	Farmer A1 & Farmer A2.	The 10 <sup>th</sup> of March (Pilot interview)	59 minutes	No
	Farmer B1	The 16 <sup>th</sup> of March	91 minutes	Yes
C	Farmer C1	The 18 <sup>th</sup> of March	66 minutes	Yes
D	Farmer D1	The 18 <sup>th</sup> of March	75 minutes	Yes
	Farmer D2	The 18 <sup>th</sup> of March	46 minutes	No
	Farmer D3	The 18 <sup>th</sup> of March	24 minutes	No
E	Farmer E1	The 26 <sup>th</sup> of April	104 minutes	Yes
	Farmer E2	The 26 <sup>th</sup> of April	39 minutes	Yes

### 3.4 Data analysis & coding structure

The collected data has been analysed via the general analytical procedure published by Miles and Huberman (1994). The process is not tied to any particular data collection method but provides a systematic way to conduct the analysis. Three flows of activity are presented: 1) Reducing the data, 2) Displaying the data and 3) Drawing conclusions and verifying the validity of those conclusions (Collis and Hussey, 2014). All three stages will be explained below.



*Figure 2 – Overlapping stages in qualitative data analysis*

*Note. The general analytical procedure. Reprinted from Business Research – a practical guide for undergraduate and postgraduate students (p. 158) by J. Collis and R. Hussey, 2014. Palgrave. 2014 by Palgrave & Macmillan.*

The process of the analysis started with the interviews being recorded and transcribed. The total number of transcribed pages was 118. Already at the transcribing stage, the data was slightly reduced. Verbal expressions like "ehm's" and "mm's" were not included in the written transmissions, as long as they did not make the interviewee stop or change the direction of their answer. As the interviews were conducted in Swedish, the transcripts were also in Swedish. This helps the credibility of the analysis since the interviews do not risk being wrongfully analysed or interpreted as words or meanings could get lost in translation from Swedish to English. However, the data used for the findings were translated after analysis to be consistent with the rest of the study. Furthermore, to increase trustworthiness, the interviewees had the possibility to review their own quotes.

This was made to ensure that they were translated correctly and that the intent of the quote was intact.

The process continued with the coding of the data. The researchers divided the transcripts and coded them separately, where a large number of codes were generated. The researchers later compared and combined their codes to be reduced into 22 first-order categories, shown in Chapter 4. This allowed discussion among the researchers and aimed at limiting any researcher biases that might have been present during the individual coding. The first order categories represent reasonings or comments in the data found to affect a farmer's probability to implement CA practices. By synthesising the data, the first-order categories were organised and grouped into second-order categories, based on their similarity and relation. This satisfies the requirements of the first and second stage of the general analytical procedure as it manages to select, discard, simplify and reorganise the qualitative data, as well as summarising and displaying it in a model to help draw conclusions (Miles and Hubermann, 1994).

Finally, four general themes were identified, affecting a farmer's probability of implementing CA practices. They are as follows: ability, willingness, awareness and the role of institutions and will be further discussed in Chapter 4. The themes emerged from the data both by semantic and a latent analysis approach. The semantic approach focuses on the surface meaning of the data and the latent examining underlying ideas, assumptions and concepts that might influence and shape the semantic data (Braun and Clarke, 2006). To exemplify, some interviewees explicitly expressed that they were interested in climate issues and sustainability. Others never used the word "interested", but their opinions and comments revealed the same feeling.

To draw further conclusions from the data and verify their validity, it was analysed both internally and externally, which means that every interview was first analysed internally as an isolated case. In cases where several interviews were conducted at the same farm, experiences and perceptions were cross analysed to identify if empirical findings from the same farm were cohesive and hence increase the study's dependability (Collis and Hussey, 2014). Furthermore, all case studies, meaning all farms, were later cross analysed

to find differences and similarities. Conclusions from every individual case could in this way be verified and findings identified.

### **3.5. Ethical considerations & trustworthiness**

Many studies have been published on ethical considerations, and the researchers of this study intended to follow Bell and Bryman's (2007) list of ethical principles. Among other aspects, this involves offering anonymity and protecting the anonymity of the individuals who participated in the study. The option of anonymity was presented to the interviewee before each interview, along with the purpose of the research. This was to establish informed consent with the participants before the interview started. Also, to give the participants an understanding of the research and explain that the purpose of the questionnaire was to search for patterns, not individual faults or errors in the farmers' way of operating their farm. This follows Lee's (1993) advice on asking sensitive questions in interviews.

Further, Lincoln and Guba (1985) suggest that four criteria should be used when evaluating an interpretive study. The four criteria are 1) Credibility, 2) Transferability, 3) Dependability and 4) Confirmability.

#### **3.5.1 Credibility**

Credibility in research involves whether the subject of the inquiry was correctly identified and described (Collis and Hussey, 2014). To increase credibility, the interviews were conducted in Swedish, the native language of the farmers and the researchers. This made the interviewees more comfortable and provided them with greater opportunities to freely express themselves to provide deeper data. Furthermore, the order of the questions was rearranged after the pilot interview to improve the flow and cohesiveness of the categories. For example, sensitive questions were moved to the later stages of the interview. The researchers also realised that the way the questions were asked affected the interviewees' comfort and willingness to share.

Interpretivist studies must address the challenge that social reality influences the subjectivity of the participants (Bell and Bryman, 2007). Data triangulation via semi-structured interviews, multiple respondents and observations addresses this challenge and



strengthens credibility as it provides a broader picture of the phenomenon under study (Collis and Hussey, 2014). Further, multiple case studies provided a broader and more comprehensive sample from which themes of findings could be supported across the data collection.

### 3.5.2 Transferability

The transferability of the research is concerned with whether the findings can be applied in another setting or situation. This depends on the findings to be sufficient to allow for generalisation (Lincoln and Guba, 1985). Since qualitative studies usually are conducted with a small sample size in unique contexts and environments, it might be challenging to transfer the findings to other contexts. However, because of the nuanced and rich sample, the researchers find it reasonable that the findings could be transferred to farms in similar contexts. This means family farms operating in similar conditions as in southern Sweden. Both regarding climate and institutional conditions. The possible generalisation is ultimately in the hands of future researchers to assess (Lincoln and Guba, 1985).

### 3.5.3. Dependability

The dependability is concerned with whether the research process is systematic, well documented and rigorous (Collis and Hussey, 2014). In other words, if the researchers would present the same findings if they repeated the study. The dependability of this study was increased by the researchers' work of following their interview categories, transcribing all interviews and systematically discussing and analysing their findings.

All through the research process, the study was examined by fellow peers and a tutor, where all parts of the study were reviewed and discussed. This ensured that the researchers continued reflecting on the findings and stayed honest (Krefting, 1991).

### 3.5.4. Confirmability

Guba (1981) argues that the audit strategy is the major technique for establishing confirmability within research. In an audit strategy, an external auditor is following along through the research process with the purpose of understanding how and why decisions were made. Additionally, the auditor also considers the data, findings, interpretations, recommendations, and the process itself. The confirmability of a study is high if the

auditor would arrive at comparable conclusions given the same data and research context. For this study, the tutor carried out the audits by meeting the researchers through seminars on five different occasions spread out from the research start to finish. Furthermore, the study was examined by fellow peers to ensure trustworthiness and allow full transparency of the process.

## 4. Empirical Findings

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*The findings and experiences of the interviewees are presented below, divided into the four identified themes: ability, willingness, awareness and role of institutions. The empirical findings start with presenting the fundamental conditions of each studied family farm. Each sub-chapter contains quotes from the collected data to exemplify and enforce the empirical findings. Additional quotes are found in Appendix 2.*

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In Table 3, the fundamental conditions of each studied farm are presented. The table includes the generation currently in management, the sources of income, if the farm is operated conventionally or if it is ecologically certified, and the size in hectares (ha). Being ecologically certified means that the farm promotes locally produced food, biodiversity, and endangered species protection. Also, that it aims to protect the environment by keeping nutrients in the soil, reducing toxins, and respecting and adapting to animals' natural needs and behaviours (Jordbruksverket, 2021). The final two columns show whether the family employs additional labour outside the family and what degree of occupation the interviewees hold, outside their farms. To find more detailed descriptions of each farm, see Appendix 3.

*Table 3 – Fundamental conditions of the farms*

<b>Farm:</b>	<b>Generation:</b>	<b>Sources of income:</b>	<b>Conventional or Ecological:</b>	<b>Size of the farm:</b>	<b>Use of non-family labour:</b>	<b>Degree of occupation outside the farm:</b>
<b>A</b>	Fifth	Mutton Wool Firewood Events Stable and horses	Conventional	50 ha	No	A1: Full-time A2: Part-time
<b>B</b>	Eight	Leasing pasture Forestry Firewood	Conventional	150 ha	No	B1: Full-time

		Game meat				
<b>C</b>	Third	Milk Beef Contract driving Forestry	Conventional	220 ha	Yes	C1: None
<b>D</b>	Third	Milk Beef Forestry	Ecological	515 ha	Yes	D1: None D2: Part-time D3: Full-time
<b>E</b>	Fourth	Sheep Bed & Breakfast Café Boutique Events	Conventional	90 ha	No	E1: Part-time E2: None

#### **4.1 Model of CA implementation - based on empirical findings**

The empirical findings extracted from the interviews and observations on the five farms conclude that four main factors are deciding the implementation of CA practices. In addition to ability and willingness, which was identified in the literature, awareness and the role of institutions was identified in the empirical findings. As visualised by the arrows, the first order categories on the left influences the second-order categories, which in turn defines the four main factors.

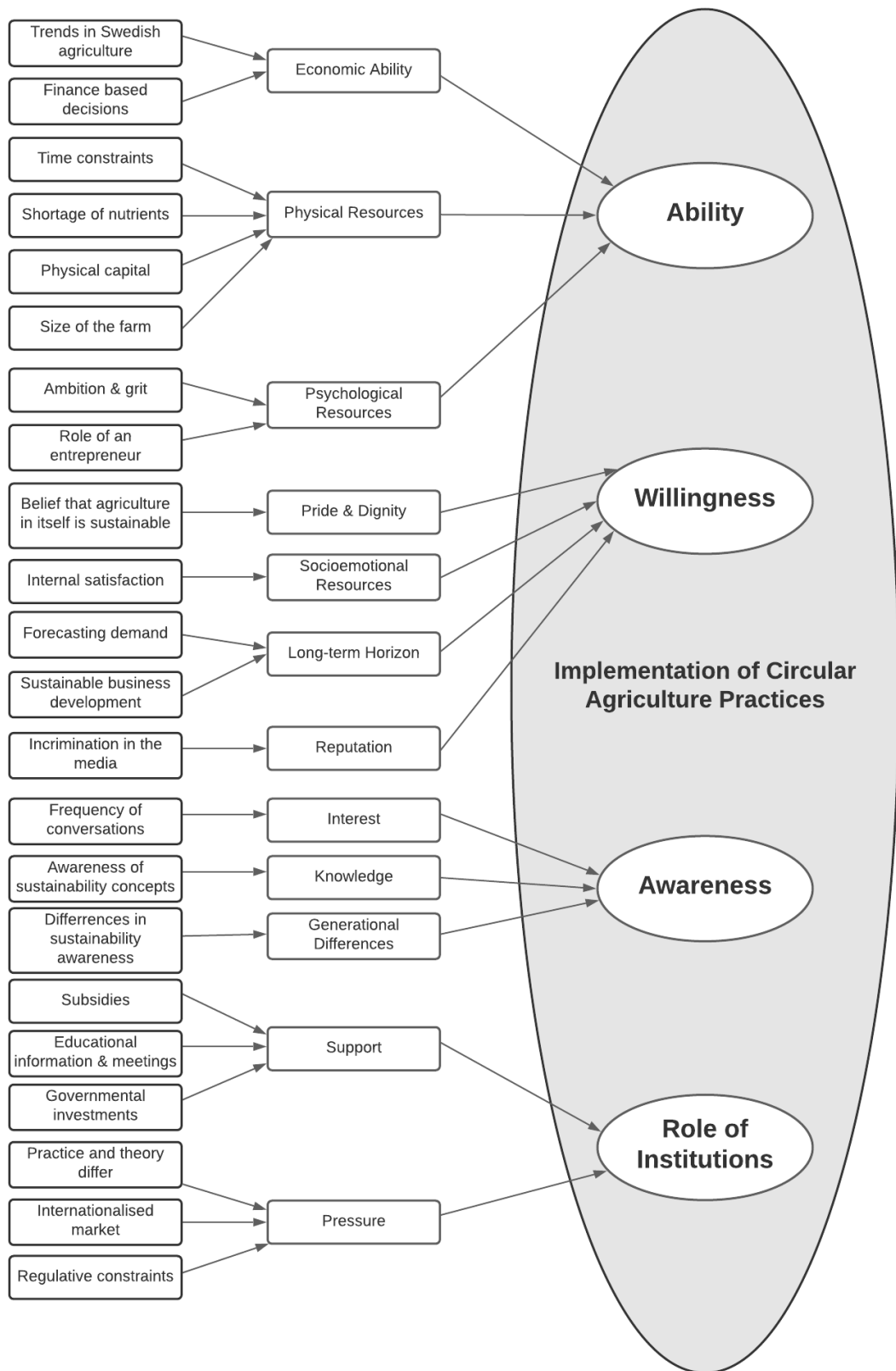


Figure 3: Model of data analysis of CA implementation – based on empirical findings

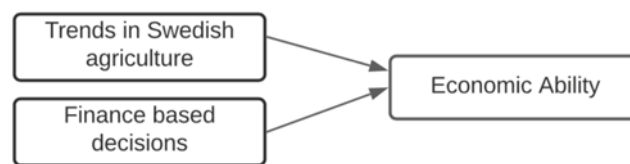
Note. Authors own figure based on empirical findings.

## 4.2 Family farmer's ability to implement CA practices

In agreement with the findings from the literature review, ability was found to affect family farmer's probability to implement CA practices. Below, eight first-order categories are presented along with their corresponding second-order category.

### 4.2.1 Economic ability

The first factor affecting the family farmers ability is their economic ability. The economic ability is influenced by two first-order categories 1) Trends in Swedish agriculture and 2) Finance based decisions.



*Figure 4: Economic ability*

The empirical findings revealed that all farmers were considering the ongoing **trends of the industry**. The major finding was the shared fear that fewer farmers could make a living on their farms. The low profit margins had already greatly affected four out of the five farms in moving towards more sustainable and circular practices in different ways. As an example, all five farms had made sustainable investment decisions to qualify for more subsidies. Additionally, farm A and farm B identified in what areas market demand is increasing and are in the process of adapting their activities accordingly.

*“I mean, I think we get as much profit now as my father-in-law did when he was young. So that is scary.” – D2.*

Because of the lack of income, many investment decisions were solely based on their ability to generate **financial output**. Some consequences of this harmed CA implementation in two specific cases. The hindering of installing solar panels and a biogas plant. Even though two of the farmers had planned instalment, the financial calculations could not justify the necessary investment. However, the researchers recorded several

investment decisions based on the financial output that also positively influenced sustainable and circular practices.

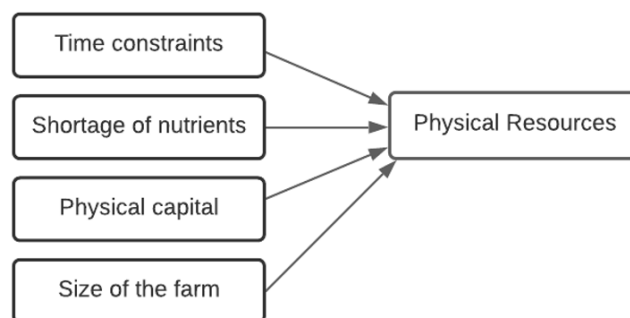
*“The economy is the driving factor. That is just the way it is. Let's say we would buy a new tractor, and the decision was between one that is run by hydrogen and one that is run by diesel... if it were less costly to buy the hydrogen fuel, it would justify a more expensive purchase. But if it is a more expensive purchase, more difficult to own and more expensive to run, we will not buy it. That is how it works.” – C1.*

One interviewee on-farm E clearly expressed a belief in CA practices being able to decrease costs and increase financial output.

*“Yes, I believe so. I see it even if I only look at my small business... How many sacks of soil would I need to buy if I did not enrich the soil I already have?” – E2.*

#### 4.2.2 Physical resources

The second factor affecting family farmer's ability is their physical resources. The physical resources are influenced by four first-order categories 1) Time constraints, 2) Shortage of nutrients, 3) Physical capital, and 4) Size of the farm.



*Figure 5: Physical resources*

As only three of our farmers worked full-time on their farms, **time constraints** had a noticeable impact. As the other six farmers had additional occupations that required time and energy, running the farm had to be done in the mornings, evenings and during the weekend. Most farmers felt that they did not have time to develop their skills or knowledge on CA in their limited spare time.

*"In periods, I have been helping out a lot. But I do not feel like I have the energy to do that when I work full-time. It has been too much. But I am still helping when I come home from work, feeding the animals." - A1.*

Farmers from all the different farms emphasised that one of the main challenges for agriculture is to return **nutrients** to the soil to avoid leaching. This is fundamental for agriculture as nutrients and bacterial culture is conditioning the ability for future yields (Foereid and Høgh-Jensen, 2004). Returning nutrients to the soil is an essential factor in CA because circularity cannot be achieved without it. The most common practices are to spread out organic matter from animals (manure) or artificial fertilisers. The animals are, therefore, great contributors to the agriculture circularity. Farm A, B, D and E exclusively used organic fertilisers in their fields. Farm C used both organic and artificial fertilisers.

*"That is why we use fertilisers, because we cannot close the loop. And the reason for that is that everyone is flushing garbage down the toilet. We cannot use the nutrients from the sewers because they are filled with too much garbage. If we could have used nutrients from the treatment plants fully, we would not have needed fertilisers because we would have had full circularity of nutrients. We ship away nutrients but get nothing back. Then nothing will grow... We want the grass clippings from your lawn, the bushes from your gardens and the sewers... everything that is biologically degradable and contain nutrients. We want it back in the fields." – D1.*

**Physical capital** such as buildings and machines also impacted the farmers' ability to implement sustainable and circular practices. They can be considered enablers to closing the loop. For example, solar panels are an enabler to produce clean energy.

*"I can influence, it is just about how much I can handle really. Because I have the ability with some buildings, machines and some capital, and that is when things become possible". – B1.*

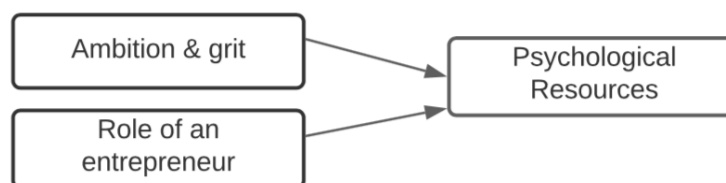
The **size of the farm** has also been observed to affect the ability to implement CA practices. Generally, the smaller farms appear to be more able to innovate and change



their activities to become more circular. For example, farm E is utilising the compost from their households and their sheep to fertilise their crops. This is enough to nourish their 90-hectare farm sufficiently. In contrast, farm D needs much more nutrients and time to fertilise their crops sufficiently on their 515 hectares.

#### 4.2.3 Psychological resources

The third factor affecting family farmer's ability is their psychological resources. The psychological resources are influenced by two first-order categories 1) Ambition & grit and 2) The role of an entrepreneur.



*Figure 6: Psychological resources*

All farms had more than one source of income, and during the interviews, it became apparent that the farmers were viewing themselves as **entrepreneurs**. The farmers searched for different ways to find liquidity in the enterprise and talked about the importance of their own **ambition and grit** for making the business financially viable. Even though their lifestyle could be challenging, many expressed their passion and emphasised the positive aspects.

*"And one more thing! Our son is developing events in the barn. [...] We have so many ideas... renting out our cottage, and I do not even know the half of it, ha-ha." – A1.*

#### 4.3 Family farmer's willingness to implement CA practices

In accordance with the findings from the literature review, willingness was found to affect family farmers probability to implement sustainable and circular practices. Below, five first-order categories are presented along with their corresponding second-order category.

### 4.3.1 Pride & Dignity

In three out of the five case studies, a general feeling of **pride and dignity** toward one's industry was identified. Several interviewees clearly expressed that the Swedish agricultural industry already was sustainable as it is, and that the problem originates from other actors. This empirical finding was often closely connected with the farmers feeling incriminated by the media and general opinion in Sweden, which will be further discussed in section 4.3.4.



*Figure 7: Pride & Dignity*

*"Agriculture is already circular. We work with biology every day. All we do is make grasses and crops, and animals, be healthy. That is the key to our success. [...] We are not the problem." – D1.*

This feeling of pride did not automatically mean that the farmers were utterly unwilling to implement CA practices. However, the feeling was connected with farmers experiencing less climate anxiety. Their non-sustainable actions were compensated by the fact that the natural capital on their land was capturing carbon.

*"If I can manage it [my forest] more efficiently or make the production increase, it will capture more CO<sub>2</sub>. Every ton of wood capture around half a ton of CO<sub>2</sub>. That means that I can drive how much I like and eat as much meat as I like because I have already compensated for it. I have no climate anxiety." - B1.*

In one case, the interviewee expressed the importance of transitioning the agriculture industry to a more sustainable and circular pathway.

*"If we are going to place these climate-investments on something, it should be here because about half... the entire climate transition is in the food industry, the agriculture and forestry." – E1.*

#### 4.3.2. Socioemotional resources

Three out of the five farms studied have demonstrated that **socioemotional resources** have increased their willingness to pursue sustainable, more circular practices. Several statements have contained comments like "That felt good" when referring to installing solar panels, taking care of waste or becoming ecologically certified. Such decisions are also made with the younger family members in mind and distinguish the farmers' identity. In the case of farm E, the farm was described as a constant in the family's and friend's life and how that motivates to keep developing it and nurturing its resources.



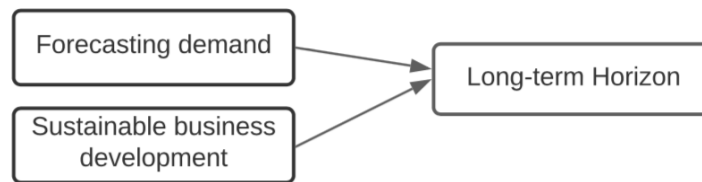
*Figure 8: Socioemotional resources*

*"Yes, and that is the thing I think is... [best about being ecologically certified]. First and foremost, the pesticides, that I do not need to handle them I think that was the thing that made me make the final decision. I never enjoyed using carbon filter masks and gloves and then taking them off and touching the tractor when I stepped outside. I had been driving in that fog... then I got home, and I had small children back then in 2005, that was not fun..." - D1.*

Furthermore, internal satisfaction and a willingness to carry on sustainable and circular practices were identified when a farmer prepared for the next generation to take over management of the farm. The aim is that the identity of the current management is passed on to the next generation.

#### 4.3.3. Long-term horizon

The third factor affecting family farmer's willingness is their long-term horizon. It is influenced by two first-order categories 1) Sustainable business development and 2) Forecasting demand.



*Figure 9: Long-term horizon*

The empirical findings reveal a strong effect on the willingness to adapt if there is a trend or clear nudge in the market. **Forecasting market demand** is important when deciding which activities or innovations to pursue, and it can have a large impact on making the farm more circular. Farm A and B both expressed a general increase in the markets interest as vital for sustainable development. Farm A has adapted its business model according to trends in demand for locally produced meat and products from sheep. Farm E agrees that market trends in demand and prices greatly influences farmers strategies towards circularity.

*"What would happen if the price on wood was five times what it is today? You would let the trees grow longer, use the wood more carefully, reuse it, and not burn it up for fuel or heat. It would give great environmental effects." – E1.*

**Sustainable business development** is another symptom of having a long-term horizon. For example, farm A is considering investing in solar panels and is currently expanding its eco-tourism offering and are planning the future of their farm with a concern of the next generation. Another example is that Farm D decided to become an ecological farmer and expressed an interest in pursuing "regenerative agriculture". However, sometimes the sustainable business development is initiated by the market.

*"When we started, we had a tractor with 75 horsepower, consuming 20 litres [of fuel]. Now we have a tractor with over 200 in horsepower, which needs 14 litres. So that development has not been something that we have affected. It has been developed by many." – C1.*

However, two interviewees also raised concern about where the current trends in the market are headed and that the public cannot make informed decisions about sustainable products.

*"People have no knowledge, and then they go public in social media, so the wrongful information spreads. I think it is scary, so yeah, we never know what might happen." – D2.*

#### 4.3.4. Reputation

Another factor found to affect how a farmer operates their business, and their willingness to operate a farm at all is how they are currently **portrayed in the media**. A general sense of frustration and a gap between how a farmer feels about his business and how the public perceives it.



*Figure 10: Reputation*

*"'The horrible agriculture with the meat production' ... it is so far from reality you almost fall apart. Most farmers know this. But if I write on social media and talk about this, people will say it is LRF (Swedish farmer association)-propaganda. It will just spiral into a debate. It is not worth it. And the problem is that people will not even listen". – D1.*

In one more case study, on farm C, the interviewee agrees that the agricultural industry is not perceived to be climate aware in the media. However, the farmers themselves believe it is. This gap in perception makes the farmers less inclined to adapt CA practices since they feel misunderstood and alienated by the public. Farmer E1 believes that being a local actor who produces and sell products locally will be appreciated and be exposed to less incrimination by the media.

#### 4.4 Family farmer's awareness of CA practices

In addition to the ability and willingness paradox identified in the literature, the empirical findings support awareness to affect the implementation of CA practices. The more aware the farmers are, the more likely they are to implement CA practices. Awareness of CA is influenced by the farmers' interest, knowledge and long-term horizon.

##### 4.4.1. Interest

The first factor that is influencing farmers awareness of CA is interest. This was examined via the farmers' frequency of conversations about sustainable agriculture in general and CA more specifically. Almost half of the interviewees expressed the habit of regularly speaking of sustainability, while the other half were only talking about it or seeking new information when facing a new challenge. Those with expressed interest were very invested both in their own farms' development and the national and global development.



*Figure 11: Interest*

*"I was about to answer that we hardly discuss anything else... but yes, of course, we talk about it a lot... it is E1's main interest, and I am very interested as well."* – E2.

##### 4.4.2. Knowledge

The interviews suggest a considerable variety in the farmers' **awareness of concepts** like CE and SDG's. In cases of a high level of **knowledge**, the researchers found it correlated with the implementation of sustainable and circular activities on their respective farm. Knowledge about regulations and criteria for obtaining environmental subsidies is overall high. More on regulations in section 4.5.2.



*Figure 12: Knowledge*

In several of the interviews, the farmers did not recognise the term CA. However, when the researchers explained the term, the interviewees realised that they already were conducting CA practices on their farm and had this in mind when strategising. However, the ambition among most farmers to go beyond regulations is limited and therefore, time spent on acquiring additional knowledge of sustainable, circular practices is overall low, with a couple of exceptions.

*“We want the soil to stay healthy. Because if the soil is not healthy, the crops will not be healthy. They must return to the soil again to make it more nutritious. It must function all the way. You cannot impoverish the soil of nutrients continuously... that is why he (D1) wants to take these courses in regenerative agriculture. Because if you use conventional methods and use a bunch of pesticides, the crops might look great and grow tremendously, but what else is happening to the soil? Well, you kill many of the microorganisms down there that are the ones that are actually making the soil healthy.”*  
– D2.

#### 4.4.3 Generational differences

All respondents commented on the **generational differences** at their farms, more specifically, how the different generations feel and think about sustainable practices. The empirical findings indicate that the older generation expressed less or no interest in sustainable development, but not in every case.



*Figure 13: Generational differences*

*“It is about generations once again. We are more susceptible because we see what might go wrong and have read more. The older generation has not studied this in school in the same way. That is at least one reason why we see it differently. So I do not argue that much with them, I do not want us to become enemies.”* – B1.

Farm A also expressed how they often found metal scraps and other wastes buried in the ground by former generations and that they have worked many hours to extract it and make use of it. However, they also stated that the generation after them were even more invested in sustainable development.

*"Our kids are even more aware than us"* – A1.

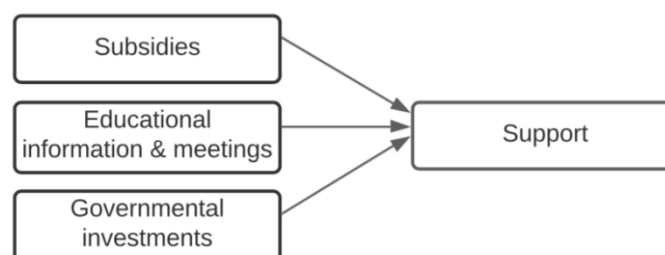
The interviews in three cases indicate that the awareness of CA practices increases with the younger generation. However, in two cases, farm D and farm E, the generation who was currently in management showcased more interest and knowledge than the one following.

#### **4.5 The role of institutions and family farmer's implementation of CA practices**

Finally, the fourth factor identified as affecting the family farmers probability to implement CA practices is the role of institutions. Just like awareness, this factor has been identified in addition to the ability and willingness paradox. This final factor is divided into two parts, support and pressure.

##### **4.5.1. Institutional support**

The first way in which the role of institutions affects family farmers is through their support. This factor, in turn, consist of three first-order categories 1) Subsidies, 2) Educational information & invitations to meetings, and 3) Governmental investments.



*Figure 14: Institutional support*

As explained in section 4.2.1, financial aids play a crucial role in pursuing CA practices. It is identified as the first-order category with the most effect on the farmers' perception



of being supported in a way that benefits them. In the case studies, **subsidies** have been used to finance ponds, plant new deciduous forests, and invest in business development.

*"The thing that made us finally take the decision was that, well, the county gives subsidies [...] and we also get a little bit of support from EU every year since it is a surface of water and it contributes to biodiversity." – B1*

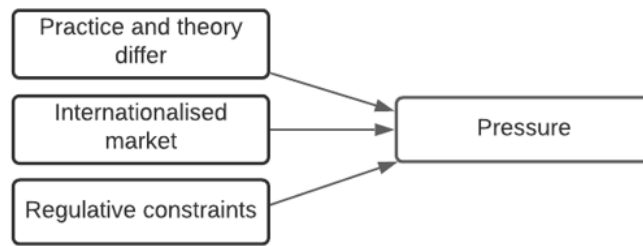
Furthermore, another supporting factor identified in the data is educational information and invitations to meetings. All farms from the study state that they frequently get **information** from the government, organisations and institutions. Whether they are perceived as a support or a pressure differs. The farmers also get **invitations** to meetings where they both get the chance to exchange best practice experiences and get inspiration from lecturers. This is often where the farmers get information about sustainable innovations and how to implement them.

Finally, two interviewees talk specifically about how **governmental investments** could accelerate the implementation of CA practices on Swedish family farms. Both regarding pensions and research investments. Furthermore, that the investments should be done locally and enable actions locally. One interviewee mentioned the example of wind turbine parks. If the local population do not benefit from having the park on their land, it is understandable that they fight it.

*"If there is anything that our pension funds should be invested in, it is these wind parks. It is a safe return on investments. But they have not invested a single SEK in it. Instead, it is the foreign pension funds that, if we put it like that, continue to harvest benefits here. [...] Why do we not invest our pension funds in renewables? I mean... it is thousands of millions of SEK." – E1.*

#### 4.5.2. Institutional pressure

On the other hand, farmers from all cases mentioned at least once how pressures from institutions affect them, often decreasing their probability of changing or innovating. The collective factor is built on three first-order categories 1) Practice and theory differ, 2) Internationalised market and 3) Regulative constraints.



*Figure 15: Institutional pressure*

Several interviewees identified situations where they felt that the criteria and the pressures from institutions **differed from their reality**. The pressures would, in those cases, be regarded as uninformed, and the farmers felt like no one understood their reality. Hence, they became reluctant to adapt to or follow said pressures. For example, farmer B1 perceives the SDG's as a positive development and wants to contribute to reaching the goals, but sometimes feel the people in governance are distanced from reality. Farmers from farm C, farm D and farm E agrees.

*"I understand that when you form rules and criteria for these kinds of subsidies, of course, I understand that you have to make them controllable and manageable. And that is where practice and theory sometimes differ." – C1.*

Furthermore, since the Swedish farmers compete on an **internationalised market**, they compete on price with farmers operating in different contexts and climate conditions. Also, regulations in Sweden are different from other countries. The regulations prevent the farmers from charging extra for their efforts since those efforts are required by law. In this way, regulations make farmers less likely to adopt circular practices if they are not voluntary. By forcing everyone to do something, the competitive advantage is taken away, and the farmer loses a way to increase their income.

*"A conventional farmer competes on the international market, and we are the only country in the world that has regulations on grazing. That is why we want to get rid of that law. Because then we cannot charge extra for it. When you have a law, you can never charge extra for it." – D1.*

Finally, the last identified pressure are the **regulatory constraints** put by the government, organisations and municipalities. This has reportedly affected the farmers' implementation of CA practices in a straightforward way. Two of the farms, C and D, both reported that they were considering installing solar panels but was hindered by the regulations regarding the possibility to sell the excess energy produced by them, which has also been discussed in section 4.2.1. They both talked about the potential energy that could be produced and exported from their farms, but the regulations made it non-beneficial to invest. Farm D had also made steps towards installing a biogas plant, but regulations on them as a KRAV-certified farm made it impossible.

The regulations were even mentioned as one of the most demanding parts of being a milk producer overall. They were the main reason for farm E to switch from milk production to their current business model. Also, frustration was expressed on the fact that the same information often is reported to different institutions.

*"The government decided three or four years ago that regulations for Swedish farmers should decrease... Instead, it is increasing all the time. That is what is making people quit. We became farmers to grow things and take care of animals. Not to sit at the office all the time. [...] We want the government to reconsider. To have them collaborate on the control systems."* – D1.

#### **4.6 Currently implemented CA practices**

As identified in section 2.3.1, CA practices include 1) Making an analysis, 2) Closing the loop, 3) Producing clean energy and 4) Extending social networks and collaborations. The four practices were investigated on each farm both by interviews and observations.

##### 4.6.1. Making an analysis

No farm had done such an analysis as Murillo et al. (2020) are referring to. This first step of CA implementation is therefore unfulfilled. However, four out of the five farms had conducted other types of analysis, such as analysis for nutrition in the soil and financial analysis before investment decisions and inventory controls. One interviewee at farm E also described that thoughts about what goes into the farm and what goes out of it are always in the back of their minds.

*"When we applied for subsidies, as you can do when you purchase the milk-robots, then we hired a consultant. It was not really an analysis, but we examined our operations and conditions, and he wrote some of it down. So, we looked at different segments... it is not an analysis but something similar."* – C1.

#### 4.6.2. Closing the loop

Jun and Xiang (2011) proposed that the basic principle of closing the loop is to reduce non-renewable inputs and waste, reuse resources multiple times and recycle products that have served their purpose. Firstly, only two farms were run by a low carbon renewable source even though all farms had considered installing solar panels. Some expressed a clear motivation for installing solar panels in the future.

Secondly, it was easy to identify isolated closing the loop-activities like reuse of old windows to build a greenhouse, promote biodiversity and capture nitrogen by digging a pond and recycling plastics and other waste products. Farm E worked actively to design out waste by using waste products from the sheep, utilising rainwater and food waste and implementing them in the growing of greens and root vegetables.

Each of the five farms used organic fertilisers to return nutrients to the soil but in various degrees. Another common activity was to purposefully sequester carbon through their natural resources on their land. Farm E also used methods of regularly growing legumes on their land to bind more nitrogen and phosphor in the soil to maintain its nutrition level.

*"The entire idea of modern agriculture is to think more recycling. To purchase as little input as possible and use what you already have. [...] Because often we cannot raise the price of the products we sell, but we can save on how we produce them."* – B1.

#### 4.6.3. Producing clean energy

The production of renewable, low-carbon energy is an important part of CA. Farm D considered installing a biogas plant and solar panels but found that neither of them was financially beneficial. Apart from that, they regarded biogas and solar panels as an attractive CA practice. Farm A and C had also considered installing solar panels but came

to the same conclusion. All three farms argued that the current taxation of selling electricity was the main factor for their decision. If you want to sell more self-produced electricity than you use, your tax reduction is no longer valid, which greatly affect the ability to save money on solar panels (Skatteverket, 2021). The farmers argued that if they could sell more electricity with tax reduction, they could justify the high investment cost of the instalment. Farms B and E were the only farms that already had solar panels. Furthermore, farm E participated in founding a wind turbine park, providing electricity to the local households.

*“Yes, we have talked about building a biogas plant here. But since we are a part of KRAV[-certification], it is not much that we can put in it. It is very difficult to get things approved. [...] With regards to what we are allowed to insert and the possibilities with subsidies and all of that, we found that we would barely brake-even. And that is if we include the fertilisers when we calculate.” – D2.*

*“Nowadays, large corporations build large facilities where they use waste from both the urban and rural areas, often with foreign owners. [...] I think the environmental benefits decrease since this results in many and long transports, with these kinds of facilities. [...] I think there should be at least one facility in every village, just like solar panels should be required when building new houses. Today the power lines in Sweden are too small to transfer electricity from the north to the south. Why not produce electricity where it is consumed?” – D1.*

#### 4.6.4. Social networks and collaborations

Murillo et al. (2020) argued that establishing partnerships with surrounding farms will bring further environmental and economic benefits. Farmer B1 expressed a kind of partnership with a neighbouring farm with the purpose of exchanging services based on expertise, and an irregular habit of meeting other farmers and participating in information meetings regarding forestry.

*“I can trade game-meat with my friends, and I can go work for a friend for a day, and he can then come and work for me a day. He is better with machines, so he fixes my forest trailer, and I can advise him in forestry because that is my expertise. [...] So, it is a win-*

*win. The alternative is that we buy those services for 500-600 SEK an hour. This way, you also nurture your relationships." – B1.*

Farmer D1 frequently discussed farming activities, ideas and investments with a close neighbour. He was also regularly participating in courses and farming discussion groups. Farmer D3 was currently extending his growing network in his class at the agricultural high school and expressed positivity towards farming networks. Farmer C1 was previously frequently participating in courses from the Swedish farmer association, but that was some years ago. He still met up with other farmers in the area to share information, discuss and sometimes listen to invited speakers.

*"That network could have worked well [network of classmates]. I do not know, but I think it is mostly us farmers that could help each other. No one else seems to want to help. – D3.*

*"Often, the best part of the courses is the exchange of experiences among the farmers. Because the existing literature is often already five years behind the best farmers. – D1.*

Farm E had been participating in a project where the neighbours let wind turbines be built on their land. All neighbours could divide the risk of the investment and collectively reap the profits. The project had brought them closer together, and they feel that they can ask their neighbours for help but that people generally "take care of themselves". Farm E also took part in a network of local entrepreneurs when starting their bed and breakfast. However, that network is not active today because many had to close their businesses. Farm A was the only farm that did not regularly meet other farmers, with time constraints expressed as the main reason.

*"When the storm Gudrun destroyed a lot of the forest around here, we saw that opportunity... we looked around and thought, 'What will we do with these lands now? It will not grow many trees in the near future'. So, the neighbours around here came together and started projecting the wind turbines that we see here today." – E1.*

Even though networking among farmers overall was found as common, few business partnerships with an exchange of goods, services, materials, energy, waste or other transactions – other than information and idea-sharing - was identified by the researchers.

## 5. Analysis

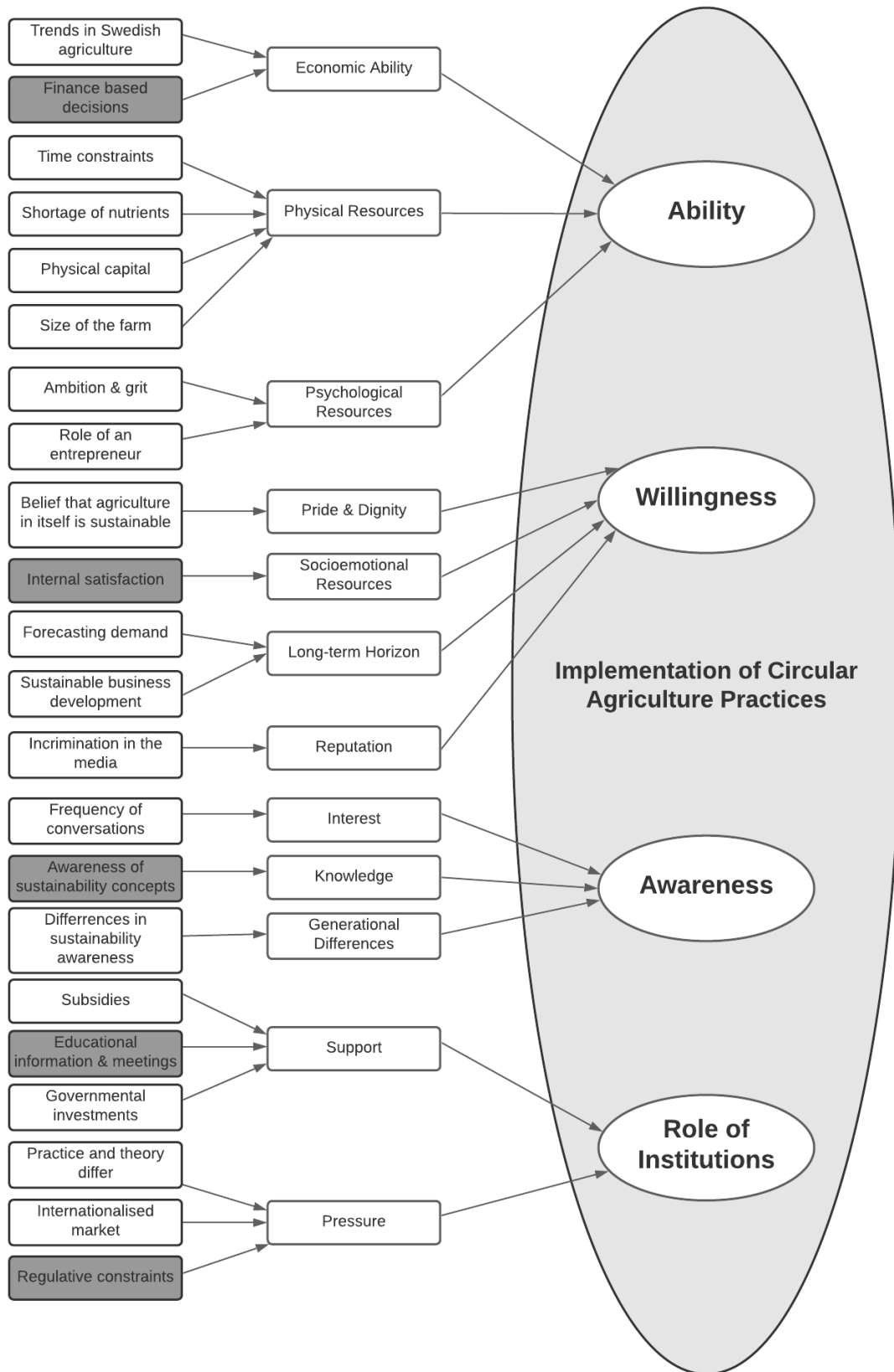
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*This chapter will analyse the empirical findings in relation to the existing literature on circular agriculture implementation and family farms. This will, in turn, address the research questions of this study and fulfil its purpose. The chapter is divided into five sections, where the identified themes, ability, willingness, awareness and role of institutions are presented separately. Finally, all four sections are synthesised, and a model is presented to illustrate the emergent framework.*

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The chapter begins with the presentation of a model where the results from the empirical findings and the frame of reference are combined, see Figure 16. The model indicates which first-order categories from the empirical findings that **do not** agree with the findings of current literature. These categories are marked as grey boxes. After the model, a deeper analysis of each identified theme and the most important findings follows.





*Figure 16: Model of empirical findings alignment with theory.  
 Note. Authors own model based on empirical findings and frame of reference.*

## **5.1 Ability**

De Massis et al. (2014) urged scholars to research sources that affect family firm's ability and willingness and how those, in turn, affect their behaviour. Empirical findings in this study answered this call in the field of agriculture. The researchers found four important sources that affect ability in the context of family farms.

### **5.1.1 Shortage of nutrients**

The shortage of nutrients greatly decreased the farmers' ability to implement CA practices since bringing back nutrients to the soil was a challenge that all farms faced to close the loop. This was found to be fundamental for agricultural efficiency and for the farms to build a circular system (Zhu et al., 2019).

The current solution to this challenge is for farmers to let ruminants fertilise the soil "naturally". This solution was regarded as the optimal solution amongst the farmers since the alternative is to use expensive artificial chemical fertilisers or drain the soil of nutrients. However, this requires all farms to use ruminants even though methane release from ruminants is identified as one of the main polluters in Swedish agriculture (Naturvårdsverket, 2020). In one of the interviews, an interesting idea was discussed as an option to the current solution. To return biodegradable matter from the cities to be used as fertiliser for the agricultural fields, including waste from the cities sewers where the nutrients usually leave the economy's loop. If that were possible, it would enable not only the farms to become circular but also make our entire economy circular.

### **5.1.2 Finance-based decisions**

Empirical findings from this study highlight the importance of financial ability to enable the pursuit of CA practices and gain SEW. Concern over finances was a common finding and greatly influenced the strategic behaviours of the farms, in contrast to previous studies (Block and Wagner 2013; Berrone et al., 2010). This caused most of the farmers to secure income from other occupations, which limited the time and energy they could use for activities on the farm. Their time and energy often only covered day-to-day activities and prevented them from analysing and making strategic improvements on their operations and activities.

The interviewees mentioned that the development of having to compete on the international market and at the same time have high regulations pushed down the pricing of their products and increased the cost of running the farm. This had led to very low, if any, profit margins for most farmers who need to pursue financial profit or risk losing their livelihood and a large part of their family identity. This confirms Chrisman et al.'s (2015) question on how inability to innovate causes family farms to lose competitiveness and ability to survive.

### 5.1.3 Size matters

The size of the farm was clearly affecting the farmers' opportunities to make a living on solely the farm itself. The larger the farm, the more full-time employees. Yet, farmers on the smaller farms were found to be more entrepreneurial, more probable to implement CA and consequently were the most circular. An example of this is that smaller farms typically have more sources of income than larger farms, often even income from outside of the farm. This enhances their ability to invest in new activities. It could be argued that it is more difficult to strategically implement a circular system on larger farms since they compete on the international market and opt for efficiency above everything else. In comparison, the smaller farms compete on the local market that has different demands. The benefits of close local relationships are supported by Murillo et al. (2020).

### 5.1.4 Networks and collaborations

The motivation for reducing cost or making profits is causing farmers to take on the role of an entrepreneur and use networking as a business activity, which is in line with the literature on CA implementation (Yoshida et al., 2020, Sumane et al. 2018); Networking is identified as an important source for CA innovation (Murillo et al. 2020), but empirical findings reveal that business partnerships are not common in Swedish agriculture. The lack of collaborations reduces the farm's ability for innovation and is an activity the farmers should prioritise if they pursue CA implementation. This is confirmed by the few findings that showed that networking led to CA implementation, for example, in the case of farm E that, together with its neighbours, leased out land for a wind turbine park.

Conclusively, in contrast to the ability and willingness paradox (Chrisman et al., 2015), several empirical findings suggest that family farmers ability is overall low.

## **5.2 Willingness**

The findings of this study showed that three important characteristics influence family farms willingness to implement CA practices the most. In literature, Chrisman et al.'s (2015) identified sources for the lower willingness among family firms - lack of necessary skills within the family and resistance to share control with non-family managers with such skills and hesitance towards external financing – but the empirical findings did not support these sources to be influencing.

Highly subjective sources such as the farmers' personal belief in sustainable agriculture, the farmers' lifestyle and important life-cycle events on the farm are found to be influencing the farmers' willingness of CA implementation. However, since the differences among the farmers naturally are varied, it is difficult to derive any implications from these sources. Instead, other reasons showed to have a much more significant influence.

### **5.2.1 Risk-aversion**

In addition to the five first-order categories, it became obvious that risk-aversion is very influential for farmers willingness. This is a latent finding since the farmers did not explicitly use the term risk-aversion, but the researchers identified it as a shared characteristic of the farmers. When combining several of the individual first-order categories it revealed that a feature they shared was risk-aversion. This is in line with Fitz-Koch et al.'s (2018) description of what distinguishes family firms from non-family firms. Even if most farmers would like to invest more in CA, the extensive investment cost and the risk of losing money on the investment was common arguments for why the farms did not invest. Therefore, the risk-aversion among family farms is likely enhanced by the low-profit margins of the industry.

### **5.2.2 Socioemotional resources**

Empirical findings partly support literature on non-financial benefits as one of the motivations for family firms (Block and Wagner, 2013). If the family identity includes sustainability, then sustainable and circular agriculture practices will be pursued. However, this study finds that when low-profit margins threaten the family farm, financial goals triumph over internal satisfaction, which adds to the literature. This can be

explained by the risk of losing the non-financial resources that the family members already derive from the farm if they can no longer afford to operate it.

### 5.2.3 Long-term horizon

Empirical findings also support literature on the characteristic of a long-term perspective (Dolucà et al., 2017). They showed that market demand for sustainable products and methods increased willingness for CA since forecasting was proven to be profitable. The ability to foresee and meet customer demand invisibly steered the business activities on most farms. Another "invisible hand" that made CA implementation easier were innovations such as biogas, solar energy, or more energy-efficient machines. In these cases, the farmers had little to no influence, but they moved the industry towards CA.

Conclusively, in contrast to the ability and willingness paradox (Chrisman et al., 2015), ability seems to restrict willingness since low profit margins and time constraint enhances risk-aversion. So, despite that empirical findings indicate a high willingness, risk-aversion typically triumphs.

## 5.3 Awareness

Apart from ability and willingness, awareness has been identified as a crucial factor in implementing CA and therefore added to the final model of CA implementation, see Figure 17. This theme is related to willingness but differs slightly. As Siebrecht (2020) claimed, awareness and knowledge have been found crucial for family farms innovation for sustainable agriculture. This translates to the farmers understanding of the industry's problem and the methods to solve it, not only that they are motivated to do so. Essentially, they need to know what needs to be done. The willingness to do "something" is not enough. Three sub-factors were found to affect the level of awareness: 1) Interest, 2) Knowledge, and 3) Generational differences.

### 5.3.1 Interest

Firstly, one of the factors found to be singlehandedly affecting the level of CA implementation was the time devoted to conversations about sustainability in general, or CA in particular. This was by the researchers translated to interest since it communicates an understanding of the problem, a desire to spend time thinking about it and a yearn to

educate and include others in the pursuit towards sustainable agriculture. The empirical findings clearly indicate that the more time spent talking about CA, within the family or outside the family, the more CA practices are implemented or considered to be implemented. Compared to the other factors affecting awareness, this was the one found to be the most important.

### 5.3.2 Knowledge

The empirical findings on knowledge both confirm and contradicts Siebrecht's (2020) statement that knowledge is crucial for sustainable development. In the first half of the interviews, the participants were asked if they knew the concepts of CE or CA, to which many replied that they did not, or they displayed uncertainty or a lack of confidence in the area. However, as the interview proceeded, the same respondents did in several cases mention practices on their farm that fit into the category of CA perfectly. They simply used other words or phrases to describe them rather than circular. This did not mean that they were unaware of the aspects and principles included in the concept. Ultimately, academic knowledge seems less important than practical knowledge. Whether the findings confirm or contradict Siebrecht's (2020) statements then depends on how one defines the word knowledge. Furthermore, Sumane et al. (2018) finds that farmers value their peer's knowledge the most as it is perceived as practically, personally and locally relevant. This is confirmed by our interviewees who would rather gain knowledge from their colleagues than institutional education or textbooks.

### 5.3.3 Generational differences

Finally, the difference in generations was found to play a role in the level of CA implementation, but not in the same direction in every case. The empirical findings indicate a volatile interest and awareness where every other generation express more or less interest than the one before. This could be explained by the problem of sustainable development feeling less urgent for the younger generation when their older family members were already finding solutions.

## **5.4 The role of institutions**

Similarly to awareness, the role of institutions has been added as a separate theme to the model of CA implementation, based on the empirical findings. Literature indicates that

support from institutions will influence both a firm's willingness and ability to adapt CA practices (Atinkut et al., 2020; Härrri et al., 2020). Also, this study revealed the role of institutions to raise many emotions and, overall, negatively affect the ability and willingness to operate in the agricultural industry at all. Hence, this theme is given its own place in the final model. There are two ways in which institutions affect farmers, by 1) Support and 2) Pressure.

#### 5.4.1 Institutional support

The single most appreciated and efficient way to support farmers seems to be monetary support through subsidies, which highly agrees with current literature (Atinkut et al., 2020; Härrri et al., 2020). Subsidies have, in many cases, both enabled and hindered CA practices, according to the empirical findings. Hence, it is one of the most critical factors affecting CA implementation overall. The current study reveals that it not only aids the farmers who already have a deep awareness and willingness. But also, that it nudges the ones who showcase lower willingness since it provides an additional incentive, financial profit. It is also proven that if awareness and willingness exist, the lack of subsidies might lead to no action being taken since financial profit is fundamental in every investment, as explained in section 5.2.1. Other forms of support offered by institutions are not valued as highly by farmers as monetary support. Only a few farmers frequently engage in the meetings and courses offered by organisations. In two cases, the information sent to the farmers is regarded as pressure rather than support.

Furthermore, two interviewees suggest that the government make investments to support the industry in their pursuit towards CA. In both cases, the argument is made that finances decide where development is pursued. Preferably, governmental investments should be made locally. In conclusion, to support farmers in their development of sustainable and circular practices, institutions should take on the role of an investor, not an information distributor or educator. This challenge the statements of Sumane et al., (2018) on institutions being a facilitator of knowledge.

#### 5.4.2 Institutional pressure

One aspect found to highly differ from literature is the attitude towards institutional pressures. In theory, family firms are recorded to respond well to it (Berrone et al. 2010). However, in the empirical findings of this study, respondents indicate the opposite. This draws light to how a family farm may differ from a general family firm. However, another reason, also backed by the empirical findings is that the pressures or restrictions put on the farmers are regarded as unrealistic. In all cases but one, several respondents indicated that the regulations and criteria installed by organisations and institutions are uninformed and unable to be met. However, a single respondent on farm D confirmed one aspect of Berrone et al.'s (2010) claim by mentioning that their farm aims to meet regulations and exceed them. Since this farm was also one of those that demonstrated the most profound interest in sustainable agriculture, this desire likely stems from that interest, not the fact that they are a family-driven farm.

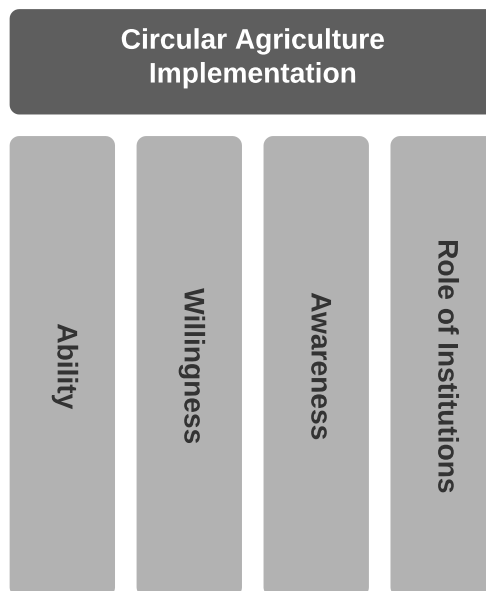
Also, emphasising the importance of financial income for farmers, directives regulated by law are regarded as counterproductive. They are perceived as taking away the ability to implement sustainable practices to gain a competitive advantage. The same principle applies to regulative constraints that hinder financial profit. If an investment results in more circular practices, it will only be pursued as long as it also generates financial income. Hence, farmers need to be handled and regarded by institutions as business owners, not as people who have chosen a particular lifestyle and are willing to put finances aside to gain SEW or confirm their identity. To summarise, in the case of institutional pressure, it is crucial that the regulations and laws are conducted in accordance with the reality of the farmers and that they do not prohibit the farmers' ability to generate income.

#### **5.5 Emerging framework for CA implementation**

As Hansen (1996) concluded, a holistic approach is needed to comprehend the transformation towards sustainable agriculture. A holistic approach where farmers and other stakeholders collaborate are also enforced by Stål and Bonnedahl (2015). In accordance with a holistic approach to sustainable agriculture, particularly CA implementation, an emergent framework has been formed, shown in Figure 17 below. The framework shows that not only ability and willingness affect CA implementation,



but awareness and the role of institutions also need to be taken into consideration. It should be interpreted as four pillars supporting a “roof”. Without one of them, the foundation will be unstable, and the roof will collapse. Meaning that farmers will fail to implement CA practices if one or more pillars are absent. This elaborates the theory of the ability and willingness paradox (Chrisman et al., 2015). The empirical findings in this study suggest that ability and willingness are not enough to answer the posed research questions, but two other themes are also crucial. How these four themes succeed in fulfilling the study's purpose and research questions will be further explained in the next chapter.



*Figure 17: Model of circular agriculture implementation.*

*Note. Authors own figure.*

## 6. Conclusions

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*In this section, key findings are presented, the purpose is met, and the two research questions are answered.*

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This study purposed to explore Swedish family farmers' ability and willingness to implement circular agricultural practices. Overall, the findings indicate that the ability and willingness paradox in the context of Swedish family farms might be inverted. Meaning that this study argues that there is a high willingness to implement CA practices among the family farmers and that ability is the factor that is preventing CA implementation. In addition to this conclusion, the findings also suggest that awareness and the role of institutions are influencing factors that both enforce and restrict CA implementation. The purpose is divided into two research questions, which are answered below.

*RQ1: How does family farmer's ability and willingness to innovate affect their implementation of circular agriculture practices?*

In contradiction to the literature, this study suggests that family farmer's ability to innovate is overall low and is influenced by economic ability, physical resources and psychological resources. The farmer's willingness to innovate is overall high and is influenced by pride & dignity, socioemotional resources, a long-term horizon and farmers reputation. In addition to the suggestion that the farmer's ability is preventing CA implementation, findings suggest that awareness and the role of institutions are two other factors that are affecting it. It is not enough for farmers to want to change "something", but they must be aware of what it is that needs to be changed. Also, institutions provide guidelines to which farmers need to adapt. Therefore, this study argues that Swedish family farms must have sufficient ability, willingness, awareness, and even institutional support to ensure CA implementation across the industry. The researchers conclude that a holistic perspective is a requirement for making transformational changes in the agricultural industry.

*RQ2: What differentiates a family farm that invests in circular agriculture practices from a family farm that does not?*

The findings suggest that small-scale farmers have better conditions for implementing CA practices since they typically have an occupation outside of the farm, making them less risk-averse. Findings suggest that smaller farms operate on local markets and have several sources of income which increases their financial ability. Smaller farms usually are less regulated and therefore less pressured, which was found to restrict the larger farms. Since risk-aversion was found to be a dominant characteristic of the family farms, this meant that farms with low-profit margins did not implement CA practices despite the farmers' willingness to do so. These are important findings, showing that financial ability and institutional pressures are crucial for family farmers implementing CA practices.

## 7. Discussion

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*This final chapter discusses the study's contributions to literature as well as the practical implications for farmers and institutions. It concludes by mentioning the study's limitations and suggesting further research.*

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### 7.1 Contributions

This research provides three key contributions. Firstly, it contributes to the literature on family firms in the context of the agricultural industry by elaborating on the ability and willingness paradox by Chrisman et al. (2015). De Massis et al. (2014) urges scholars to research ability and willingness simultaneously to find how they interact and influence family firm's effectiveness when innovating. By following this call, this study has added two additional themes to the paradox: awareness and the role of institutions. This contribution acknowledges Siebrecht (2020) statements that awareness and knowledge are crucial for a family firm's transformation.

Secondly, the study contributes to sustainable development within the agricultural industry by researching conditions for its practitioners. It does so by explicitly answering the call by Zhu et al. (2019) to gather empirical work at the level of individual farmers regarding the development of CA practices. Siebrecht (2020) further argues that to speed up sustainable development, studies need to involve actual practitioners of family firms, which this study has considered.

Finally, since the study is context specific it answers the call for contextualizing entrepreneurship research (Baker and Welter, 2018; Zahra, Wright and Abdelgawad 2014). It adds to current literature by conducting the study in a country where, to the best of the authors' knowledge, it has never been done before. This adds another socioeconomic context to the literature and nuances it further. This also addresses Chrisman et al.'s (2015) questions on how the paradox differ in new contexts by bringing light to the uniqueness of the agriculture industry and its practitioners.

## **7.2 Implications**

The initial intention was to provide practical implications for farmers; however, during the research process, it became clear that institutions play a more critical role in CA implementation than any individual farmer. Meeting regulations, seeking subsidies and reporting numbers are moving the farmers away from their crops and animals while giving them less time and economic freedom to pursue necessary investments in CA practices. This could be addressed by institutions adapting the role of an investor, not an educator since it would address the problem of farmers financial situation and high institutional pressure. The farmers low-profit margins are generally the cause for their risk-aversion and they could lose more than money - pride in their work, to be able to hand over the farm to the next generation and other non-financial goals. Being a family farmer is not only a profession but also a part of their identity.

This study argues for the importance of a holistic perspective and the need for institutions to include the farmers in their decision-making processes. This would ensure that theory and practice better align, develop a better understanding of the institutions' purpose among the farmers and help connect the rural and urban areas. Because of the farmers' low-profit margin, the researchers believe that Swedish family farmers would more likely implement CA practices if they could find a local market and avoid competing internationally. The researchers argue that a national goal for greater self-sufficiency could be a crucial method in Sweden's strategy to develop a CE.

## **7.3 Limitations**

This study is not without limitations. Firstly, the data was gathered from one single perspective, the farmers themselves. While this resulted in a clear and vibrant picture of Swedish family farmers awareness, willingness and ability, it also gave a one-sided perspective of a factor where other stakeholders are involved. The role of institutions and the conclusions and implications based around it is not drawn from the institutions themselves. While the authors see the value of rendering the view of the ones affected by the institution's decisions, they also acknowledge that the implications would be more complete if the institutions were involved in the study.

Secondly, the authors find an interesting connection to the process of this study and the findings from Stål and Bonnedahl (2015) regarding the change of heart of climate advisors. Just like in their findings, our interviews often shifted to conversations about how farmers are portrayed in the media and how the agricultural industry already is "climate-friendly". This phenomenon might have led to the authors being biased in analysing the empirical findings, in similarity to the climate advisors in Stål and Bonnedahls (2015) research.

Finally, the differences in the socioeconomic nature of China, Brazil and Sweden not only provide more nuanced literature but also poses questions on the appropriateness of "borrowing" concepts from each other. In this study, the CA practices discussed were drawn exclusively from countries with different political, economic and climate conditions than where the study itself was conducted. Questions could be raised whether the CA practices used and developed in China and Brazil are directly applicable to the very different conditions of Sweden.

#### **7.4 Suggestions for future research**

Since the researchers suggest that the ability and willingness paradox might be inverted, there is a clear need to investigate if the inverted paradox only applies in the agricultural industry or if it could be found among family firms in other industries as well. Further, research in the context of CA is encouraged to be conducted from the perspective of other stakeholders, for example, institutions. A high regulatory burden was a common reason for farmers' frustration, and measures to ease that burden are needed since the researchers fear this could result in family farmers leaving the industry, as indicated by some interviewees.

Furthermore, the farmers expressed that Swedish agriculture used to sustain Sweden's food consumption, but that is not the case anymore. Studies that can explain Sweden's high import, the benefits from self-sustaining and how the development towards self-sustainability in Sweden should be pursued are encouraged by the researchers. Increased local demand could generate more income and security for the farmers as well as increase their reputation in their local communities.

The farmers themselves suggests practical implications for future research areas to include 1) Crossing fast-growing cereal crops with slow-growing legumes in order to get a legume that grows in a month shorter so that it could be threshed in Sweden, 2) Build a system for shipping nutrients from the city to the farms and 3) For the government to invest pensions in local, renewable energy sources that farms ultimately could be run on.

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## **Appendix 1 - Outline of interview questions**

### **Start & background information:**

1. Present ourselves, the topic and purpose of the study. Offer anonymity & ask if recording is okay.
2. Name/Age/Role at the farm & in the company
3. How long have your family-owned this farm? How many generations?
4. What is your business model? How do you make a living? One area or several?
5. How has the business model evolved? Has it always been the same?
6. Anything else you want to tell about your farm?

### **Sustainability awareness:**

7. How often do you talk about sustainability within yourselves?
8. Are you personally interested in sustainability?
9. Are you familiar with the phenomenon - circular economy or even circular agriculture?
10. What do you believe circular agriculture is about?
11. Do you see any difference in the awareness about sustainability in the generations before and after you?
12. Are you aware that the Swedish government has stated a national goal to adapt to a circular economy in order “to become the world's first fossil-free welfare nation”?

### **Sustainability willingness:**

13. Do you actively seek out knowledge on how to make the farm more sustainable?
14. Do you ever talk about how the farm could become more sustainable within the farm/family?
15. Do you ever talk about how the farm could become more sustainable with other farmers?
16. Are you aware of any contribution or subsidies you can receive for adapting circular or sustainable practices?

17. Do you think you would financially benefit from increasing your farms circularity practices?

**Sustainability ability:**

18. Do you feel like you have the ability to follow demands on sustainability from the EU, the SDG's & CAP.

19. What would you need to become more interested, willing or able to pursue circular agriculture?

20. Do you feel you get enough support from institutions or governments?

21. Do you feel you have an appropriate network for increasing circularity practices?

22. Do you feel you have the skills for circularity practices implementation?

23. Do you feel you have enough resources to implement circularity practices innovation or processes?

**Circular agriculture practices:**

24. Have you ever made an analysis of your business/farms inputs & outputs?

25. If yes, what were the results?

26. What kind of waste is generated from your business model?

27. What happens with the waste?

28. What kind of fertiliser do you use on your farm?

29. Is your business releasing any pollution in its surrounding nature?

30. How is that minimized/handled?

31. Are you adapting processes where products or materials lifecycle is prolonged?

32. How is your business/farm dependent on its surrounding ecosystems?

33. How is your business/farm benefiting or hurting its surrounding ecosystems?

34. How is your business/farm energized? Electricity/heat?

35. Are you active within any network of other farmers?

36. If yes, how do you collaborate?

37. Do you know any other farmers who might be interested in talking to us as well?

## Appendix 2 – Additional quotes from the interviews

Theme :	Second-order category:	First-order category:	Supporting quote:
Ability	Economic Ability	Trends in Swedish agriculture	<i>"It is one aspect of the largescale production that certainly is not fossil-free. We need to break that pattern. [...] It is the same regarding the cultivation of food, diet and economy. One of the EU guidelines is the principle that you should produce locally and consume locally. Not everything should compete on the international market. If you compete on the international market... you compete against everyone, and everyone is trying to beat each other with the lowest price. That will not get you the best output for the environment, that is for sure. Then you also need to add the emissions from transportation." – E1.</i>
			<i>"The trend is clear. Units are getting bigger. It is to spread out the cost over a greater number of units over larger areas" – B1.</i>
		Finance based decisions	<i>"There has been a shortage of money in agriculture for many years, that is why we cannot afford to hire people, the salaries are too low. Why are we working 80 hours a week? It would have been better to hire two people and go home [in the afternoon] like everyone else. I might want to go out on a run or bike with my friends, but I am stuck driving the tractor instead." – D1.</i>
	Psychological resources	Role of an entrepreneur	<i>"To have different sources of income is an important part. We say that every entrepreneur in the countryside needs four legs in their enterprise. So, for me, that is housing for long-time residents, forestry, leasing out pasture and hunting." – B1.</i>
			<i>"We sell mutton and sheepskin and other products from the wool that A1 produce. We also lease out horses and the stable and sell firewood." – A2.</i>
			<i>"Somehow the economy is a condition, if there is money to be made, then a lot of people will participate. Otherwise, it is only entrepreneurs that are trying, that believes in an idea and wants to make it happen. But then it becomes too easy to back out of it... when you should probably contribute. Maybe it is because you are too cautious that people do not support each other. Somehow, I think that the entrepreneurship spirit is not frequent enough. Perhaps we do not understand that you need it in order to create a thriving society?" – E1.</i>
			<i>"They usually always miss the crucial aspect of entrepreneurship. Who will do it? There is a very simple question in debates like that - what will you do about it yourself? Are you going to talk or do something? Where is the action? I think that is a very important and sensitive point in the debate. Because we usually escape that question quickly." – E1.</i>

Willing-ness	Pride & Dignity	The belief that agriculture in itself is sustainable	"We think that we are already climate aware." – C1.
			"We cannot reach full circularity because we are selling products all the time. The problem is not agriculture. The problem is that we ship products from the field to the store but get nothing in return. We are not the problem." – D1.
	Socio-emotional resources	Internal satisfaction	"We have invested in all the buildings, which we would not have done if they [the family] had not lived here. But you can never know, they have not signed up to stay here forever. However, it feels good to take care of all the buildings and that everything is used in some way, that they are not left to decay. And it is not viable to just invest to make them look pretty, they have to be useful as well." – E2
	Long-term horizon	Sustainable business development	"Why did I invest in solar panels? For the long-term, you save some money all the time. The first ten years it cost roughly the same each year, but after that its almost 20 years of free electricity... not really but almost. It feels good! And the roofs are practically for free so... and it adds an extra dimension of life." – B1.
		Forecasting demand	"Then we have the vegan movement that I also think is concerning. I do not care about what people eat; they can eat whatever they like, and if they do it for their health, then it is fine. But if they say that they are doing it for the environment and then import products from Brazil, then I cannot take it. Because it is much more harmful to nature to ship it from Brazil than having a cow graze the land, farting a little. It just does not add up. It is so wrong. People have no knowledge, and then they go public in social media, so the wrongful information spreads. I think it is scary, so yeah, we never know what might happen." – D2
Awareness	Interest	Frequency of conversations	"I think it is always present. Some little discussion every day. Either it's some course that you need to discuss... now some meeting about biogas was scheduled on his (D1's) birthday that he wants to participate in. So, I guess we are not going to have a party then... the night will be about biogas instead ha-ha." – D2.
	Knowledge	Awareness of sustainability concepts	"You have to seek information or try to network when you are facing new situations. When you are running a farm, there are so many different parts, so you cannot be an expert in everything...." – C1.
	Generational differences	Differences in sustainability awareness	"Yes, it is a big difference. It is not worth discussing sustainability with the elderly." – B1.

The role of institutions	Support	Subsidies	<i>"We have to remember that we have already paid once via our taxes, so we should take it back. The intention is for the money to be used on measures. [...] And that is a kind of circular act, to circle the money. Because they should go back into the ground so that they grow." – E1</i>
		Governmental investments	<i>"The research in Sweden has very much been held back the last twenty years because it has not been economically attractive to invest in this industry. That means that you won't receive any funding for your research. No one wants to invest, and that is why all development has been held back." – D1</i>
			<i>"With solar panels, they have considered the individual consumer and if what they can produce will benefit their own house. So, there you go, the local production and local consumption. There is no better way of distributing it. If there is going to be a balance, the power should not go from northern Sweden to southern Sweden or any long distances. The most important thing is to maximize local production." – E1</i>
			<i>"If there is anything that our pension funds should be invested in, it's these wind parks. It is a safe return on investments. But they have not invested a single crown in it. Instead, it's the foreign pension funds that, if we put it like that, continue to harvest benefits here. So, the income does not go to the local area, it seems like we are satisfied if we can have a small part in it somehow. The politicians might think that they do a good deed if they build some wind turbines, but they have completely misunderstood the enormous possibility of their own natural resources. It is the same with the steel in Norrland, they clearly do not understand that... it is foreign pension funds that have invested there and continue to build there. Where do the tax income go? Not to Sweden. So, it is your task to ask why. Why do we not invest our pension funds in renewables? I mean... it is thousands of millions of Swedish crowns." – E1</i>
	Pressure	Practice and theory differ	<i>"Let me give a simple example. Our farm is KRAV-certified, so we are required to keep our cows outside in the summer. [...] But most of them, when we let them out over here, they walk around and go inside again. It is too hot, the flies are eating at their udders, and they have it much better inside. And they produce less milk. A healthy cow produces a lot of milk, and an unhealthy cow produces less milk, it is as simple as that. In the summer, the production plummets. But we are forced to keep them outside because a piece of paper says so." – D2.</i>
			<i>"The pressures are sometimes more than we think that we can live up to". – C1.</i>
		Regulatory constraints	<i>"I feel they usually they are positive. They rarely think something is bad. It is more like they see it as their job to utilize their resources." – E1.</i>
			<i>"With the size of this farm... if you are going to live of it with the conditions that society gives you... you cannot do it. Not if you are competing on the international market. You cannot do it. So, you have</i>

			<i>to consider other solutions. We kept the animals for some years after my father passed away, but then all the EU regulations and bureaucracy was put on us, and that is the case if you are going to compete on the international market. There was nothing to do but to close down those activities. The bureaucracy was that extensive... It's just as extensive for a small-scale farmer as it is for a milk producer with 1000 cows.[...] That's what killed the interest. It takes a lot of time and it is very complicated."</i> – E1
			<i>"We also have an obligation to follow certain requirements, controls and stuff like that. And I think it is good that there is a control function. I believe it has taken away the possibility for people to cheat or ignore things."</i> – A1.
Currently implemented CA practices		Making an analysis	<i>"Process descriptions and inventory, what we purchase and what we produce... I have not made a balance sheet, but for me, it is very simple in my forestry business. I can do that in one minute if I do a simple one. Let's say I buy some fuel and spare parts for my chainsaw and brush cutter. And some cans of gasoline and oil for my log chopper and then use my tractor, and let out a little bit of diesel exhaust, so that I can gather some firewood. The firewood contains at least ten times more emissions than I let out from my tractor when I produced it." – B1.</i>
		Closing the loop	<i>"We reused our old windows when we built our greenhouse. I have done things from old reinforcing bars... speaking of... they used to bury old scraps and metal in the ground. So, when we found it, we dug it up...[...] Then we felt like we did something for the environment... we still find stuff like that and when we do, we always take care of it." – A1.</i>

### **Appendix 3 – Deeper description of the farms**

#### *Farm A*

At farm A, one semi-structured interview was conducted with two interviewees. Both represented the fifth generation on that particular farm. As the interview was conducted by video conversation, no observations were made. The farms business model contains several sources of income. The major ones being meat from sheep, mutton, and wool. The farm sells firewood, hosts events like weddings in their barn and rents out their stable and horses. The farm is operated conventionally and is the smallest of all the farms in the study, 50 hectares. As of today, all labour on the farm is solely conducted by the managing family. Also, both interviewees held occupations outside their management of the farm. Interviewee A1 worked full-time, while A2 was starting to decrease working hours outside the farm.

#### *Farm B*

At the second farm, named farm B, only one person was interviewed. This was the only person who currently manages the farm and is part of generation number eight. Just like farm A, the business model contains of several branches. The cows had just been sold, so the main income as of now was the leasing of the farm's pastures. Also, forestry, firewood and selling game meat made up the farm's income. This farm is operated conventionally, however, the farmer who leases its pastures is ecologically certified, see definition in section 4.1.4. The farm consists of 150 hectares of land and employs no labour outside the managing family, even though farmer B1 is also employed full-time in addition to the duties on the farm.

#### *Farm C*

Farm C is currently operated by two people from the same family, however, only one was interviewed. Management is held by the third generation, and the primary business consists of milk production. Also, the farm profits on beef, contract driving and forestry. The farm is operated conventionally and is spread on 220 hectares of land. This farm, in contrast to the formerly studied family farms, employs additional labour outside the family. Said labour consists of one person who focuses on tasks inside the barn and

helps take care of the cows during weekdays. The two family members who manage farm C holds no additional employment outside the farm.

#### *Farm D*

The farm where the most amount of family members were interviewed was farm D. Members from both the third and fourth generation were interviewed, where the third is the one currently in management. This farm generated the majority of its income from milk production. But also include beef and forestry in its business model. This farm was the only one in the study which is ecologically certified. Meaning that it aims to protect the environment by keeping nutrients in the soil, reducing toxins, and respecting and adapting to animals' natural needs and behaviours. Being ecologically certified further means that the farm promotes locally produced food, biodiversity and the protection of endangered species (Jordbruksverket, 2021).

Farm D was furthermore the largest of all the studied farms, with its 515 hectares of land. Like farm C, it employed labour outside the family while several family members also contributed to the farm's labour activities. Among the interviewed family members, D1 did not have any additional employment, D2 worked part-time, divided between tasks at the farm and an additional business. Person D3 is also occupied by their full-time studies.

#### *Farm E*

The last farm to be explored was named farm E. This farm is currently managed by both the fourth and fifth-generation, however only the fourth generation was interviewed. The business model has evolved from focusing on milk production to breeding sheep, managing a bed & breakfast, a café and boutique. Also, the family farm hosts different kinds of events in their barn, similar to farm A. The farm is operated conventionally but uses a lot of ecological principles in its operations.

The size of the farm qualifies between farm A and farm B with its 90 hectares of land. The business in total uses much labour from family members but does not employ any outside labour. The managing family has successively worked less and less at their ordinary day jobs, and the majority are now working full time at the farm.