

Financing the transition towards agroecology: the case of Nijmegen cooperative Arbres

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Colophon

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While living in the Dutch countryside, I began to notice how much environmental harm was caused by conventional agriculture and affecting harming plant life and wild animal life. Ever since, I have been occupied with sustainable agriculture as a research subject in my free time and, later, at university. I feel it is of incredible importance in providing habitats for wild animals (instead of actively harming them) and as a tool for climate mitigation. Even though I am very passionate about the subject, writing this thesis was no easy feat. The process of realizing a work of this length was very intimidating to me. That is why I want to thank all my lovely and supportive friends and my father and mother that helped me get through this process. I love all of you dearly. Special thanks to my loving boyfriend Luuk, who supported me through all the hard times and has continuously helped me regain my courage when I encountered obstacles in myself. And my ex Nick, who was always up for a brainstorm and supported me where he could. Furthermore, I want to thank everybody at Arbres for opening up their organization and themselves for my research during my internship at Arbres. And a big thanks to Joke, Jonah, Frank, Marieke, Joris, Arne and José for making time to be interviewed by me. Without all of them, I wouldn't have been able to write this thesis. Moreover, it was wonderful and inspiring to hear and experience their visions regarding the subject. And, of course, a thank you to my supervisor Henk for his encouragement and input.

Abstract

Conventional arable agriculture has been proven to be harmful to the environment and is a widespread phenomenon in the Netherlands, which is why it is said that an agriculture transition needs to happen in the Netherlands urgently. Agroecology offers a viable alternative to conventional arable agriculture that mitigates the effects of climate change and has the potential to improve the environment. Even though the alternative seems clear, the agriculture transition is not yet widespread. Among the reasons given for the difficulty of realizing this transition is the lack of financial possibilities to fund the switch due to a systemic lock-in and the habitus of farmers. This thesis looks at how existing agroecological farms can finance their business operations; this is done by performing a case study focusing on a young agroecological co-operative in the area of Nijmegen, called Arbres, and places it in the context of the agriculture transition to expand the field of knowledge surrounding the topic.

Keywords

agroecology, agriculture transition, case study, Nijmegen, cooperative

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List of abbreviations and Arbres terminology

AFN	Alternative food networks
CAP	Common Agricultural Policy
CBS	Centraal Bureau voor de Statistiek
CSA	Community-supported agriculture
EU	European Union
FAO	Food and Agriculture Organization of the UN
F2F	Farm to Fork Strategy
GCF	Green Climate Fund
IFAD	International Fund for Agricultural Development
LNV	Ministerie van Landbouw, Natuur en Voedselkwaliteit
LTO	Land- en Tuinbouw Organisatie
NAV	Nederlandse Akkerbouw Vakbond
NGO	Non-governmental organization
NPLG	Nationaal Programma Landelijk Gebied
RIBW	Regionale Instelling voor Beschermd en Begeleid Wonen
RVO	Rijksdienst voor Ondernemend Nederland
SDG	Sustainable Development Goal of the UN
SER	The Social and Economic Council of the Netherlands
SFSC	Short food supply chain
UN	United Nations
UNGA	UN General Assembly
WFP	World Food Programme
WUR	Wageningen University & Research
Deelnemers	The term Arbres uses for the people with an occupational disability that Arbres employs
Oogstgenoten	The term Arbres uses for their self-harvesting system and its subscribers

1. Introduction

1.1 Context

The most recent numbers on land use in the Netherlands state 54% of Dutch land is being used for agriculture, compared to the 12% that is reserved for wild nature (CBS, 2020). Around 75% of this land is classified as conventional agriculture (Berkhout et al., 2019). Conventional agriculture impacts the environment negatively, using natural areas for its expansion, a great array of harmful external inputs and land management practices (Bionext, 2022). Main practices include: using artificial fertilizer, using harmful pesticides, heavy machinery, monocropping and lack of soil nutrient recovery (John, 2009; Mahmood et al., 2016; Gürsoy, 2021; Sukkel et al., 2019). This causes soil, water and air quality degradation and biodiversity loss (Pimentel, 2006; Tan et al., 2005; Ravishankara et al., 2009; Gunstone et al., 2021). Considering the extensive scale of conventional agriculture in the Netherlands, this is detrimental to the Dutch environment. Moreover, according to Sustainable Governance Indicators, an NGO that monitors the biggest environmental challenges of European countries, water pollution through nitrogen and phosphates and soil quality degradation through salinification due to conventional agriculture are the primary causes of environmental concern for the Dutch environment (SGI, 2022).

Agroecology could offer a solution to these environmental issues. There are various definitions of agroecology provided in academic literature; most focus on ecology and economy (Oppedijk van Veen et al., 2019; Nabisubi et al., 2020). Gliessman (2018) provides a broad overview of these definitions and uses these to formulate a general definition of agroecology. Moreover, Gliessman adds an aspect to agroecology in which he argues redefining the food system is in itself political. To realize this on a broad scale, a political and economic focus has to be taken to formulate alternatives to the lock-ins that thwart the agriculture transition; this is the orientation of this thesis.

Agroecology is the integration of research, education, action and change that brings sustainability to all parts of the food system: ecological, economic, and social. It's transdisciplinary in that it values all forms of knowledge and experience in food system change. It's participatory in that it requires the involvement of all stakeholders from the farm to the table and everyone in between. And it is action-oriented because it confronts the economic and political power structures of the current industrial food system with alternative social structures and policy action. The approach is grounded in ecological thinking where a holistic, systems-level understanding of food system sustainability is required (Gliessman, 2018, p. 600).

This definition of agroecology is the philosophy behind agroecological farming this thesis addresses and is reflected in agroecological farming practices. From here on, agroecology is used in this thesis as referring to agroecological farming practices.

Agroecological farmers strive to move away from conventional practices towards cultivating agricultural systems that diminish the negative side-effects of conventional practices and, in most cases, positively impact the environment (Gliessman, 2018). There are several land management practices related to the philosophy of agroecology. One can discern the following practices:

- Organic agriculture; this practice has many forms. It can be a monoculture system with high external inputs (such as using extensive amounts of organic pesticides or natural fertilizer), but this category can also contain management methods such as natural pest management and cropping systems that are helpful for restoring biodiversity (van Zwaluw, 2021c). Many of the agricultural practices outlined in this paragraph also fall under organic agriculture (van Zwaluw, 2021c).

- Biodynamic agriculture is rooted in the anthroposophical movement and is therefore driven by a focus on a holistic system created by integrating animals and crops into the system that enhance soil life and quality and thereby positively impact the environment (Biodynamic Association, 2018).
- Circular agriculture focuses on creating a closed system, where there are no external inputs and, usually, the only output is the cash crop. It aims to create a system where all inputs come from the system, thus enhancing itself (van Zwaluw, 2021b).
- Vegan agriculture is focused specifically on using no animals or input sourced from animals in the agricultural system (van Zwaluw, 2021b).
- Nature-inclusive agriculture is based on creating a resilient ecosystem, in which food is produced. The cultivation of the ecosystem is the main focus here, and food production should fit in this ecosystem (WUR, 2022).
- Agroforestry includes trees as part of an agricultural system (van Zwaluw, 2021b). This can include silvopastoral, in which animals are included, or silvoarable, in which trees are added to a system with various crops (van Zwaluw, 2021b). Additionally, it includes food forestry, in which the agricultural design mimics the composition of a natural forest (see 4.1) (van Zwaluw, 2021b). It can enhance biodiversity and uptake greenhouse gasses, therefore positively impacting the environment (van Zwaluw, 2021b). It should be noted that not all agroforestry is agroecological; in some cases, harmful pesticides are used in silvopastoral forms (van Zwaluw, 2021b).
- Permaculture is a complex cropping system, which has a high likelihood of positively impacting the environment (van Zwaluw, 2021b).

In the Netherlands, agroecological land management practices are growing in numbers. Demeter is a Dutch biodynamic certification label. Their site indicates that Demeter farms covered 8730 hectares in 2021, which is 11% rise and the total number of farms applying Demeter standards has risen from 143 to 152 (Stichting Demeter, 2021). Additionally, it is estimated around 1000 farmers practicing circular agriculture have emerged since its development in the eighties (Oppedijk van Veen et al., 2019). Additionally, there is growth in food forests (Nabisubi et al., 2020). Toekomstboeren is an organization that seeks to provide information about agroecology and is mainly targeting new farmers (Oppedijk van Veen et al., 2019). In their four years of existence, they have acquired 300 members (Oppedijk van Veen et al., 2019). Furthermore, Warmonderhof - a school that educates students in biodynamic practices - has grown from 198 students in 2012 to 278 in 2017 (Oppedijk van Veen et al., 2019). It is not known exactly what caused this rise in numbers (Oppedijk van Veen et al., 2019).

Even though the number of agroecological farmers is rising, it would greatly benefit the Dutch environment if this process was accelerated. It is for instance known that this growth in numbers mostly comes from new farmers, as opposed to conventional farmers switching to agroecology (Oppedijk van Veen et al., 2019). This might be because the starting phase of an agroecological farm is often insecure, because of a lack of established public and private financial resources (Oppedijk van Veen et al., 2019). Another factor is that, on a business level, agroecological farms have a time gap between implementing the design and yielding positive results (Niggli et al., 2023). These vary per method, but the income gap is between two and ten years (van Zwaluw, 2021a; de Groot & Veen, 2017). This research hopes to provide a clear overview of the financial challenges agroecological start-ups face and provide valuable knowledge to help overcome these challenges.

1.2 Research aim and research questions

1.2.1 Research Aim

The aim of this thesis is to contribute to the progression of agroecology in the Netherlands. It focuses on the incentive to start agroecological farms to reduce the environmental issues caused by conventional agricultural practices. This is actualized by analyzing the inhibiting factors surrounding financial resources for agroecological farmers, identifying the financial resources available for these farms in the public and private sphere and the other sources of income available for these farms in the Netherlands.

1.2.2 Main research question

The main research question that can be formulated based on the research aim is: how do the agroecological arable farmers of Arbres, in the area of Nijmegen, establish financial viability in the starting phase of their enterprise?

1.2.3 Secondary research questions

Secondary research questions that can be derived from the main question are:

- What are the inhibiting factors surrounding financial resources for agroecological farmers in the Netherlands?
- What are the financial resources available for agroecological farmers in the Netherlands in the public sphere?
- What are the financial resources available for agroecological farmers in the Netherlands in the private sphere?
- What other possible means of income are available for agroecological farmers in the Netherlands besides these two forms?

1.3 Scientific and societal relevance

1.3.1 Scientific relevance

Several kinds of financing can be identified concerning research done into financing the starting phase of agriculture worldwide. Government financing, bank loans and alternative financing forms, like microfinancing and crowdfunding, are used to gain starting capital (Kragt et al., 2021; Niggli et al., 2023; van der Ploeg et al., 2019). For financial health during the entire starting phase, the business model a farm uses is imperative as it is for any business. Robben and Shüller (2022) did research into the funding of agroecology by five prominent public funders and they found during their literature review that reviewed the money flow from a total of around 750 projects and found that of their budgets only 4-22% contributed to financing agroecological farms (Robben & Schüller, 2022). Moeller (2020) found more specifically that the projects supporting agroecology were only found in the portfolio of one international funder (GCF) and represented only 10.6% of the total amounts of their investments in agricultural projects. Public funders in this study, channeling funds from the EU (FAO, IFAD & WFP) invested only 2.7% in agroecological projects between the latest available numbers, that were for 2016-2018 (Moeller, 2020). This is contrasted by the 79.8% of EU funds and 79.3% of the GCF money flows that fund conventional agriculture (Moeller, 2020). Hilmi (2019) found that bank loans are not a viable option for agroecological farmers, because these loans rely on collateral and security, which agroecological farmers cannot always supply or are too risky for them (Hilmi, 2019). Furthermore, agroecological farmers have to keep into account their income has a seasonal nature, due to the seasonal nature of farmers and banks have also failed to keep this into account when extending credit (Hilmi, 2019; Giraldo & McCune, 2019). This contrasts with conventional farmers, who can

accumulate wealth faster, so acquiring or paying back bank loans is easier (Giraldo & McCune, 2019). Whereas agroecology has a time gap between implementing the design and yielding positive results (Niggli et al., 2023). Oppedijk van Veen et al. (2019) published a paper studying the state of agroecology in the Netherlands; their findings showed that bank loans for agroecological projects are currently not available, due to the aforementioned lack of security. They also stated that government financing is also lacking in this area (Oppedijk van Veen et al., 2019). Research by Smits et al. (2019) confirms this and speaks of a “critical transitionzone” (p. 5) in which the government has to break through current policy barriers to start facilitating support for agroecology sufficiently.

When it comes to the small body of research into alternatives to these established forms of financing used for agroecological farms, it is mainly case studies that focus on microcredits or crowdfunding (González-Azcárate et al., 2023; Saiti et al., 2018; Kragt et al., 2021; Ramírez et al., 2019). Crowdfunding is a relatively new form of alternative financing, so it is often unknown to farmers on a worldwide level and has varying success rates according to the case studies done (González-Azcárate et al., 2023; Saiti et al., 2018; Kragt et al., 2021). Multiple studies state microfinance, in the form of microcredits, is used mainly in the Global South, where it is extended to people with lower incomes (Ramírez et al., 2019; Assadi et al., 2018; Vidal & Agustí, 2018). There are a small number of cases of microfinancing in the Global North (Allet & Hudon, 2015; Forcella & Hudon, 2016). This research states higher success rates for agroecological farms that receive microfinancing. Generally, both methods are stated to be able to increase the success rate of these small to medium enterprises (Assadi et al., 2018). While searching for papers addressing these forms of financing in the Netherlands, many crowdfunding initiatives for agroecological farms can be found. However, research on the topic is lacking. Oppedijk van Veen et al. (2019) do name a few private funds that use crowdfunding to fund agroecological projects.

When it comes to viable business models for agroecology, the emphasis worldwide is often put on local collaborative efforts to succeed, collaboration between farmers, AFNs, CSA and the valorization of the ecological and social worth that these farms create (García & Acín, 2022; van der Ploeg et al., 2019; Adam, 2006; Orlando, 2018; Espelt & Moreira, 2019). When it comes to the Netherlands, literature specifically concerning agroecology on this topic is hard to find. However, when searching for nature-inclusive farming (which is a term popularized by Dutch government policy in 2018, which includes practices shared by agroecological farms) collaboration between farmers and valorization of the ecological and social worth (true cost accounting) and choosing to facilitate recreational activities are emphasized (Farjon et al., 2018; Drion & van Lienen, 2020; Drion et al., 2020; WUR & LNV, 2019). Concrete models for financial exploits within an agroecological farm are missing. Nabisubi et al. (2020) have published research, in which they specifically researched agroforestry (a subcategory of agroecology) projects throughout the Netherlands. They found that forms of alternative finance such as CSA and using private investors to possibly negotiate a bank loan are parts of a successful business model for agroecology (Nabisubi et al., 2020).

This study attempts to fill the gaps in the literature concerning financing for agroecology in the Netherlands and the Province of Gelderland and the lack of concrete advice when it comes to viable business models for agroecology, by executing a case study at the agroecological farmer cooperative Arbres; Arbres is registered as an official agricultural organization (ARBRES voedselbos design & beheer, 2022). Most agroecological projects in the Netherlands are not; their income model is often centered around catering and guided tours (WUR & LNV, 2019). They are constantly looking for new ways to sustain income to cover the aforementioned income gap that agroecological farms suffer during their starting phase (Niggli et al., 2023). Currently, Arbres' money flow is steadily growing while they are in the starting phase of their farm (ARBRES voedselbos design & beheer, 2022). This divergence in approach and their innovations can differentiate their income methods from other agroecology organizations that have been studied and therefore provide additional insights to the scientific community. Additionally, because there is minimal

literature on how to approach starting an agroecological farm, it is interesting to study this successful case to see where they sourced it.

1.3.2 Societal relevance

This thesis' societal relevance is identified using the different aspects (cultural, environmental, economic and social benefits) as formulated by Bornmann (2012). Social benefits come from helping farmers that want to turn to agroecological practices discover new possible options for financing their organization. Currently, these options are largely unknown (Oppedijk van Veen et al., 2019). This research has specifically been written about arable agroecology and the case study applies to an entirely vegan system. This is potentially interesting for other agroecological farmers that want to move towards or implement a vegan system and know which financing options are specifically available for them because some financial options that are granted to farms that do dairy farming do not apply to them.

Additionally, adding to the body of information about agroecology and thereby potentially aiding farmers fits the UN's SDGs and EU's Green Deal, which are focused on improving employment rates, assuring food safety and improving human health, biodiversity and the environment (UN, 2022; European Commission, 2022a). Moreover, this case study specifically focuses on an organization that has people employed with an occupational disability. If these people are included in more agroecological organizations, it could contribute to an improved quality of life for this often disadvantaged group.

Food safety and human health would also be improved if agroecological methods are used more since they combat soil depletion. Soil depletion has been predicted to lead to eventual issues with food safety (FAO, 2019). Additionally, agroecology does not use management practices that are harmful to human health (Gliessman, 2018).

Concerning environmental benefits, the advice this research provides could lead more farmers to see that agroecological agriculture is viable. Consequently, more agroecological organizations could be started; this impacts the environment positively in many ways. It would improve biodiversity, air quality, soil health, and water quality and provide an increased uptake of certain harmful greenhouse gasses (Gliessman, 2018).

Currently, the publication of the NPLG (2022) states the aim to have lowered nitrogen emissions by 50% by 2030; research into funding alternatives to conventional arable agriculture could contribute to realizing this. Since the policy note was published on 10 June 2022, farmer protests have been erupting nationally (NOS, 2022, July 5). They are causing disorder because they are afraid to lose their farms. The strong opinions surrounding the topic divide the Dutch people and no sustainable solution is yet being offered on a political level (NOS, 2022, July 5). This research contributes to providing information on a viable alternative. Elaborating on this body of knowledge is important because it can result in allowing farmers to keep their farms and, consequently, contribute to less societal unrest (NOS, 2022, July 5). Furthermore, it could aid governing institutions in what can be done to stimulate the agriculture transition, which would also lead to improvement for the environment.

2. Theoretical exploration & conceptual model

This chapter is a theoretical exploration of the policies and financial resources surrounding agroecology on a global, European, state and local level and what prevents agroecology from being implemented on a broader scale in the Netherlands and how private financing offers a possible partial solution. In this exploration of theory, some relevant concepts related to these topics are discussed. A conceptual model is added at the end of the chapter that operationalizes the phenomena discussed in the exploration.

2.1 International Politics

2.1.1 Global Politics

In 2015, at the UNGA, a solution called Agenda 2030 was formulated to achieve goals that have to be reached by 2030 (UN, 2015). These goals are called SDGs and are formulated to address fighting root causes of problems, instead of symptoms.

Agriculture has a connection to multiple SDGs, like food security, livelihoods, ecosystems, climate change and health (see 1.1). The FAO (2018b) has highlighted that for agriculture to align with the SDGs, a transition toward sustainable agriculture is needed. The FAO offers moving towards agroecology as a viable and good option for this transition (FAO, 2018a). In their report on agroecology, they discuss that agroecological practices directly contribute to multiple SDGs. Additionally, it contributes to the aims of the Paris Climate Agreement to limit global warming to below 2 in comparison to pre-industrial levels and to improve concerns formulated during the Convention on Biological Diversity: it helps to increase biodiversity and supports the UN Convention to Combat Desertification by helping to decrease soil erosion (UN Climate Change, 2022; FAO, 2018a).

Multiple SDGs pertain to agroecology, specifically arable practices. Agroecological approaches have shown to improve farmers' income by 30 percent, through diversification, reduction of external input and alternative marketing channels (FAO, 2018a). In this sense, it contributes to the first SDG that aims to reduce poverty.

Furthermore, global hunger has increased significantly over the years. The vast majority of people living in hunger live in areas of conflict or areas with climate change-related shocks. Areas that applied agroecological methods have been proven to retain 40 percent more topsoil and suffered 69 percent less erosion after a hurricane hit (FAO, 2018a). In this way, it helps to fight hunger (SDG 2) while performing climate action (SDG 13).

Additionally, one-third of the population of the Global South suffers from micronutrient deficiencies. Agroecology can provide fresh, often local food, that contains more nutrients because the soil it was grown on is healthier. Additionally, agroecology often comes with a differently designed supply chain that emphasizes values in the production process, locality and less environmental impact (see 2.3.2) (Orlando, 2018).

Because of its locality, it contributes to more sustainable cities and communities (SDG 11) and, because of the more nutrient-dense foods, responsible consumption (SDG 12) and reduction of hunger (SDG 2).

Conventional agriculture in many ways decreases biodiversity and agroecological practices can help restore biodiversity (see 1.1). The FAO (2018) found that several case studies showed an average improvement in biodiversity of 30%. This ties into responsible consumption (SDG 12), the promotion of life on land (SDG 15) and, depending on the design and system used, life below water (SDG 14).

On top of that, it contributes to the employment of women (FAO, 2022). Poverty among rural women is disproportionately larger than among men (FAO, 2018a). Currently, many rural women around the world are already concerned with producing crops without pesticides and

preserving and multiplying native seeds (FAO, 2022). Expanding the market for agroecology consequently would provide a chance to generate income for these women. This ties in with the fifth SDG concerning gender equality.

2.1.2 European policy

A few years after the SDGs were formulated, the EU formulated the Green Deal in 2019, which aims to make Europe climate neutral by 2050. Part of the Green Deal is an agricultural plan, that is called the F2F. This strategy aims to transform agricultural practices and introduce a transfer of resources attached, so they become more fair, healthy and environmentally friendly. On the F2F website, specific demands for food systems are formulated: they should have “a neutral or positive environmental impact, help to mitigate climate change and adapt to its impacts, reverse the loss of biodiversity, ensure food security, nutrition and public health and make sure that everyone has access to sufficient, safe, nutritious, sustainable food” (European Commission, 2022b). On top of that it aims to “preserve affordability of food while generating fairer economic returns, fostering competitiveness of the EU supply sector and promoting fair trade” (European Commission, 2022b). They plan to do this through increasing public awareness and thus demands for sustainable food and through new scientific discoveries and technologies (European Commission, 2022b).

Agroecology can aid the F2F program by contributing to healthy diets and improving environmental and climate change issues related to primary food production (see 1.1) (European Commission & CORDUS, 2021). It can contribute to biodiversity strategies formulated in the Green Deal. Furthermore, the EU adopted a new action plan aiming to increase organic production and agroecology is seen as an important driving factor for this (European Commission & CORDUS, 2021).

The Horizon 2020 programme of the EU has funded several living labs (governance projects in which the scientific research is a joint effort between scientific institutes, business and civil society) and other research projects surrounding agroecology. This is done to encourage local innovation and thereby accelerate the agriculture transition as formulated in the F2F strategy.

Additionally, it is stated that the results can provide useful knowledge for evaluating the Common Agricultural Policy (CAP) of the EU (European Commission & CORDUS, 2021). This policy, among other things, provides regulations and subsidies around agriculture for European Union citizens (European Commission & CORDUS, 2021). In December 2021, the CAP for 2023-2027 was formulated; it aims to be greener, fairer and help with competitiveness. In their greener section, it says - among other things - that there are funds to increase sustainable rural development, fund agricultural eco-schemes and fund climate and biodiversity-improving agricultural projects (European Commission, 2022c). These are areas where agroecology contributes and thus it indirectly promises to support agroecological practices. However, the new CAP maintains the position regarding market orientation of the last CAP (European Commission, 2022c). This means that farms are encouraged to supply for demand from Europe and beyond, which goes directly against the locality agroecology often aims to realize.

2.1.3 Dutch national policy

The agricultural policy of the Dutch government directly aligns with the periods of time used for the CAP and is based on translating the CAP into national policy. It focuses on encouraging the increase of sustainable agriculture and new agricultural technology enabling that (Rijksoverheid, 2022a). In line with this, the Dutch Ministry of Agriculture, Nature, and Food Quality (LNV) formulated a policy note “Agriculture, Nature, and Food: Valuable and Connected” (2018). This note discusses how the government wants to support circular agriculture. They see this as nature-inclusive, but at the same time, this inclusivity is used to optimize production (LNV, 2018). This transition is realized with the help of new technology.

Supporting this is done through spreading awareness, providing knowledge and encouragement. Notably, this document does not provide any mention of governmental monetary support for farmers that want to switch to sustainable practices, nor does it mention laws and regulations concerning both agricultural practices and encouraging responsible consumption patterns (LNV, 2018). In streamlining Dutch agricultural policy with the CAP, goals set are preparing agriculture for climate change and decreasing greenhouse gas emission. This is actualized by focusing less on monetary support for farmers and more on encouraging the increase of sustainable agriculture and new technologies enabling that. Additionally, the transition towards circular agriculture will continue by encouraging the development of techniques in the areas of fodder, manure, soil, land leasing and animal wellbeing. These plans do not align with the call of agroecological farmers for monetary support and policy change.

The reduction of greenhouse gas emissions related to nitrogen regulation in the Netherlands is in part focused on regulating agriculture. In June 2022, the Rijksoverheid published the NPLG, which stated that nitrogen emissions need to be reduced by 50% over the coming eight years (Rijksoverheid, 2022b). Actualizing this plan starts with organizations that are distanced around one kilometer or less from Natura 2000 areas (Planbureau voor de Leefomgeving, 2022). This note is being translated into regional policy, where it is applied to regulation surrounding traffic, construction and agriculture (Rijksoverheid, 2022b). A transition fund will be set up for rural areas and nature with €24.3 billion to contribute to meeting the 50% goal. It is specifically focused on projects addressing nitrogen emission, water pollution and wild nature (Rijksoverheid, 2022b). Since agriculture is estimated to contribute around 60% of the national nitrogen emissions (which originate from dairy farming and fertilizer use in arable farming) and because of the current housing crisis in the Netherlands, many speculate this will be done through regulating agriculture (NOS, 2022 June 10). The monetary support indicated here could be of great support to agroecological farmers. However, conventional farmers have started protesting throughout the country, because they fear many farms will have to be closed due to this policy (NOS, 2022, July 5).

Furthermore, there is a general agricultural subsidy, which is a national implementation of the CAP; agroecological farms can apply to receive basic payments from the RVO; these are called payment rights (RVO, 2022a). This payment is € 220 per acre. An extra payment was added to this subsidy providing €54 per acre up to 40 acres. This subsidy is given after signing up at the RVO, which is obligatory for an agricultural organization (RVO, 2022a). Additionally, the RVO offers an eco-payment for farmers whose design contributes to improving the following: biodiversity, soil and air quality, climate, landscape and water (RVO, 2022b). Depending on what and how much a farmer contributes in this area their bronze, silver or gold ranking is determined. The rewards are respectively €60, €100 or €200 per acre.

2.1.4 Local policy

There is no local policy addressing agroecological agriculture yet in the municipality of Nijmegen. However, an exploratory notice was published in July 2022 on possible local policy on the issue of urban agriculture (Gemeente Nijmegen, 2022). Urban agriculture is agriculture within and around cities (Pearson, 2010). When it comes to bigger projects (because the term also includes individual projects e.g. kitchen gardens), it usually implies a focus on agroecological agriculture (Pearson, 2010). The exploratory note focuses on facilitating networking between bigger projects and emphasizes mainly focusing their support on the agroecological projects in the Kop van Malden (Gemeente Nijmegen, 2022). Financial instruments are not mentioned.

On a provincial level, the province of Gelderland's policy is a governance execution of the national policy that focuses on nature-inclusive agriculture. They set up an online platform to support nature-inclusive farming called "Platform Natuurinclusieve Landbouw

Gelderland”¹ (Platform Natuurinclusieve Landbouw Gelderland, n.d.). Their two main aims are promoting biodiversity and circular agriculture. This is done mainly by offering tools to educate and provide networking opportunities. Furthermore, they extend monetary compensation to farmers.

In May 2022, they published a subsidy to promote the transition towards agroforestry. According to José van Gerven, the project Leader Agrifood Innovations Provincie Gelderland and one of the initiators of the subsidy, its main aim is to get conventional farmers to implement elements of agroforestry to their design (J. van Gerven, personal communication, 16 May 2022). It is the first of its kind in the Netherlands and was inspired by the national Belgian agroforestry subsidy. The subsidy is reserved for funding the planting of trees and shrubs. The total amount that was divided was €300.000. It reimburses 75 percent of the costs, up to €20.000. The development of this subsidy was started in September 2020 and it was launched on 2 May 2022 (J. van Gerven, personal communication, 16 May 2022). The province wanted to promote agroforestry specifically because they see it as a more sustainable model with better revenue.

Additionally, van Gerven mentioned that there is an agrifood innovation subsidy that the province extends (J. van Gerven, personal communication, 16 May 2022). It focuses on smaller companies (including farmers) that want to invest in innovation in the area of circular and nature-inclusive agriculture (Provincie Gelderland, n.d.). It specifically covers machine purchases, new research and product design, education and means to promote sales of agricultural products. This subsidy provides up to 40%-60% of the costs of innovation, with a maximum of € 35.000.

2.2 Factors preventing agroecology from becoming an established agricultural method

Agroecology is thus encouraged by international and national politics. Yet, there are still many farmers that use conventional agricultural methods that cause environmental degradation (see 1.1). The question that remains is: why are farmers not inclined to switch to, or start, agroecological farms on a broad scale? This section discusses this in detail, focusing on the two main overarching factors found in the literature: institutional and socio-cultural factors. These are discussed including relevant concepts that aid in understanding this phenomenon.

2.2.1 Institutional factors

An institutionalist theory developed within evolutionary economics suggests that an innovation pathway can be dominant and strengthened by feedback from its implementation, despite the existence of alternative innovations that could have provided better long-term sustainability (Dosi, 1982). This is called a lock-in. Lock-ins are composed of path-dependencies (Dosi, 1982). Path-dependencies at play, formed by the paradigm of intensification around agriculture, are predominantly seen on two levels: the institutional dimension and the socio-cultural dimension. When it comes to agricultural practices in the Netherlands, the paradigm of intensification has stabilized around a socio-technical system, creating a lock-in, caused by the convergence of innovations (homologation of new pesticides, change in methods of contamination, and earlier sowing) and strategies of actors; one of the most relevant examples being agricultural management surrounding optimizing production by growing annual crops in a monoculture setting and the formation of a supply chain in which large companies contract farmers for certain yields and the steering of the Dutch government towards producing for global markets (Lamine et al., 2010). Natural

¹ <https://www.natuurinclusivelandbouwgelderland.nl/>

processes are regulated to optimize production, which in practice means a reduction of natural processes.

In the fifties, farming depended upon processes like symbiotic relationships between plants and fungi and ecosystem dynamics, which functioned in enhancing crop growth and health (Baar & Ozinga, 2007). There were many farms, but the farms operated on smaller scales of a few hectares (Oppedijk van Veen et al., 2019). During the late fifties, minister Manholt decided to change this system, because of the famine that occurred during the second world war; food safety became a number one priority and was to be achieved through large-scale farms that produced large amounts of food. These were partially meant for export, which was encouraged through a minimum price guarantee when exporting (Oppedijk van Veen et al., 2019). Additionally, the government started educating farmers about intensive agriculture on a broad scale (Oppedijk van Veen et al., 2019). This meant producing monocultures and the industrialization of food production, processing and distribution. This ultimately has led to an increase in corporate control of the food system (Gliessman, 2018).

This evolving process had detrimental effects on the environment (see 1.1). This was already known in 1972 when the Limits to Growth report was published, discussing the environmental pollution of intensive agriculture and questioning its sustainability (Meadows et al., 1972). This report sparked international discussion about climate change and is one of the main instigators of the foundation of environmental politics as an area in international politics and thus was widely known, also in the Netherlands (Lieverink, 2021). Yet, agricultural policy in the Netherlands in the 1970s was still on the course of increasingly intensifying agriculture. It can then be concluded that Dutch policy-making willingly chose not to pay attention to improving agriculture in a way that would have been environmentally friendly.

An explanation for this can be found in the fact that policymaking is influenced by agricultural trade unions. According to their websites, these trade unions organize protests and stand up for the interests of conventional farmers (NAV, n.d.; LTO, n.d.). There are two big trade unions for arable farming: NAV and LTO. They plead for a fair price for their products and for a good position for the farmers within the markets. On their mission and vision page, they state that they also want more sustainable farming. They define sustainable farming as being economically smart with their land, using auxiliary materials efficiently and preventing emissions. However, when these changes increase their costs above the limit of the price they can sell their products for, and thus will not be economically efficient, they will not engage. In that case, they state they will take action and address the government (NAV, n.d.).

These trade unions have risen in visibility through participating in the recent nitrogen-related protest (see 1.3.2). They lobby at the government to exert influence on policies concerning agricultural policymaking (Boumans, 2022). Furthermore, they can participate in the SER to exert further influence (Wisserhof, 2000). Additionally, these protests also influence public opinion, which causes politicians to react and decrease the strictness of policies to stay popular and keep being voted on (Huiteima, 2005). These influences inhibited agricultural policy change surrounding encouraging sustainability efforts (Wisserhof, 2000; Huiteima, 2005).

Furthermore, the environmental impact of agriculture has not always been a topic in public opinion. In the 1980s in the Netherlands, the public discourse around environmental change was not usually linked to agriculture (Shantora, 1983; Bager & Proost, 1997). In the 1990s, the negative impact of pesticides became a topic and policy responded to this by banning certain harmful pesticides (Bager & Proost, 1997). In the 2000s and 2010s, public opinion was mostly directed at the harmful effects of CO₂, not particularly addressing the impact of agriculture on this (Dewulf et al., 2017). Currently, environmental concerns surrounding conventional agriculture are increasingly more integrated into the public mindset due to the nitrogen crisis (see 1.3.2). The subsequent farmers' protests (see 1.3.2) influence the public opinion surrounding the topic, with some sharing sentiments with the protestors. Politicians tend to respond to public opinion to a certain extent (Soontjens & Sevenans,

2022). A politician who is unsure about re-election is more inclined to respond to voter preferences than a politician who is sure about their re-election (Soontjens & Sevenans, 2022). This means these sentiments surrounding agriculture and environment might have led to agricultural policy striving towards intensification throughout the 80s, 90s and 00s and the still deficient (from an environmental perspective on the topic) changes in agricultural policy.

Intensification continued from the eighties onwards; the minimum price guarantee was removed and replaced by free market mechanisms in which consumer prices were lowered and farmers received compensation for this per product (Renting et al., 2003; Oppedijk van Veen et al., 2019). Individual farms and the agri-industry keep growing and the export rates go up. This is caused by national and European governments steering towards the production of raw materials for multinational agribusinesses. Prices of products are kept low, because of the free market mechanism. As a consequence, production rates have to go up to make a living (Oppedijk van Veen et al., 2019). This led to an income crisis among farmers, 20-40% make less than a monthly minimum wage. To increase their incomes, the majority of farmers invest in upscaling, mechanization and intensification.

This has led farmers to be in debt, because of the bank loans they had to take to finance this process (Oppedijk van Veen et al., 2019). In 2012, the CBS reported that the combined loans of all Dutch farmers added up to €24 billion, with an estimated debt of €600,000 per household (Oppedijk van Veen et al., 2019). These debts cause stress among farmers and lead them to quit. Their land is subsequently often sold to neighboring farmers, which causes them to have even bigger farms and debts that they have to work even harder to pay off (Oppedijk van Veen et al., 2019). This is why farmers feel like they cannot afford the financial risks of investing in new, seemingly more unsure (because of the lack of broad-scale education on agroecology) forms of agriculture (Oppedijk van Veen et al., 2019). It also causes farmers to feel unseen in politics (Runhaar et al., 2020). This is probably why the new regulations surrounding nitrogen emissions elicit such a strong reaction from conventional farmers. Additionally, it contributes to a problem new farmers face, namely that there is no land for them to purchase (Oppedijk van Veen et al., 2019). This way, the cycle of the paradigm of intensification persists.

From an institutional perspective, this cycle, and the policy framework surrounding it, shape the lock-in. Political institutions (in the form of regulation and subsidy), agricultural schools and banks are predominantly focused on promoting conventional agriculture (Oppedijk van Veen et al., 2019). Dutch banks do not provide loans to agroecological starters (Oppedijk van Veen et al., 2019). This indicates that there is a “market failure” (Needham, 2006, p. 55). This is a term coined by Pigou (1933) to describe the idea that the free market mechanism cannot be relied on when it comes to collective goods that have no market value. Farmers are encouraged to invest in conventional agricultural methods to increase production for the world market and consequently damage the environment - the collective good with no market value in this issue. This phenomenon is caused by what Pigou calls an “external effect” (Pigou, 1933, p. 195). Farmers are not supported in the form of subsidies when they switch to sustainable agriculture. Switching will require investments and will initially lower their food production, causing them to lose money. Additionally, European as well as national policy remained more reactive than anticipative, there have been emergency measures on agriculture, but never policy with a clear future orientation (WUR, 2018). Furthermore, acquiring land is one of the biggest obstacles for agroecological farmers (Boere, 2015; Oppedijk van Veen et al., 2019; Nabisubi et al., 2020). There is a shortage of land, since when farmers quit, their land is often bought by neighboring conventional farmers due to the pressure for extensification. Or the zoning plan of the land is changed to building land, leading to a decrease of land available as agricultural land (Nabisubi et al., 2020; Boere, 2015). Land that is available to buy is expensive: in the last quarter of 2022, one acre of land costs €69.000 on average (Kadaster, 2022). Considering farmland usually takes up multiple acres of land, the costs are usually too high for agroecological farmers. Agroecological farmers often cannot take out bank loans (Oppedijk van Veen et al., 2019). Therefore, rent or lease constructions are often used. However, Oppedijk van Veen et al. (2019) found that this does not solve the insecurity surrounding land for agroecological

farmers. Conflicts between these farmers and landowners are common and when this happens, farmers commonly have to leave within a year. Furthermore, zoning plans can also be changed by municipalities, leading to the same result (Oppedijk van Veen et al., 2019). Potential archeological worth also creates obstacles, since some agroecological designs use trees (Nabisubi et al., 2020; Nederlandse Archeologievereniging, n.d.). Agricultural land near river beds is always deemed land with possible archeological worth (Nabisubi et al., 2020). When this land has not yet been researched for archeological worth - this can last years after it has been deemed this - trees cannot be planted. This is detrimental because agroecological farms need more than one year to establish their ecological systems and create sufficient income (Oppedijk van Veen et al., 2019). Furthermore, it inhibits the possibility for farmers to experiment for finding a financially viable business model (Oppedijk van Veen et al., 2019).

Zoning plans in general create an obstacle for agroecological farmers (Nabisubi et al., 2020). Because agroecological methods and designs do not always fit those of the conventional sector, land with an agricultural purpose may, according to regulations, not be seen as applicable.

2.2.2 Socio-cultural factors

As discussed, farmers are not in a favorable position when it comes to regulation surrounding both the intensification of agriculture and moving towards more sustainable forms of agriculture. However, there are also existing norms among conventional farmers that come from the pathways established for conventional agriculture (see 2.2.1), which influences the opinions they have when it comes to agricultural management methods and their attitudes towards wildlife and the environment. To conceptualize this, the concept of habitus can be used.

The habitus is an embodied mental structure that is established through socialization (Bourdieu, 1990). It is the way individuals position themselves and perceive the world and it shapes and generates practices and representations. One's habitus is often unconscious. Socialization shapes us by the reproduction of structures and, at the same time, humans are agents, because they position themselves in a field and have the freedom to choose how to act, perpetuating the habitus (Schapendonk, 2020). In the case of conventional farmers: their primary conditioning (done by parents) is that they are raised with the outlook that if money is to be made as a farmer, one applies certain conventional agricultural practices, which is seen as the only way to make enough money to feed your family (Runhaar et al., 2020).

When an individual enters a new field, the habitus can be influenced by what Bourdieu calls secondary socialization. A field is a social context and setting in which humans are located (Bourdieu, 1993). Habitus is influenced by the specific field that individuals function within. For a conventional farmer, the field in which their secondary socialization often happens is the neighboring farmers. Farmer communities are tight-knit, the social pressure to conform to these values to maintain acceptance and support from neighboring farmers and their companies is high (Runhaar et al., 2020). Their secondary conditioning is highly likely to be at least in part the habitus of other conventional farmers.

In some cases, though, they might be exposed to a different field that will make them change their habitus (Bourdieu, 1993). This can lead them to gradually choose agriculture practices other than conventional ones. Sometimes, these individuals are successful in proving to the agricultural community surrounding them that their breaking from the norm is a viable model (Runhaar et al., 2020). In some cases, this inspires other conventional farmers to apply different agricultural practices too and thereby slightly unlocking the lock-in.

An important value within the community is recognition from neighboring farmers about the appearance of a farmer's farmland. The land has to look 'clean' and 'neatly organized'. In this context, these terms are interpreted as farmland that has monoculture, organized in mechanically created rows or grassland including only one type of grass. More sustainable farming practices are often focused on creating polyculture in farmlands because this is more beneficial for biodiversity and storing CO₂ emissions (Yahya et al., 2017). Using

polyculture does not always mean using mechanically created rows with one crop and therefore agroecological farmers often encounter the judgment that their land is 'messy' (Runhaar et al., 2020). Since a 'clean' look is important to the conventional agricultural community, there is resistance from farmers to switch toward more sustainable methods of production (Runhaar et al., 2017).

Another factor to consider when analyzing the habitus around conventional agriculture is the influence of the NAV and LTO. The view held by these trade unions is published in the newsletter 'De Nieuwe Oogst', which is prevalently read among farmers and thus shapes the view of farmers on this topic (Runhaar et al., 2020). De Nieuwe Oogst usually negatively frames political regulation of environmental lawmaking that influences conventional agricultural practices to move towards more sustainable practices (Runhaar et al., 2020). Consequently, the view of farmers on switching is influenced to be resistant to truly sustainable agricultural methods.

As discussed before, some conventional farmers or new farmers enter a field where sustainability is discussed and seen as an important enough factor to change their ways, the most radical among them choosing agroecology.

2.3 Founding agroecological organizations

Even though most agriculture is still conventional due to the factors discussed in section 2.2, there are agroecological organizations in existence. Section 2.2 demonstrates that the lock-in causes difficulty to provide income when a farmer switches to agroecology. It discusses the farmer's fear of the financial risk of switching, due to the lack of bank loans and governmental aid available in this area. This section looks at the financial resources available for agroecology despite the lock-in and how agroecological farms manage to generate income.

2.3.1 Alternative financing

Alternative financing is based on income that is sourced from fringe actors that function away from established financial institutions (University of Cambridge, 2022). These are private sphere actors; some from civil society (crowdfunding campaigns), others from the market sphere (hedge funds, private equity investors, venture capitalists, investment funds and credit unions) (University of Cambridge, 2022). Alternative finance is often done through digitization, specifically, the growing platform economy, which means that internet platforms are used to unite supply and demand, transactions and services surrounding alternative financing (University of Cambridge, 2022; Leveau et al., 2019). Digitisation also makes these options more accessible to smaller actors, because the barriers and demands to access them are lower (University of Cambridge, 2022).

From the current research done into agroecology in the Netherlands, private investment funds (using crowdfunding, which is project-oriented accumulation of money via donations on digital platforms) seem to be the main contributors in the market sphere (Oppedijk van Veen et al., 2019). Additionally, venture capitalists (private investors that are more willing to invest in start-ups) occasionally extend patient capital (longer-term investments) in the form of loans (University of Cambridge, 2022; Nabisubi et al., 2020). These loans function to enable agroecological projects to receive a bank loan. In the public sphere, CSAs (where direct investments make the investors co-owners of an organization) are usually the source (Oppedijk van Veen et al., 2019; Nabisubi et al., 2020).

2.3.2 Alternative Food Networks

At the base of every commercial organization is its business model. The phenomenon of AFNs covers concepts related to this subject when discussing agroecology. It is a term introduced by Renting et al. (2003) and has a wide variety of focuses, which determine how it

is defined. Orlando (2018) has done research into these different definitions among AFNs and has formulated one of the broadest definitions and thereby a good general starting point to start understanding the concept. According to Orlando (2018) “[a]lternative food networks are a wide-ranging body of practices dealing with food provisioning in a way that differs from the mainstream agro-food system” (p. 10). AFNs started as grassroots experiments to reorganize supply chains (Orlando, 2018). These experiments came from ethical, moral, political and health concerns with conventional supply chains and were inspired by a shift in agricultural practices, Fair Trade and local specialty foods (Orlando, 2018; Goodman & Goodman, 2009).

Several concerns are underpinning the existence of AFNs: the length of the chain, the environmental concern and embeddedness. The length of the chain, ideally a short chain, is seen as supporting farmers against intermediaries. The term SFSC is used to refer to this phenomenon (Orlando, 2018). In conventional food supply chains, intermediaries often benefit from rents, which is at the expense of the farmer (who receives a lower price for their produce) and the consumer (who pays an increased price due to several actors in the chain wanting to make a profit). The success in selling products associated with AFNs has been noticed by big supermarkets. These started selling their products, adding rents to AFNs, which counters the original intention of the short chain (Goodman & Goodman, 2009). There are however still many AFNs that work without big market players (Orlando, 2018). Furthermore, some operators along the chains, like transport companies, also add rent to the original costs of production. Environmental concern is based on how far food travels from the producer to the customer. Short chains reduce emissions for transport and unnecessary waste of resources (Paxton, 1994).

However, the environmental aspect and length of the chain do not guarantee that the food is produced ethically. For instance, working conditions could be poor or harmful chemicals could be used. This is where embeddedness is added to the discussion. Embeddedness is used here in the sense of looking at a product’s connection with the process it is produced in. This enables the consumer to see the production process and thereby potentially communicate the values of the organization, which is added to the ethical value associated with a product.

There are differing phenomena making up different AFNs. These differences can be seen between and within countries (Renting et al., 2003). In practice, this means there are different production codes (organic, regional, artisanal, etc.), having to do with consumer demands and producer supplies. These codes are a result of diversity in territorial settings, and farming systems, but also different gastronomic and cultural traditions and dissimilarity in consumer perceptions. Other factors that play a role are the way the establishment is constructed: the organizational structures of supply chains and institutional and policy structures (Renting et al., 2003).

Renting et al. (2003) have focused an extensive literature review on identifying three types of AFNs in the European countryside. They based these types on three criteria: organic farming, quality production and direct selling. In the paper, they use SFSC and AFN interchangeably. The categories they came up with were ‘face-to-face SFSCs’, ‘proximate SFSCs’ and ‘extended SFSCs’ (Renting et al., 2003). These categories are used in the case study because it provides a clear overview of what AFNs in Europe generally look like in practice.

Face-to-face SFSCs

This type of AFN is based on face-to-face interaction (Renting et al., 2003). Producers sell products directly to consumers. It largely coincides with direct sales (B2C); ‘pick your own’ gardens, farmers’ markets, roadside sales or farm shops are examples of this. There are also delivery-based methods, like mail order (which can also be done through the internet as e-commerce), subscription services and home deliveries. The main benefit of this method is saving costs concerning logistics, transport and marketing. An important factor is that these services remain restricted to individual farms.

Proximate SFSCs

Proximate SFSCs are based on relations of proximity (Renting et al., 2003). These relations create more complex arrangements with multiple partners. The most common example of this is the cooperation between producers, for instance, to widen their product range by exchanging products with other farms or by combining products under a regional quality hallmark. Consumer coops and CSA are examples of proximate SFSCs where consumers facilitate the extension of SFSCs by establishing shared ownership of an organization (Renting et al., 2003). CSAs are funded and owned by a community. They are popular in the Netherlands; between 2008 and 2019, the number of CSAs have risen from 10 to around 90 (Nabisubi et al., 2020). Adam (2006) defined two kinds of CSAs: the subscription CSA and the shareholder CSA. The subscription CSA is farmer-driven in the sense that the farmer organizes the CSA and does most of the management (Adam, 2006). Subscribers are not required to do farm work. This also includes a farmer cooperative, where two or more farmers produce products for the subscribers. Most CSAs are based on this model. The shareholder CSA is consumer-driven. Its management is determined by a core group. The core group hires a farmer and, if necessary, acquires land and organizes subscriptions.

Locality underpins this kind of AFN, products are only sold locally and the selling point is its locality (Renting et al., 2003). This locality may also be based on regional products, which are promoted as such and sold via events or fairs or to local shops and restaurants. This stretches out the length of the chain since it involves more intermediaries.

Extended SFSCs

This third category extends the length of the SFSCs to extended relations (Renting et al., 2003). Products that are regional specialties are sold to customers outside the region. Here, locality is no longer an important factor, taking away the environmental aspect. This is still an AFN because embeddedness continues to play a role. Information about the production process is for instance displayed on the website that sells the product or on the package, so there is still an emphasis on values. In the process of exporting products over a great distance, intermediaries are inevitably needed. This takes away the short-chain aspect of AFNs.

2.4 Conceptual model

The conceptual model in this thesis (figure 1) is constructed based on the relationships found in the theoretical exploration. This model is not a scheme for hypothesis testing using quantitative methods; it is a thought scheme used to structure the data gained from qualitative data from desk research, interviews and observations in the case study chapter. It displays the influences affecting the agriculture transition from the use of predominantly conventional agriculture to predominantly agroecological agricultural practices. It displays a negative relationship between the lock-in and this transition. Linked to the lock-in are the socio-cultural and institutional factors that were created by the lock-in but also reinforce it. The institutional factor is displayed as having a positive relationship with the forms of income from bank loans & government financing, while agroecological agriculture has a negative relationship with these because the government and banks mainly cater towards conventional agriculture due to path-dependencies. The part of income that is linked to alternative finance and AFNs has a positive relationship with agroecological agriculture because these support the existence of this form of agriculture. These links are outlined in the several corresponding sections in the case study, always in relation to Arbres' financial viability at the time it was studied for this case.

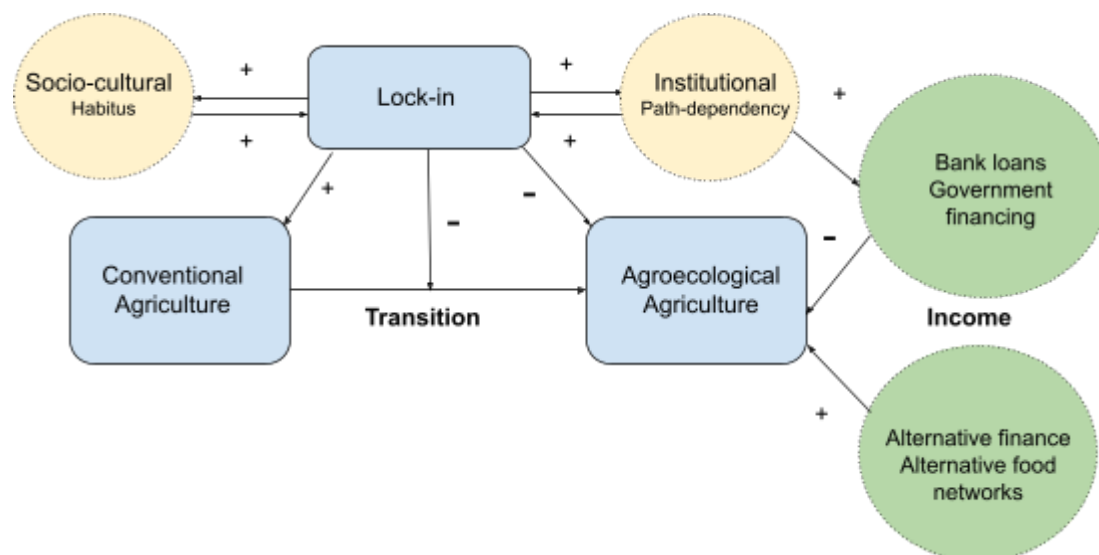


Figure 1: Conceptual model

3. Research philosophy & design

This chapter describes the research philosophy that guides the choice of methodology and methods attached to this methodology for this study. It discusses the philosophy by outlining the epistemology and ontology used in approaching this topic. Subsequently, the research design of this study is discussed by outlining the methodology and research strategy, methods and data analysis linked to this methodology. Additionally, this chapter includes reflections on the limitations of the chosen methods and considerations around trustworthiness, positionality and ethics.

3.1 Ontology

For this research a constructivist paradigm as described by Guba & Lincoln (1994) was applied, because it deals with a complex social phenomenon that is caused by multiple views colliding (see 2.). There are various interpretations of what certain paradigms, ontologies and epistemologies are like (see for example Moon & Blackman, 2014), for this research Guba & Lincoln (1994) was chosen because it provides a clear overview of paradigms and their respective ontologies, epistemologies and methodologies based on an extensive literature review on the subject. Constructivism is the belief that there are multiple realities that are constructed through multiple mental constructions (Guba & Lincoln, 1994).

The paradigm of critical theory is often used to look at complex phenomena. What discerns this paradigm from others is that it takes multiple social constructs (such as gender, political, social and ethnic factors) and tries to use these to look at how they shaped the current view on reality (Guba & Lincoln, 1994). This would have inhibited this particular research since it aims to be open to concepts that were not uncovered prior and thus using these fixed factors would damage the research.

Guba & Lincoln (1994) argue that the ontology underlying a constructivist paradigm is relativism. Relativism is the belief that there is not one ultimate truth, rather multiple realities exist. They are based on prior experiences and beliefs and are therefore specific and local in nature. It is important to note that certain concepts of reality can be shared between individuals; however, individuals still all have their own unique conceptions of reality based on their unique circumstances. In this particular paradigm, reality is seen as being constructed through interaction; there is no reality external to this. The language and choice of words used when writing, talking or discussing shapes heavily influence these realities; hence, they are called social realities within constructivism (Guba & Lincoln, 1994).

A paradigm within an objectivist ontology was not chosen, because it would not provide a chance to consider the multiple colliding views that make this social phenomenon complex. Rather, an objectivist ontology would inhibit the researcher, because they would have to zoom in on one of these views and deem that the 'true' one and omit all others (Guba & Lincoln, 1994). In this case, that could damage the insights that this research can provide to society and the academic field.

3.2 Epistemology

The epistemology matching the constructivist paradigm as described by Guba & Lincoln (1994) is subjectivism (Guba & Lincoln, 1994). In a constructivist paradigm individuals are continuously unconsciously constructing and reconstructing the experiences and social phenomena they encounter (Boudry, 2008). Therefore, the interpretation of reality depends on the subject constructing it. The researcher here is seen as an actor that can only interpret the data they research and are influenced in this process by their own constructs (Guba & Lincoln, 1994). The researcher and the subject are thus linked and findings manifest as the research proceeds. The researcher is subconsciously led by their subjective reality which shapes their research (Guba & Lincoln, 1994). In an attempt to reveal these subconscious influences, a section considering positionality was added to this chapter (see 3.7).

Hence, the choice of topic, the research questions, design and methods are not value free. The motivation to choose this research topic was chosen out of a feeling of urgency concerning climate change and the effect it has on animal lives and a desire to contribute in some way to solving or mitigating these effects. The motivation behind the choices concerning research design and methods are discussed in their respective sections.

3.3 Methodology

Based on the ontology and epistemology chosen, a qualitative approach is the most suitable for this research. A qualitative approach offers the chance to keep in account the reality of the researcher and the respondents, which adheres to the constructivist paradigm (Creswell & Poth, 2016). The topic of financing agroecological organizations is highly complex and multifaceted - as was shown in the theoretical exploration - and therefore requires detailed understanding. One of the key goals of qualitative approaches is to provide a holistic account, whereas quantitative approaches are more focused on measuring a couple of specific aspects (Creswell & Poth, 2016). A quantitative method, then, does not provide sufficiently detailed understanding of the phenomenon underlying the topic that this research aims to uncover.

The specific methodology listed by Guba & Lincoln (1994) for a constructivist paradigm is a hermeneutical and dialectical one. Because the reality of an individual in this paradigm is variable and personal, they can only be uncovered through interaction between the researcher and the respondents. These constructions are interpreted using hermeneutical techniques (Guba & Lincoln, 1994). Furthermore, the constructions are contrasted and compared through a dialectical process (Guba & Lincoln, 1994). The aim of the research becomes to uncover an improved construction through consensus that is formed and informed through this process. Throughout acquiring data for this study, the researcher was in constant interaction with their own view and with the respondents to interpret data and improve this interpretation through clarification by the respondents.

3.4 Research strategy

To gain a better understanding of what finding solutions to financing agroecology looks like in practice, a case study method was chosen. In addition, elements of participatory observation and grounded theory methods were used to gain additional information to 'thicken' the description of the case study.

3.4.1 Case study

Case studies can add to our knowledge in a unique way because it contributes to knowledge of several phenomena (Yin, 1984). One case study, for instance, can inform the researcher of individual, social and political phenomena. In this way, it is fit to use when studying several aspects of complex social phenomena. That is why it is often used in such fields as sociology, psychology, planning and economics, which research this kind of phenomena. Case studies have emerged to study complex phenomena over a relatively short period of time and can be used to focus on specific cases in relation to individuals, groups or sites (Yin, 1984).

The case study method focuses on research conducted in the field, in this study, the agroforestry co-operative Arbres (Fidel, 1984). It provides an in-depth description and interpretation of the investigated case (Hays, 2004). This makes the method useful to answer the 'how' and 'why' questions. According to Yin (1984), it can be justified to answer 'what' questions with an exploratory nature, since it can help discover new contributing factors to a complex phenomenon. A critique of this method is that it is less accurate than surveys or experiments (Yin, 1984). This is an objectivist view. A subjectivist answer to this concern would be that the materials collected reflect a broader, more complex image than said other

methods. On the other hand, surveys and experiments might miss certain contributing factors and viewpoints, because these methods are focused specifically on the factors that the researcher views as important and therefore what is not deemed as important might not be included in research surrounding the topic. In this case, this would result in a less holistic body of knowledge on a phenomenon. Since this study is focused on a complex societal phenomenon, the information a case study generates is thus more applicable.

The particular kind of case study this research used is an in-depth case study, which means one case was studied elaborately (Fidel, 1984). It was carried out through a research internship at the Arbres co-operative and looked at their business operations concerning generating income (the internship contract is included in the digital files submitted to Brightspace). Their case is an interesting one concerning young agroecological farms; usually, these only have one (smaller) location (Oppedijk van Veen et al., 2019).

In an attempt to provide as holistic a body of knowledge as possible, the thick description method was used; this is a method introduced by Geertz (1973). This method utilizes paying attention to contextual detail when observing, and later interpreting social meaning. It takes into account the contextual and experiential understanding of the behaviors that give the action meaning (Begoray & Banister, 2010). By doing this it tries to uncover the layers of understanding that underlie the studied subject.

Case study selection

For the purpose of this research the agroecological (a combination of food forestry and a permaculture garden) farm Arbres was selected. Arbres is in its starting phase and already operates at two locations: in Weurt and Malden (ARBRES voedselbos design & beheer, 2022). Arbres aims to step away from the recreational business model often used by agroecological farms, which drives them in their innovative search for a viable business model that can bridge the financial gap of the agroecological starting phase (WUR & LNV, 2019; F. de Gram, personal communication, 31 May 2022). These constant innovations could provide insights into new ways to generate income.

The two most notable examples are Arbres' care model and chosen agricultural methods. Arbres' care model, in which part of their income is generated through working with people with an occupational disability to help cover the income gap in the agroecological starting phase (ARBRES voedselbos design & beheer, 2022), is unique for an agroecological organization that is registered as a commercial farm, although it shares certain similarities with care farms since Arbres is offering daycare on a farm (J. Lardinois, personal communication, 19 May 2022; Federatie Landbouw en Zorg, 2023). The difference is that daycare is not the central component of Arbres (J. Lardinois, personal communication, 19 May 2022; F. de Gram, personal communication, 31 May 2022). At Arbres the daycare is seen as an additional component to provide multiple value creation. Studies on agroecological farms using this model could not be discovered during an extensive search and this is therefore an interesting new concept to study in relation to financing agroecology.

Additionally, Arbres aims to develop a business operations model that seeks to convince conventional farmers to switch to agroecological methods and to be taken seriously by governmental and private institutions as a commercial form of agriculture by diverging from established agroecology methods (F. de Gram, personal communication, 31 May 2022). An extensive literature overview of practices most used in agroecology reports organic materials are generally used where possible and certain crop formations that differ from well-known commercial crops (Migliorini & Wezel, 2017); Arbres' chosen methods differ, sometimes opting for materials and crops used in conventional agriculture. All in all, studying this case could therefore provide interesting insights into beneficial financial exploits for young agroecological farms.

3.4.2 Participant observation

To provide this thick description, this study used participant observation. Participant observation aims to gain knowledge by becoming closely familiar with the subjects being studied (Saunders, 2016). Usually, it is applied throughout periods ranging from months to years. There are several forms of participant observation; this study applied active participation, in which the researcher becomes a member of the group, embracing its skills and customs; this allows a more in-depth understanding of the subjects studied (DeWalt et al., 1998).

In this study, this has been done through working together on the land with the employees of Arbres, which consists of volunteers, the deelnemers and the management over a period of six months, from January 2022 to June 2022, during the internship period at Arbres. The internship consisted of being present at Arbres grounds two days a week, working half days at the office and half days on the land. Arbres consists of two locations: the Waalgaard and Grootstal. Working days were divided among these locations. The Waalgaard sees most activity on Tuesdays and Grootstal sees most activity on Thursdays. Consequently, these days were chosen for the internship because they provided most data. The half days at the office provided conversations with the core team that at times led to additional relevant data and to a more holistic image of what the day-to-day processes at Arbres were and the philosophies behind them. The half days in the field led to additional conversations with the core team and moreover with the deelnemers and volunteers, who execute most of the fieldwork. This led to insights into the biological system used for Arbres and the motivation behind it. All together it created a familiar setting, which created a fertile ground for casual conversations on day-to-day business and ideas on several topics related to financing agroecology. Furthermore, it allowed for observing the practices applied on the land, which in some cases gave additional context as to the financial status and business operations Arbres applies. If clarification was needed concerning observations, this method allowed gaining that through following up on what was seen and said during working on the land.

3.4.3 Grounded theory

Additionally, the practices of theoretical sampling, open coding and memoing of grounded theory research have been used to identify some extra factors that may not have been named in the literature. Grounded theory was developed in 1967 by Glaser and Strauss (Creswell & Poth, 2016). It is concerned with generating new theories through an iterative process in which data from the field are systematically collected and analyzed (Creswell & Poth, 2016). It is used to understand phenomena that are not yet broadly researched by academics. This element was added because the resources available for financing agroecology are very place- and culture-dependent and are rapidly changing and evolving in the Netherlands at the moment since civil society actors are increasingly seeing the importance of the sustainability aspect of agroecology and thus relatively more agroecology projects are started compared to the past years (Renting et al., 2003; Oppedijk van Veen et al., 2019).

3.5 Research methods & data analysis

This section discusses the research methods and data analysis techniques that were chosen to actualize the research design in-depth to provide an overview of the practical execution of the research design.

3.5.1 Research methods

The four methods chosen to conduct the study were desk research, observation, unstructured interviews and semi-structured interviews. The observation and interviews are

helpful to provide primary data to contribute to understanding the main research question (Czarniawska, 2014). Desk research helps provide secondary data to understand the background of the topic, to provide a theoretical framework and to see how the primary findings compare to the practices used to generate income by other organizations (Czarniawska, 2014). These four research methods combined are important to use during this research because then its design meets the requirements of triangulation (Schoonenboom & Johnson, 2017). Triangulation entails using multiple (three at least) research methods to interpret acquired data. If the findings of the methods used are cohesive, the research will meet the requirements for academic validity.

Desk research

Desk research combines knowledge from academic literature, articles and several forms of archived data, such as documentaries, pictures and interviews (Czarniawska, 2014). Information from the desk research provided a useful literary background and conceptual framework to approach the primary data gained during the case study research. Furthermore, it can help identify the gaps in the literature that the primary data helps to elaborate on (Czarniawska, 2014). During the initial phase of the study, this has been essential in providing an image of what methodology was needed for this research. Additionally, it can help identify how the primary data compares to former research (Czarniawska, 2014).

Observation

To execute the observation for this study (see 3.4), the researcher has functioned as a participant, by working on the land with the employees of Arbres. During the several tasks that were performed as a participant, like planting trees, weeding, sowing and watering the plants, the land was observed. Having prior knowledge of organic production systems, it was possible to notice when certain methods were used differently.

Furthermore, observation allowed seeing how the organization functions on a day-to-day basis, which gave insight into which practices are common and which are uncommon, what choices are made often and what choices are made incidentally. This also helped to gain more information during the semi-structured and unstructured interviews, since informing why these practices are in place and what choices were made provided more insight into the business operations of Arbres. The relevant data gained from this process was written down in notes and some photographic material was gathered by photographing. Notes of the observations are included in the digital files uploaded to Brightspace.

Unstructured interviews

Additionally, this research used unstructured interviews. Unstructured interviews are informal conversations; in this case, they were conducted during the participatory observation work. This interview method was chosen to build a relationship with the employees since it manifests a feeling of inclusion, rather than a distance between the interviewee and interviewer (Swain & Spire, 2020). This can result in informative conversations due to the respondent feeling more familiar with the interviewer. No recording devices were used during these interviews; a recording device can bring a certain formality to the interview, inhibiting the safe space that has been cultivated through familiarity (Swain & Spire, 2020).

Using this method over an extended period of time provides extensive data, enabling a multi-faceted vision of the complex phenomenon being studied that strives to be as holistic as possible within the constraints of the inevitable subjectivity a researcher is subject to (Swain & Spire, 2020). The unstructured interviews provided context for the observations and, at times, specific knowledge concerning business operations and events affecting them.

A consideration concerning the use of unstructured interviews is the researcher forming their opinion and interjecting that in an informal conversation (Hammersley &

Atkinson, 2007). Hammersley & Atkinson (2007) argue that this could be seen in a positive light since the reaction of the interviewee to an opinion could provide additional insight. Another concern is that interviewees might not always speak openly and honestly (Hammersley & Atkinson, 2007). During this research, observation is used to add context to diminish the amount of information that might be missed in case this happened. Notes of the unstructured interviews are included in the digital files uploaded to Brightspace.

Face-to-face semi-structured interviews

Semi-structured interviews can be an effective way of gaining insight into the perspective and experience of the interviewees on the studied phenomenon (Creswell & Poth, 2016). They allow the respondent relative freedom to tell their story concerning a certain topic, which might provide additional information on topics or factors related to the phenomenon, sometimes even new insights; the data collected has a chance of being richer and more detailed than when a structured interview method is used. At the same time, it allows the researcher to mildly steer towards topics of interest that were prepared beforehand or come up during the interview by asking follow-up questions or probing. An interview guide was composed beforehand to make sure relevant topics were included in the interview. However, this guide was not always precisely executed; questions have been altered and expanded upon according to the natural flow of the interview. The interviews were conducted on-site in a face-to-face manner except for the interview with Arne; this interview was conducted through phone, due to his location and technical difficulties with the video call software.

This method was chosen to complement the knowledge gained from observation and unstructured interviews because it helped to clarify the overarching philosophies the interviewees held and to specify what the business operations have looked like in the past and do look like currently. As was mentioned in section 3.4.3, the factors at play are place-, culture- and time-dependent and differ per organization. The interviews helped to identify new important factors relevant to this organization and, potentially, relevant to others. The guide was designed to elaborate on the knowledge gained during desk research and also to see if the knowledge gained in the desk research applies to the business operations of Arbres.

The respondents were selected through purposive sampling; the main research question provides direction for this selection by providing the category of people it focuses on (Bryman, 2012). The research question of this thesis provides two elements these respondents should adhere to: they have to be connected to Arbres and they have to have insights about acquiring income in the starting phase of agroecological organizations. Therefore the respondents that have been selected are either part of the management of Arbres that know the history and day-to-day finances of Arbres, or of institutions that have provided finances for Arbres. These participants are detailed in table 1.

The interviews were done in Dutch. Dutch was chosen because all interviewees were more fluent in and comfortable with speaking Dutch. The assumption that was made was that because of this, the data the interviews provided would be more elaborate and precisely expressed, and thus richer, when the interviews are conducted in Dutch. The audio files and transcriptions of these interviews are included in the digital files uploaded to Brightspace.

Table 1: respondent selection for face-to-face semi-structured interviews

Respondent	Activity status	Date interview
Jonah Lardinois	Care Management Arbres	19-5-2022
Joris de Kleer	PR and sales Arbres	24-5-2022
Joke Feenstra	Co-founder Arbres	24-5-2022
Marieke Meijer	Kitchen garden management Arbres	24-5-2022

Frank de Gram	Co-founder Arbres	31-5-2022
Arne Driessen	Impact Investor Golden Bird	3-6-2022

3.5.2 Data analysis

The observations and unstructured interviews were written down in Word documents and documented through pictures. Pictures were used as context for the observation and unstructured interview notes. This was an iterative process in which data from the field was systematically collected over half a year and analyzed. These were all dated and collected in a folder in Google Drive. The processing of the data from the semi-structured interviews was started by transcribing the semi-structured interviews and translating the raw data material. Transcription and translation are seen as important beyond the technical aspect of understanding data; they also entail judgment and interpretation, which contributes to the usage of the data at hand (Marshall & Rossman, 2014). The transcription was facilitated using the transcription function in Word 365 to provide a draft. This draft was corrected and enhanced by playing back the interviews at a slower speed and pausing if needed to transcribe the full interviews.

For the primary data, an analysis based on thematic content analysis was followed using Atlas.ti (Burnard, 1991). This aimed at producing a systematic documentation of themes addressed in the interviews. The process commenced with reading through the transcripts and observations, uploading them to atlas.ti and making notes on general themes (Burnard, 1991). Subsequently, the transcripts and observations were coded using open coding to discover additional themes. These themes were then reviewed and code groups were created corresponding to trends found in the themes (the coding file and code-book are included in the digital files uploaded to Brightspace). Codes were added to the respective code groups and codes that were similar were merged. These code groups were then reviewed to create subsections and main sections. The sections were made into folders to create an outline for the case study. Subsequently, code reports were generated per folder and used to write up findings that adhere to answering the research questions. If the data did not fully answer the questions, additional literature was used.

In this data analysis, theorizing about the data was added to the analysis as part of the thick description method (Bryman, 2012). This is done to avoid not doing justice to what interviewees displayed in their behavior or tone. A mere description of what interviewees said and did can omit helpful additional data. The theorizing then helps the data acquire significance in the context of the research.

3.6 Limitations

Each method has limitations. In this case, one of these limitations lies within the case study method. Case studies usually center around the collection of large amounts of data to be analyzed (Hodkinson & Hodkinson, 2001). During the analysis of this data, it needs to be filtered into categories. Data that does not fit in these categories or accounts that provide the same information need to be omitted (Hodkinson & Hodkinson, 2001). This can result in giving more attention to data from certain respondents over others.

Furthermore, by working with observation within a case study, certain biases are inevitable. Saunders (2016) describes that the data collected through observation never provides the whole picture, since the data collected depends on the place and time in which the researcher is situated during the observation.

Additionally, the data collection is influenced by the beliefs of the researcher on what is important and the interpretation of said data depends on the worldview of the researcher (Hodkinson & Hodkinson, 2001). Similarly, misunderstandings are a risk when doing unstructured and semi-structured interviews, since assumptions of the researcher can

possibly result in inaccurate interpretations of the data. This was addressed by including a positionality section (see 3.7) (Saunders, 2016).

An additional limitation of case study research in general is that there is no generalizability or external validity. This ties into Yin's (1984) argument concerning experiments, which was discussed in section 3.3. However, the case study method is chosen from an understanding that the subject is too complex to apply quantitative measures and therefore does not seek to make generalizations, since that would omit valuable data from the bigger picture (Bryman, 2012). Likewise, this study does not aim for generalizability, since it is not considered relevant when portraying the complexity of the issue at hand. The research was based on the knowledge that agroecological organizations differ in their business operations and the belief that this difference is valuable knowledge that can benefit the expansion of societal and academic knowledge on the topic.

3.7 Trustworthiness, Positionality & Ethics

Trustworthiness

The research process has to meet the criteria of trustworthiness. In this research, the criteria lined out by Bryman (2012) were used. These are credibility, transferability and confirmability. These criteria reflect the reliability and validity of the research. Qualitative research is not aimed at objectivity, making it difficult to completely fulfill these criteria. However, this research aims to unveil a sense of what interpretations of data are based on through reflexivity in the positionality section below, providing a certain transparency that helps meet these criteria in some form. Additionally, triangulation was used to check the validity of the research (see 3.5.1).

Positionality

Holmes (2022) formulates a concise overview of the requirements of positionality. He writes that a strong positionality statement includes “a description of a researcher’s lenses, such as their philosophical, personal, theoretical beliefs and perspective through which they view the research process” (Holmes, 2022, p. 4). This perspective has been described in sections 3.1, 3.2 and 3.3. The other components are:

“[...] potential influences on the research (such as age, political beliefs, social class, race, ethnicity, gender, religious beliefs, previous career), the researcher’s chosen or pre-determined position about the participants in the project (e.g., as an insider or an outsider), the research-project context and an explanation as to how, where, when and in what way these might, may, or have, influenced the research process” (Holmes, 2022, p. 4)

When it comes to potential influences, I am a white 31-year-old Dutch cis woman that grew up among the higher middle class; I perceive the world through the lens of the increasingly growing sustainability trend which emerged in my twenties in the Netherlands and is a prevalent topic among people in the higher middle class and in the left-leaning circles that I grew up in and which remains to be my political inclination. When I was a young girl, mobile technology was less prevalent in society, so my playtime was mostly set in the physical world. My parents always encouraged me to play outside growing up. My childhood home is situated at the edge of a city, so I usually played in nature and near farm fields. This was foundational to my relationship with nature and agriculture and the delicate balance between the two. Over the years I continued to seek to be in nature and the farming fields and observed how climate change has affected areas and animals negatively and learned that conventional agriculture is one of the factors causing this decay. An internship at BioMyGreen, a mycorrhizal preparation producer, gave me additional insights into how alternative approaches to agriculture can make a positive difference, which also strengthened my drive to contribute to the field of research into alternative forms of

agriculture to hopefully do my part in contributing to the agriculture transition. Furthermore, I have come to adopt esoteric beliefs that have strengthened my affinity with nature, which has been leading to an ever-increasing drive to stimulate positive change when it comes to sustainability efforts. This means that I lean towards positively evaluating the project I am researching since they show sustainability efforts steered towards achieving regenerating nature combined with alternative approaches to agriculture. Additionally, this perspective provides a bias towards the outcome of my research, where I hope that Arbres does provide an example of a viable business model for agroecological farms.

The researcher's chosen position in this project is neither that of a complete outsider nor of a complete insider. As I did participate in the daily operations of Arbres both in office and on the land at both of their locations, I have functioned as an insider as time went on, learning about the day-to-day processes and dynamics of Arbres. Yet, since I have not worked with them every workday and have worked there for six months only and therefore have missed observing what came before and during the days I was absent, there is also the element of being an outsider. This ties into the research-project context, in which some information from the time I was not present was collected from unstructured and semi-structured interviews which is information that itself can be colored by a respondent's subjective experience and how they perceive and, consequently, interact with me. This can cause gaps in potentially relevant data delivered by the respondents, where they might not have remembered certain events or not deem them important. Furthermore, I have had to omit certain data that I did not deem relevant to the research project and the selection of respondents used for the interviews also influences a potential omission of data that respondents that were not selected might have provided.

Ethics

Research has to be based on data that was collected without harming the respondents, deception or invasion of privacy (Bryman, 2012). This was realized by speaking to the contact person of Arbres and discussing the research design with him, so he could give informed consent.

Furthermore, for the observation and unstructured interviews, the degree to which the researcher's identity is revealed is of importance to the ethics; otherwise, informed consent is an issue (Saunders, 2016). During the data collection, all people encountered during fieldwork were informed that fieldwork participation was used for data collection and providing details on what the research project entails.

Another concern regarding participatory observation is that the description of the observation does not lead to any ill effects for the respondents (Bryman, 2012). Arbres employs people with an occupational disability. Identifying these people or including information that they have disclosed that is confidential could potentially harm them. Hence, this study ensured anonymity for these people and did not disclose information concerning these details. The volunteer employees' identities were also kept anonymous because no explicit consent for including their identities in the research was given.

For the semi-structured interviews consent for voluntary participation, recording and usage of data was asked before the interviews. During the interviews, consent was asked for again concerning these topics and concerning anonymity and the processing of information. Permission or needs and demands of the interviewees about data processing were recorded for future reference and taken into account in the data analysis.

4. Case study

This chapter contains the findings based on the case study data gathered through the interviews and observations with additional data from secondary resources that were useful for clarification purposes (see 3.4). It is focused on providing new insights into the private and public financing sources that can be acquired, through looking at Arbres' business model and their ideas of what could be improved when it comes to public, private and entrepreneurial aspects related to finances, to complement the body of information provided in chapter 2. To do this, it discusses various aspects of Arbres' business model that are tied to the financial resources they acquired as starting capital, their day-to-day exploits and other sources of income. Subsequently, the public financing they received is discussed. Lastly, it outlines the data gathered on what the respondents think would help agriculture transition towards agroecology from a public, private and entrepreneurial perspective.

4.1 Introduction to Arbres

Before analyzing the data concerning the financial exploits of Arbres, it is important to understand the research context, since Arbres' financial exploits are bound to and based on these factors. The research context in this section provides an introduction to Arbres and the agroecological model they use.

4.1.1. From founding Arbres to current day

Cooperative Arbres was founded by Frank de Gram and Joke Feenstra in 2019 from a wish to combine labor reintegration and sustainability (F. de Gram, personal communication, 31 May 2022). He found agroecology, especially food forestry, to be the sustainability factor that he wanted to use since food forestry touches on all the climate change aspects Frank wanted to address with his trajectory, like biodiversity, CO₂ storage, more trees, water storage and the agriculture transition; for that reason, he sees it as an all-encompassing system, which has the additional benefit of providing food. Frank started the one-man company named Arbres. While doing a course at the Plant, he met Joke Feenstra (J. Feenstra, personal communication, 24 May 2022; F. de Gram, personal communication, 31 May 2022). They found they had the same ambition and developed Joke's food forest design and bought their first location: the Waalgaard (J. Feenstra, personal communication, 24 May 2022). This is a 2,7 hectares plot, located in Weurt (J. Feenstra, personal communication, 24 May 2022). It used to be a pear orchard that was managed according to conventional agricultural methods. This led to the foundation of the cooperative Arbres. Later, a former Staatsbosbeheer plot of two acres at the Grootstal estate in Malden was acquired (J. Feenstra, personal communication, 24 May 2022). Jonah Lardinois joined in 2021 to further shape Arbres' care branch (J. Lardinois, personal communication, 19 May 2022). The current goal for Arbres is to develop fully productive farms that are financially viable and can ultimately be sold to a young farmer; possibly a farmer that they have educated, since the Wednesdays are reserved to educate deelnemers in agroecology (J. Feenstra, personal communication, 24 May 2022).

Frank, Joke and Jonah form the current core management of Arbres (J. Lardinois, personal communication, 19 May 2022). Frank mainly does administrative tasks and provides agroecological design advice (F. de Gram, personal communication, 31 May 2022). Joke does the general organization of the company, in which she is responsible for monitoring all the processes of the organization and administrative tasks and is head of marketing for Arbres. Additionally, she works as a farmer, during which she is responsible for hiring and coordinating volunteers (J. Feenstra, personal communication, 24 May 2022). Jonah is the coordinator of the reintegration trajectories for Arbres (J. Lardinois, personal communication, 19 May 2022). They are supported by Joris de Kleer, who does sales and

PR and Marieke Meijer, who designed and coordinates the kitchen garden (M. Meijer, personal communication, 24 May 2022; J. de Kleer, personal communication, 24 May 2022).

4.1.2 Arbres' agroecological model

The majority of Arbres' design is modeled after the food forestry model. Food forestry was briefly introduced in section 1.1 as a form of agroecology. A food forest is an agricultural land use system that mimics the functional and structural vegetation composition of a natural forest ecosystem. It consists of a variety of edible plants grown in multiple vertical layers. The starting phase of this model can last five to ten years because the forest needs to mature first before being able to reach full productivity (de Groot & Veen, 2017). It aims to create a self-sufficient system that has its own ecosystem balance likened to a natural forest (Haas & de Vos, 2022). Figure 2 illustrates a common food forest structure.

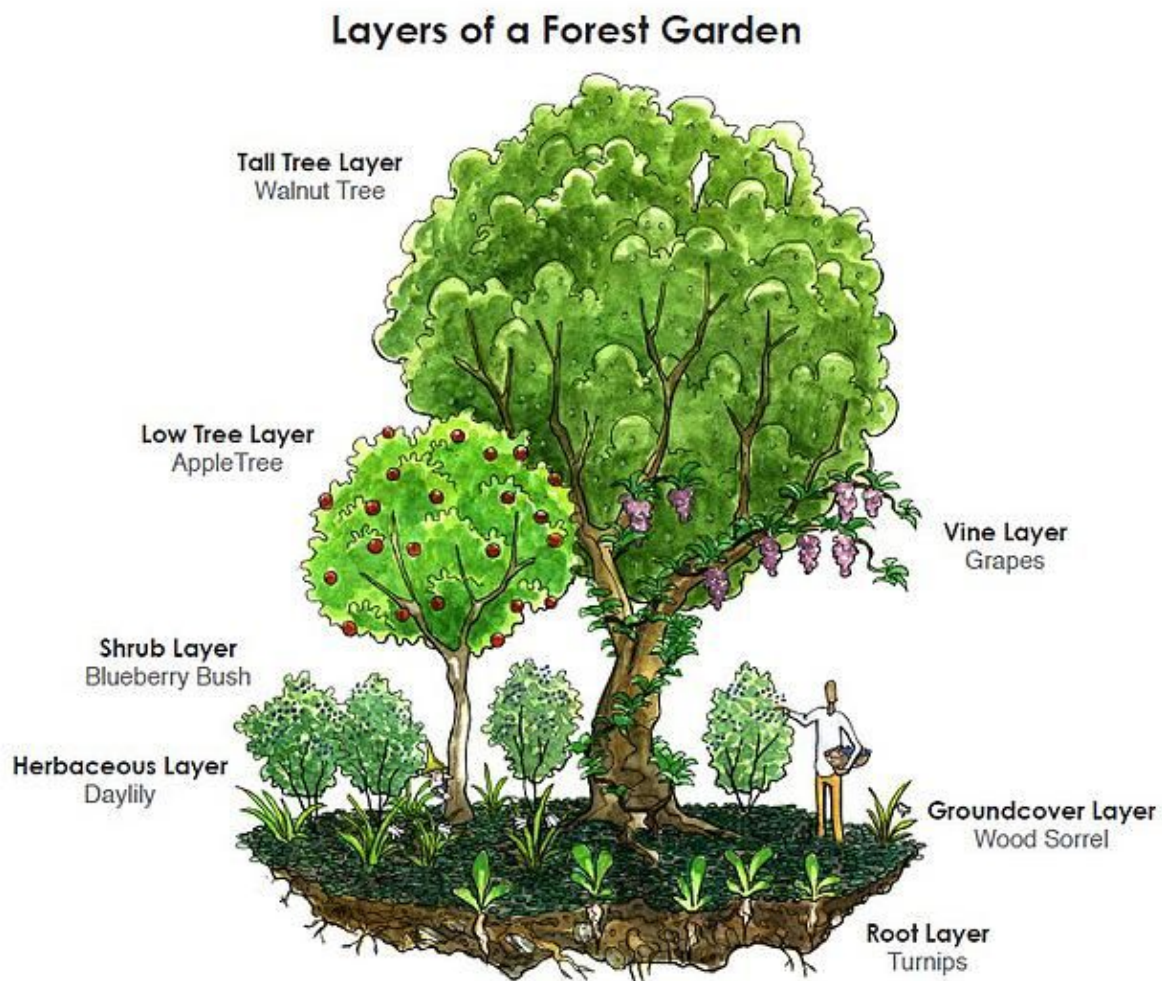


Figure 2: Common structure of a food forest (Kearsley, 2015)

It is a multi-layered structure, usually seven layers, simulating the composition of a real forest (de Groot & Veen, 2017). The top layer is the tall tree layer (around nine meters), usually containing nitrogen-fixing, nut or fruit trees. The second layer is the lower tree layer (around three to five meters), usually containing mostly fruit trees (de Groot & Veen, 2017). The third layer contains fruit, nut, flowering or medicinal shrubs. The herbaceous layer underneath contains perennial plants like herbs or bee-forage plants. The rhizosphere is the layer of root crops (e.g. carrots and potatoes) underneath the herbaceous layer. The soil surface consists of plants that protect the soil and prevent weeds from growing. Lastly, there is a vertical

layer, consisting of vines and climbing plants (e.g. grapes). A wetland layer or fungal layer may also be added to the soil surface.

Food forestry is among the oldest agricultural methods. It originated in humid tropical areas, where the majority of Earth's food forests can still be found (Ziyadi et al., 2019). The oldest is located in Inraren, Morocco; it is estimated by several studies to be around 2000 years old (Ziyadi et al., 2019). In the Netherlands, food forests are a more recent phenomenon, with the first being cultivated in Swalmen in 1995 (Dorp, 2020). It is estimated that 150 hectares of Dutch agricultural land in 2020 was used to cultivate food forests (Nabisubi et al., 2020). Food forests are growing in popularity in the Netherlands, so this scope is expected to expand and has expanded since (Keulen, 2022; Haas & de Vos, 2022).

The model Arbres uses is a slightly altered version of this food forest model since the Waalgaard is a former orchard. Therefore, Arbres' food forest design specifically works with rows of trees with lanes in between instead of a traditional forest, where trees in rows are less common (J. Feenstra, personal communication, 24 May 2022; F. de Gram, personal communication, 31 May 2022). Additionally, their design tries to seek a middle way between conventional agriculture and more traditional food forestry, where everything is directed at using sustainable and ecologically sound methods and materials in their agricultural methods (F. de Gram, personal communication, 7 March 2022). This was done because the people of Arbres want to inspire conventional farmers to copy their model and feel that using some materials or methods that are familiar to these farmers might help to create appeal for conventional farmers; when analyzing this using the conceptual model, it can be said that Arbres consciously creates a field to appeal to the habitus of conventional farmers by partially adhering to this habitus to change it and consequently using habitus to combat the lock-in instead of keeping it in place. Furthermore, the Waalgaard includes a kitchen garden in which permaculture techniques are applied (M. Meijer, personal communication, 24 May 2022). Therefore, Arbres' design includes agroecological models next to food forestry, hence this thesis chose to study it as an example of agroecology.

Additionally, the Waalgaard has a nursery (J. Lardinois, personal communication, 7 March 2022; J. Lardinois, personal communication, 31 March 2022). This is done to save money on buying plants from growers, which can turn out to be quite expensive. Additionally, because of the rise of food forests, there is a shortage of commonly occurring crops in these systems (F. de Gram, personal communication, 7 March 2022; J. Lardinois, personal communication, 7 March 2022). So, the nursery also ensures Arbres has the crops needed for their design (J. Lardinois, personal communication, 31 March 2022). The nursery is an example of Arbres' innovations since it is not usually included in agroecology (Migliorini & Wezel, 2017).



Figure 3: Food forestorchard Waalgaard, March 2022



Figure 4: Kitchen garden Waalgaard, March 2022



Figure 5: Nursery Waalgaard, May 2022

The food forest at Grootstal has also been modeled after this design except for the kitchen garden, because the Grootstal estate already houses kitchen gardens (F. de Gram, personal communication, 7 April 2022). Frank considers adding another kitchen garden as a surplus for that reason. Grootstal also has an aesthetic dimension to the design; it was redesigned to fit the aesthetic vision of the Grootstal estate (F. de Gram, personal communication, 7 April 2022).



Figure 6: Grootstal location, January 2022



Figure 7: Working on site at Grootstal, January 2022

4.2 Starting capital

As was discussed in chapter 2, amassing starting capital for an agroecological farm can be a challenge. This chapter explores how starting capital was amassed by Arbres by outlining their business structure and private financing.

4.2.1 Waalgaard

The Waalgaard plot enabled Arbres to start cooperative. The cooperative structure helps to share the responsibility and thus is financially less risky for the core management of Arbres (see 2.3.2) (J. Feenstra, personal communication, 24 May 2022). The money from the cooperative members, combined with other sources of income, is used to fund purchases and pay off Golden Bird more rapidly (see 4.2.3) (F. de Gram, personal communication, 31 March 2022). Joke says the fast payback helps lower interest rates on the loan they have taken (J. Feenstra, personal communication, 24 May 2022).

The cooperative has 60 members that pay a minimum of €5000 per person (Waalgaard, 2021a; J. Feenstra, personal communication, 24 May 2022). Currently, Arbres has 20 cooperative members. This has provided them with more than half the income they had estimated to cover the start-up of Arbres (J. Feenstra, personal communication, 24 May 2022). Each cooperative member pays this amount to earn a piece of the Waalgaard land (J. Lardinois, personal communication, 19 May 2022). They can give their input concerning the most impactful decisions at a yearly general meeting of members. The day-to-day organizational decisions are made by Joke and Frank (J. Feenstra, personal communication, 24 May 2022; F. de Gram, personal communication, 31 May 2022). Cooperative members have the right to receive part of the yield, meaning they automatically become an oogstgenoot (J. de Kleer, personal communication, 24 May 2022). This latter is a pilot, and it has to turn out if this stays financially viable for Arbres, since the members have only paid once as investors (J. de Kleer, personal communication, 24 May 2022). The members are also entitled to pear juice and free guided tours (F. de Gram, personal communication, 7 March 2022). Since this year, Arbres also organizes a yearly member day (J. Feenstra, personal communication, 24 May 2022). Most members are solely investors and do not use the oogstgenoten structure. However, some of them do and some of them are volunteers at the Waalgaard (J. Feenstra, personal communication, 24 May 2022).

Arbres had research done into the motivation of members to invest in Arbres and it concluded that they wanted to invest because the money they invest is fixed and, since they co-own the land and land value steadily rises in the Netherlands, they cannot lose money and are quite likely to gain money from their investment (J. Feenstra, personal communication, 24 May 2022).

A cooperative is a form of CSA seen in AFNs (see 2.3.2). Their particular CSA takes the form of a subscription CSA, where the farmer organizes it and does most of the management; because it is run by multiple farmers (Frank, Joke, Jonah & Marieke) it falls in the subcategory of being a farmer cooperative (Adam, 2006) (see 2.3.2). Subscription CSAs are often part of proximate SFSCs (Renting et al., 2003; Adam, 2006) (see 2.3.2). Additionally, Arbres has an element of the face-to-face SFSCs, since their customers come to the farm to harvest their produce (see 4.4.2.2) (J. de Kleer, personal communication, 24 May 2022). AFNs have a positive influence, in this case by enabling the existence of an agroecological farm; this aligns with the conceptual model.

4.2.2 Grootstal

Grootstal has a different construction that required less starting capital. The plan is for Arbres to start leasing the land from the Grootstal estate with annual contracts (J. Feenstra, personal communication, 24 May 2022). Joke remarked that this annual arrangement is out of the ordinary for agricultural businesses, since farmers tend to think long-term, so leasing contracts usually span over a larger amount of time (J. Feenstra, personal communication,

24 May 2022). However, she is well acquainted with the baroness of the estate, so she trusts Arbres' arrangement with the estate will be renewed annually for a long enough timeframe to realize and manage the food forest. Currently, Arbres is still waiting for the official lease contract. However, Arbres was already allowed to realize their design on the land. As part of the leasing arrangement, the Grootstal estate pays for the planting material and other necessary materials for Arbres and Arbres is allowed to use the tools the estate owns to realize and manage their design. This construction ties into the conceptual model; alternative financing, in this case, a private investor, enables agroecology.

4.2.3 Private Financing

Impact investor

Through their search for cooperative members Joke and Frank met Arne Driessen, who runs the family fund Golden Bird, venture capitalists that invest in the regenerative chain: pre-farm companies (companies that provide items needed to farm to farmers), regenerative agroecology projects and regenerative AFNs (A. Driessen, personal communication, 3 June 2022). Their pre-farm investments are often shared in business portfolios of funds. Golden Bird invests most of its money into this form of alternative financing. However, they also finance a couple of agroecological farms like the Waalgaard in the form of loans, if they propose business models that Arne deems to have a great chance to succeed. They often extend patient capital in the form of loans to agricultural start-ups (see 2.3.1). The loan Golden Bird was willing to extend could go to a loan for four locations during what they call the pilot phase. However, Joke says for now they kept the loan at the amount offered for their two locations, Grootstal and Waalgaard, since they already have quite some work going on setting up and running these two locations (J. Feenstra, personal communication, 24 May 2022). This loan enabled Joke and Frank to make a head start to buy land and fund starting purchases needed (F. de Gram, personal communication, 7 March 2022).

Crowdfunding

Complementary to the loan from Golden Bird, crowdfunding for Arbres to pay for necessary materials was organized in May 2021 (J. de Kleer, personal communication, 24 May 2022). They offered rewards in return for the donations: t-shirts & a food forest poster Frank designed. This resulted in €10.000 through the platform "Crowdfunding Voor Natuur" (crowdfunding for nature) which is part of Crowd about Now. They stated certain rewards and started spreading knowledge about their crowdfunding campaign to family and friends. This platform has contacts with governmental institutions. Among others, the province of Gelderland donated €3000. Together, these already accounted for half of the money Arbres wanted to raise. Joris thinks that crowdfunding is often done and succeeds in bringing in money because the small scale and ideology of these agroecological projects evoke goodwill.

Arne observes that crowdfunding is often tried instead of bank loans; this has a lower chance of succeeding according to Arne, since crowdfunded financial goals take longer to amass and campaigns are at risk of not reaching their goal. (A. Driessen, personal communication, 3 June 2022).

Both Golden Bird and the crowdfunding campaign are examples of alternative financing enabling and supporting the existence of agroecology. This aligns with the positive relationship between alternative finance and agroecology found in the model.

4.3 Government Financing

When asked what he had seen as concrete support for Arbres that was founded on the nature-inclusive national policy of the Netherlands, Frank said he had only noticed the agroforestry subsidy (see 2.1.3). Arbres applied for and received this subsidy in 2022 (F. de

Gram, personal communication, 31 May 2022; J. de Kleer, personal communication 24 May 2022).

Currently, Arbres also receives the basic payments from the RVO (see 2.1.3) (F. de Gram, personal communication, 31 May 2022). Frank states they receive about €400 per acre per year. Arbres only receives it for the Waalgaard and not for Grootstal, because Grootstal does not fit the requirements for payment rights (see 2.1.3).

When Frank was discussing the topic of subsidies, disappointment could be felt. He said this was because these subsidies they receive are too low to significantly contribute to the costs of Arbres' starting phase. This ties into the conceptual model, where the lock-in is kept in place by path-dependencies that inhibit the existence of subsidies for agroecology. This is elaborated on in section 4.5.1.2.

4.4 Finances from day-to-day operations

4.4.1 Care Model Arbres

Working with people with an occupational disability is Arbres main source of income (J. Lardinois, personal communication, 19 May 2022). Currently, Arbres has fifteen deelnemers. These come from several administrative statuses, most of them are on government welfare (general welfare programme to ensure Dutch citizens receive a lawful minimum income), WAJONG or WIA (welfare programmes to aid Dutch citizens who are not able to work due to lasting mental or physical ailments) (Rijksoverheid, n.d. a, n.d. c, n.d. d). Because these people cannot participate in the regular job market, they have what is called an occupational disability (Rijksoverheid, n.d. b). Through government consultants that are on the cases of these deelnemers, they are extended the right for daycare or re-integration trajectories and Arbres can be contacted after by these consultants (J. Lardinois, personal communication, 19 May 2022). Depending on the severity of the condition of the individual, it is evaluated if they need or will benefit from following a re-integration trajectory. These can be at a person's current job, for instance, if they are overworked and are trying to get to a normal level of functioning again, but these can also be special trajectories offered by organizations. There are usually two broad categories of people in these trajectories: people who have fallen out of the job market temporarily (who receive re-integration trajectories) or long-term (who receive day care trajectories) (J. Lardinois, personal communication, 7 March 2022; Programmaraad Regionale Arbeidsmarkt, 2019). Arbres hires both, as long as someone has an interest in or affinity with Arbres' agricultural mission. In return, Arbres receives monetary compensation from a municipal budget and via Werkbedrijf Rijk van Nijmegen, Buurteams or Sociale Wijkteams; the latter three are government institutions at the micro level that directly work with the individuals in the re-integration trajectories (J. Lardinois, personal communication, 19 May 2022). These budgets are granted to larger care institutions, which in the case of Nijmegen are Werktdoen, Driestroom, Siza, Pluryn, RIBW Nijmegen & Rivierenland, IrisZorg, RIBW Nijmegen & Rivierenland, of which Arbres is a subcontractor (Werkbedrijf Rijk van Nijmegen, n.d.). These institutions pay Arbres per part of the day that a deelnemer is present (J. de Kleer, personal communication, 24 May 2022; J. Lardinois, personal communication, 19 May 2022). This monetary compensation is Arbres' biggest source of income at the moment, which helps them bridge the starting phase income gap (see 4.1.2).

The budget provided by the municipality is composed of several "building blocks" (J. Lardinois, personal communication, 19 May 2022). This means that the more care dimensions social support organizations offer, the more money they receive per individual in their trajectory. Jonah provides the example of specialized coaching, where a deelnemer stays after their shift, during which the care coordinator provides outpatient care for them. Or the care coordinator coaches a deelnemer towards work in one year, in which it is expected that at the end of the year, the deelnemer has a paid job. Part of Jonah's function at Arbres is

also to keep in contact with the Werkbedrijf to see if there are building blocks available in the budget if they notice a deelnemer receives or requires extra care from Arbres (J. Lardinois, personal communication, 19 May 2022).

Jonah thinks that sustainability and, in the case of Arbres specifically, agroecology, adds purpose in the sense that it creates something and is societally engaged to the re-integration trajectories that are good for the deelnemers (J. Lardinois, personal communication, 19 May 2022). Food forestry specifically for Jonah seems to be a good form for this since the slower pace of food forestry allows these individuals to develop themselves and (re-)gain confidence in themselves and their abilities, which helps in their reintegration into the labor market.

Arbres does not have a limit for the number of deelnemers but does have a limit on deelnemers per daypart (J. Lardinois, personal communication, 19 May 2022). Consequently, income varies depending on how often certain deelnemers work at Arbres. The average deelnemer comes in three dayparts per week. Jonah states that it is most efficient for the organization if deelnemers work several dayparts. However, he believes everybody has to start somewhere, so an individual that comes in one daypart a week is also accepted.

Jonah remarks, that this is not always a steady source of income; the deelnemers are in these trajectories because they experience mental or physical challenges, which means they are not always present when they planned to be; they may cancel last minute or they may be unable to follow the trajectory for some time, which cause financial setbacks for Arbres (J. Lardinois, personal communication, 19 May 2022). Jonah remarked that, in this sense, it is policy-wise not ideal for agroecological organizations. Marieke adds that working with deelnemers usually doesn't go according to the planning, due to their varying needs; this can lead to fewer tasks being done in a day than originally expected or planned. Additionally, explanations of theory concerning plants are not always processed by the deelnemers, which can result in loss of produce (M. Meijer, personal communication, 24 May 2022).

Even though this is the case, the care model remains Arbres' most stable form of income at this stage. Stable enough for Arne of Golden Bird, who states that he finds this model of income something that ensures these projects a stable income from the start; for him, as an investor, this is attractive, because it ensures him that investing in this organization is less risky because the organization is less likely to fail (A. Driessen, personal communication, 3 June 2022).

Because Jonah wants to keep the care model income relatively steady, he has thought of some solutions that may still provide care, and thus income, even if a deelnemer is not physically present (J. Lardinois, personal communication, 19 May 2022). For instance, when a deelnemer cancels at the last minute, Jonah can call them and offer them a short coaching session. Coaching a deelnemer can also improve their mental state and increase their engagement with Arbres, which increases the chance that they may show up next time and prevent them - hopefully - from dropping out infinitely.

Jonah says he would not recommend making all your money with the care model (J. Lardinois, personal communication, 19 May 2022). The current model as it is is directed at commercial development by selling the produce, which he thinks makes the work meaningful, which will make the deelnemers feel more valuable and try their best too. Otherwise, their work just becomes busywork. Marieke says that all the deelnemers were made oogstgenoten partly to show them what they are producing and doing useful work (M. Meijer, personal communication, 24 May 2022). Together with the additional benefit that it might teach some to cook and eat a more diverse diet.

Jonah hopes their care model to bridge the initial years of a food forest will inspire other organizations to do the same, since he believes it contributes to multiple value creation and makes the food forest model financially viable (J. Lardinois, personal communication, 19 May 2022). However, he does stress that for this model it is imperative to employ people who have experience in care coordination. Jonah hopes Arbres can in a few years be able to provide advice to other organizations on how to apply this care model.

When applying the conceptual model to Arbres' care model, it can be seen that in this case, the current pathways established in institutional funding from the care sector enable the viability of agroecology. This goes against the stated negative relationship between path-dependencies and promoting agroecology.

4.4.2 Produce sales

This section discusses the varieties of produce sales at Arbres. Currently, produce sales mainly take place at the Waalgaard, since Grootstal is not yet developed enough to provide produce (see 4.2.2). The varieties Arbres offers vary throughout the seasons, because of the seasonal nature of growing crops outside. In winter, produce sales are the lowest, while in summer and autumn, they generally are the highest (M. Meijer, personal communication, 24 May 2022).

4.4.2.1 Pear tree sales

Since its foundation, Arbres has been making money from produce sales. It was initiated by the pear tree sales, which was selling 300 pear trees on the Waalgaard to make space for implementing the food forest orchard design. These were done through direct sales (B2C) organized by Joris. Additionally, they sold trees via an auction site, which was an experiment that went "unexpectedly well" according to Joris (J. de Kleer, personal communication, 24 May 2022). During the first year, 500 trees were sold and the year after 800. Next year, there probably will not be any pear trees left to sell (J. de Kleer, personal communication, 24 May 2022). Arbres' biggest pear tree customers were tree nurseries and gardeners that wanted to buy in bulk. They sold to individuals for €75 a piece. They placed adverts on Marktplaats and similar platforms to reach customers. They continue to sell pear trees via their website for €75 (Waalgaard, 2021d).

Because of all the pear trees, Arbres had pears to sell from year one, which is different from most other designs like theirs (see 4.1.2). They tried to sell the pears and the cooperative members were promised pears, but they could not get rid of all the pears. This is where they decided to make pear juice because it has a longer shelf life (J. de Kleer, personal communication, 24 May 2022). During September, Arbres also organizes pear harvesting guided tours for groups from 8-20, for €20 per person. During these tours, information about Arbres' design and sustainable farming is provided. Furthermore, participants can harvest pears and receive a bottle of pear juice. During the early autumn of 2022, Arbres also organized picnics at the Waalgaard, which offered an on-site picnic including a bag full of self-harvested pears for €7,50 per person (T. Gerards, personal communication, 9 September 2022).

4.4.2.2 Self-harvesting memberships

Oogstgenoten

The main way of selling produce is done through the oogstgenoten system, a self-harvesting system in which people pay per set season which offers weekly produce harvest (J. de Kleer, personal communication, 24 May 2022). This is another example of Arbres using direct sales (B2C). The system works per seasonal subscriptions. These memberships are open to the public and the citizens living in the vicinity of the Waalgaard are the primary target audience (J. de Kleer, personal communication, 24 May 2022). All deelnemers are also automatically oogstgenoten to compensate them for their labor (M. Meijer, personal communication, 24 May 2022).

The food forest orchard design included a distance of 2,5 meters between the rows of trees to make paths to facilitate the self-harvesting system (F. de Gram, personal communication, 7 March 2022). Additionally, the plot is divided to create several plots that will provide harvestable crops per month. This is done to not have to harvest all produce at

once. The food forestorchard part of the Waalgaard takes up two hectares of the entire plot (J. Feenstra, personal communication, 24 May 2022). It is also broad enough to drive through the forest with a little cart to harvest the crops and sell them at a farmers' market via an established chain if the self-harvesting system fails.

Currently, because it is more of a solution for some extra income during the starting phase, the oogstgenoten membership is a small part of Arbres' total income (J. de Kleer, personal communication, 24 May 2022). Joke says their self-harvesting system is an experiment and she wonders if they will make an amount of income from their produce that mirrors the labor put into growing produce for the produce they grow (J. Feenstra, personal communication, 24 May 2022).

The kitchen garden is a fixed part of the design and currently secures income from produce sales through the self-harvesting membership; thereby, it helps bridge the income gap of the developmental phase in food forestry. Marieke selects the produce that is offered per week and the specific amount and the oogstgenoten can come to harvest this produce themselves at the Waalgaard. When the food forestorchard parts of the Waalgaard and Grootstal have matured enough to provide harvest (aside from the current pear harvest at the Waalgaard), it is added to the self-harvesting membership system.

At the time of interviewing, Arbres has currently sold seventeen oogstgenoot memberships for the Waalgaard (M. Meijer, personal communication, 24 May 2022). The maximum number of members with the current harvest of the Waalgaard is thirty. One oogstgenoot equals produce to feed one person, so some of their members (e.g. those with families) have a second oogstgenoot membership. If there is any produce left it goes to Arbres' core team. This is to prevent food waste (M. Meijer, personal communication, 25 May 2022).

In the future, Arbres also expects to implement the self-harvesting model at Grootstal (F. de Gram, personal communication, 13 January 2022). Currently, the food forest is too young to provide produce, so the self-harvesting model has not yet been applied (J. Feenstra, personal communication, 24 May 2022). The design of the Grootstal is similar to the Waalgaard's, except the tree rows take the form of waves (F. de Gram, personal communication, 13 January 2022). The waves contain sections with shrubs forming the edges of a keyhole to facilitate self-harvesting.

Friends of the Waalgaard

As an alternative to the oogstgenoten membership, Arbres offers the "Friends of the Waalgaard" seasonal subscription. This membership is aimed at people who do not want to come harvest weekly, but do want to come for an occasional harvest, unlimited pear harvesting in September and/or occasional visits to the Waalgaard premises when it is open (Waalgaard, 2021b).



Figure 8: Pear trees for the sales, March 2022



Figure 9: Harvest at the kitchen garden, June 2022

4.4.3 Events

Plukken en Proeven tours

Since 2022, Arbres organises “Plukken & Proeven” (pick & tasting) tours in summer and fall, which are guided tours providing information about produce growing in the food forest/orchard, where they provide small amounts of food for people to taste (F. de Gram, personal communication, 7 March 2022; Waalgaard, 2021c). These guided tours serve to advertise Arbres’ produce, which is currently mostly (%) produce that is familiar to Dutch people (F. de Gram, personal communication, 31 May 2022). This high ratio of produce that is familiar to the Dutch market is not typical in food forests. Frank made the conscious choice to do this, due to the probability of it attracting more customers and because the gastronomic market, to which the rarer produce from food forests is often sold, could get saturated in the near future (F. de Gram, personal communication, 31 May 2022; Natuur & Milieu Overijssel, 2019). The remaining % part of the produce is more traditional food forests produce, which is not commonly eaten in the Netherlands. Therefore, the guided tours also serve to familiarize potential customers with the lesser-known produce. Frank is thinking of possibly expanding the latter kind of produce later, but he first wants to attract people through this produce ratio (F. de Gram, personal communication, 31 May 2022). The tours are advertised on Arbres’ website for the Waalgaard; they are offered for €15 per person, with a discount for oostgenoten (Waalgaard, 2021c).

Guided Tours

Arbres also offers guided tours, which they sell through their webshop for €125 (Waalgaard, 2021e). During these tours, the business model and the ecological design of Arbres applies are explained. One of the more recent tours was a tour for Toekomstboeren at the Waalgaard in March 2022 (J. Lardinois, personal communication, 7 March 2022; F. de Gram, personal communication, 7 March 2022). During this tour, the Waalgaard was shown. This tour specifically was to inspire other people working in the agroecological sector.

4.4.4 Other sources of income

Design advice Frank

Another form of income for Arbres is agroecological design advice by Frank. He designs for various clients, catering to their needs (F. de Gram, personal communication, 31 May 2022). In 2018, he designed a climate adaptive garden and in 2019 a design for the food forest project at de Moer for Hartenboeren (ARBRES voedselbos design & beheer, 2022; Hartenboeren, n.d.). Additionally, he did a project in Geldermalsen (F. de Gram, personal communication, 31 May 2022). Furthermore, at the time of interviewing, Frank received a possible client; a farmer who wanted to put solar panels on his land and possibly use the remaining four hectares for a food forest. Frank says it is becoming a good source of income for Arbres. Networking seems to be an important factor in gaining clientele; his network with the conventional sector, which he has because he hopes to familiarize and inspire conventional farmers to start using agroecological methods, granted him this client.

Donations

Arbres’ webshop offers the opportunity to donate money for funding planting material (Waalgaard, 2021f). There is an open donation possible for people wanting to donate any amount of money to this purpose. Furthermore, there is the option for a “street name donation” (Waalgaard, 2021g). This is through a fixed donation of €100, through which Arbres can buy “two fruit trees, four shrubs and eight herbs” (Waalgaard, 2021g). If someone

chooses to donate via this option, they get a sign with their own street name text in front of one of the tree lanes at the Waalgaard.

When looking at Arbres income generation from day-to-day activities, examples of AFN features can be seen in their use of direct sales for the pear tree sales and the self-harvesting memberships. Additionally, the guided tours are a combination of direct sales and recreational activities, where produce is sold through offering an arrangement. These findings adhere to the positive relationship between agroecology and AFNs. Furthermore, the use of crowdfunding in the form of donations through their website can be seen, which also adheres to the conceptual model. What is not included in the model is enabling income through branching out by Frank offering advisory services.

4.5 Financing the agriculture transition towards agroecology

This section discusses what Arbres has seen of the societal limitations due to the lock-in (see 2.2) that restrict them financially and the ideas they have about how to improve the situation and methods they apply to work around the limitation to improve financial viability. The section is structured into phenomena from the public institutional sphere, private institutional sphere and entrepreneurial sphere.

4.5.1 Public institutional sphere

4.5.1.1 Regulation

Zoning plans

Frank has been speaking to the Province about changing zoning plans (F. de Gram, personal communication, 31 May 2022). He cites the complications of the bureaucracy of the Province as one of the reasons these changes are not made. Because of their lack of money from having to wait for the crops to mature (see 4.1.2) and lack of subsidizing to bridge this period, Arbres has to be innovative. The zoning plans can restrict innovation because they can prohibit certain activities on a plot (Rijkswaterstaat, n.d.). For instance, Joris gives the example that if they want to run a terrace or set up a booth to sell their pear juice, it is not allowed by the zoning plan for Arbres' grounds (J. de Kleer, personal communication, 24 May 2022). Joris sees this as the biggest obstacle to generating money for their organization.

Archeological worth

Another factor that is established in Dutch policies for land is the rule that all land near riversides and open landscapes in poldered land has to be researched for archeological findings before deeper-rooted plants may be planted there (F. de Gram, personal communication, 31 May 2022; Rijksdienst voor het Cultureel Erfgoed, n.d.). On Arbres' land, this research costs about €3000, which is costly for an agroecological start-up. Frank wishes that the government itself would pay this amount or have an archeological employee research this before selling the land, so farmers know beforehand whether they can cultivate plants in a certain area or not. Conventional farmers are not restricted by this policy, since the soil can be worked on until 30 centimeters deep (Rijksdienst voor het Cultureel Erfgoed, n.d.). The roots of the annuals used by conventional farmers do not reach this deep (Lott & Hammond, 2013). Agroecological initiatives however are much more prone to also use perennials or trees, which usually have a deeper root system because they can develop for longer (see 4.1.2). This restriction results in less income because plants cannot be cultivated in these areas.

Established norms

When Arbres applied for the agroforestry subsidy, they had to wait a while, because at first their project was not seen as falling under the agroforestry subsidies norms. This might be because one of its main aims was converting conventional farmers or because, as van Gerven, who works for the agrifood team of the Province of Gelderland (see 2.1.4), remarked, they believe that food forests are not real agriculture since they often do not fall into the described norms for what nature-inclusive agriculture is and they see these smaller projects - which food forests usually are - as recreational or educational in purpose instead of having as main aim to produce produce. This is backed by Joke, which has called the Waalgaard a food forestorchard to avoid this stigma and is aiming to set an example to emancipate the food forest model (J. Feenstra, personal communication, 24 May 2022).

4.5.1.2 Subsidies

Frank states the agroforestry subsidy from the Province of Gelderland is not at all high enough for food forest projects (F. de Gram, personal communication, 31 May 2022). He says a food forest would cost €15,000 per hectare, so the max €20.000 is insufficient. Even if all the money was given to food forests, it could only fund 20 hectares of food forests, which is insufficient for a large-scale transition. Furthermore, for the aim of the subsidy to convert conventional dairy farmers, it is also insufficient Frank says, since for €300.000 in total, only a small dairy farm could mostly be transformed, but it would not even cover all the costs. Joris also wishes the subsidy was higher, he says they could easily spend 1,5 million in the agroecology sector (J. de Kleer, personal communication, 24 May 2022). She is the one that worked on the agroforestry subsidy Arbres applied for. Furthermore, both Joke and Frank state that the RVO subsidy (see 2.1.3) is far less money than they need to cover basic costs (J. Feenstra, personal communication, 24 May 2022; F. de Gram, personal communication, 31 May 2022).

Intrinsic motivation to contribute to society and nature is named by several of Arbres' respondents as a key factor in starting an agroforestry farm (J. Feenstra, personal communication, 24 May 2022; F. de Gram, personal communication, 31 May 2022; M. Meijer, personal communication, 24 May 2022). They all mention this is, because of the low wage in the first few years, caused by the costs of starting up and that food forestry in particular takes time to mature and reach its optimal production (see 4.1.2). Frank would like to see a subsidy for starters for this reason (F. de Gram, personal communication, 31 May 2022).

Furthermore, the lack of further subsidies attributes to limitations in making a viable income (see 2.1 and 2.2.1) and across most interviews, there is a certain disillusionment with the government for that reason (J. de Kleer, personal communication, 24 May 2022; M. Meijer, personal communication, 24 May 2022; J. Feenstra, personal communication, 24 May 2022). Joris researched the options for Arbres regarding subsidies and states that he found that in the Netherlands most subsidies are only directed at conventional agriculture (J. de Kleer, personal communication, 24 May 2022; F. de Gram, personal communication, 31 May 2022). This corresponds with the literature on the subject (see 2.1 and 2.2.1). Usually, Arbres, as a small farm, does not fulfill the size requirements. He feels this lack of attention for agroecological initiatives might come from the government being locked-in by outside factors, such as the political power of conventional farmers; this is consistent with the literature (see 2.2.1). Joris feels discouraged to search for subsidies for this reason. Marieke shares this sentiment; she sees the nature-inclusive agriculture government plans spouted from EU policy but misses actual encouragement to realize these projects. She sees the lack of subsidy for smaller agroecological initiatives as a lack of acknowledgment of the importance of what they do, whereas more attention in the form of subsidies would make her feel supported in the good they do (M. Meijer, personal communication, 24 May 2022). Joke also would wish for more action than just theoretical plans (J. Feenstra, personal communication, 24 May 2022). Marieke also says it would help smaller organizations in the

start-up phase and believes that subsidies should just help an organization set itself up and then it is an effective organization if it can sustain itself. Frank concretizes this with the example of subsidies going to conventional dairy farmers, even though they are unable to sustain themselves without subsidies (F. de Gram, personal communication, 31 May 2022). This is indeed an issue caused by the increased pressure for intensification in conventional agriculture (see 2.2.1). Frank feels Arbres helps recover the soil, instead of polluting it and they receive little support. It feels unfair to him. He also expresses a certain hopelessness towards this changing, most probably because he understands the political process behind these processes from his own background in local politics. A solution Frank sees is that the European subsidies for dairy farming are used to support agroecological start-ups because it would combat pollution and at the same time recover nature (F. de Gram, personal communication, 31 May 2022; F. de Gram, personal communication, 7 April 2022).

4.5.1.3 Research as motivation

Institutional path-dependencies seen in the logic underlying inhibiting regulation and the lack of subsidies, therefore, restrict Arbres' means of income as an agroecological farm; this confirms the conceptual model. However, Joke believes that scientific research into what agroecological initiatives do and how successful their models are could really contribute to motivating the government to spend money on the sector and help change the mindset around the established norms (J. Feenstra, personal communication, 24 May 2022). She gives the example of a newspaper article on findings of the WUR about a future vision for agriculture. She says that if people are skeptical about food forests, she can show them this article to demonstrate that it should be taken seriously and is supported by the vision of important government players.

4.5.2 Private institutional sphere

4.5.2.1 Bank loans

Frank observed around him that for agroecological projects, bank loans are often out of the question, because they are not well-established societally and because of the often experimental nature of agroecology, which creates financial insecurity for loan pay-back (F. de Gram, personal communication, 31 May 2022). Frank and Joke have tried to take out a loan at the Rabobank, but also got rejected for this reason (F. de Gram, personal communication, 31 May 2022). It contrasts with conventional farmers, whose debt is often high because of bank loans that are extended to them for continuous upscaling and intensification (see 2.2.1).

Arne believes that alternative financing or having amassed a high amount of money in your savings account are the two most viable options right now for agroecological start-ups to start their companies (A. Driessen, personal communication, 3 June 2022). In some cases, Golden Bird has extended loans to agricultural start-ups so they could provide enough financial security for a bank to extend a loan. This confirms the conceptual model, in which the lack of bank loans negatively impacts agroecology and alternative financing enables agroecology to gain these finances.

4.5.2.2 Research as a solution

According to Joke, a solution could be offered by academic research dedicated to researching agroecological business models to prove their success. She believes this can help agroecological farms to be taken more seriously in the eyes of institutions such as banks or the government (J. Feenstra, personal communication, 24 May 2022). Arne also sees research as a valuable tool to be able to predict the viability of the revenue models of food forests, which could lead to gaining bank loans (A. Driessen, personal communication, 3 June 2022). He states that banks look for proof that they feel guarantees them that farmers

will be able to pay bank loans plus interest rates back. He predicts that if models like these could be proven to be effective and be made replicable - perhaps with the help of a tool or application - banks would be more willing to extend loans for agroecology start-ups (A. Driessen, personal communication, 3 June 2022). He sees Arbres as an example of a revenue model that works and states that if this can somehow be proven that he would see banks extend their common types of loans, with a 2/2,5 percent interest rate. The only challenge is the possibility that banks might not like being repaid as quickly as Arbres repays Golden Bird, since the interest rates are based on the profit a bank calculates to make when a loan is repaid over the span of about 30 years (A. Driessen, personal communication, 3 June 2022).

4.5.3 Entrepreneurial sphere

Aside from the lack of money, due to the lock-in, the respondents also indicated a lack of a widely known proven business model and methodology to use for a financially viable agroecology farm. Arbres is continuously captivated with the search for how to innovate to generate enough income to survive. Entrepreneurship, finding ways to save money and research on agroecology are imperative to realizing this goal.

4.5.3.1 Entrepreneurship

Using innovative entrepreneurship to address the financial challenges Arbres faces is an overarching theme. Joris says examples of their entrepreneurship can be seen in the addition of the kitchen garden and the creation of pear juice (see 4.3.2.1) (J. de Kleer, personal communication, 24 May 2022). As for future innovation, Jonah hopes to be able to offer advisory services on implementing the care model. Furthermore, Joke mentions the aim to work on a “new form of agriculture” to set an example and take the opportunity of their fresh view as new farmers who think outside of the box (J. Feenstra, personal communication, 24 May 2022). This can be observed in the methods used at Arbres, at a biological level and a business model level.

This “fresh view” Joke mentions as part of them being new farmers indicates that the habitus of the members of Arbres is different than the habitus enabling the lock-in. Because new farmers have a different habitus, they create new fields which may eventually change the habitus of conventional farmers, influencing the transition positively.

4.5.3.2 Saving money

Because of a lack of income in the starting phase of food forests (see 4.1.2), finding options to save money is also included in Arbres' strategy. Where possible, crowdsourcing is used as a strategy to save money. Using materials that are already there is one of the factors Marieke names; for example, during the execution of the design of the kitchen garden at the Waalgaard the irrigation system that was already there is used and figuring out how to use that in the newly installed kitchen garden or creating growing fences for the beans from second-hand material and figuring out where to get this material (M. Meijer, personal communication, 24 May 2022). At Grootstal, a similar strategy is visible. The poles used to protect the growing trees from the wind have been sourced second-hand. And the cardboard used as a base for mulching around the trees came from a bike shop (Observation notes at Grootstal, personal communication, 31 March 2022, 19 May 2022). The mindset for acquiring these materials is also a component according to Marieke; she says “you have to be ready to ask around.” (M. Meijer, personal communication, 24 May 2022). It is a certain innovativeness she names in which they always have to think of a different solution. She describes a mindset in which “[...] cooperation with nature and not wanting everything to be perfect” is important, which fits the permaculture philosophy.

Free services originating from goodwill towards Arbres' goals also play a part in this. Joris mentions when building a sign they asked someone in their network who was good at

carpeting for help, which he guesstimates saved them €1000 (J. de Kleer, personal communication, 24 May 2022). Another example of Arbres using free services is Arbres' use of volunteers, which they have used from their start-up for their day-to-day activities in the field (J. Feenstra, personal communication, 24 May 2022).

4.5.3.3 Research to aid innovation

Joke mentions that academic research can help agroecological farmers innovate. For example, she benefited from the research that was done at the WUR with pilot gardens into cultivating pear trees. She wishes to see more research like this into agricultural management methods that would help agroecology farmers to know what they need to know because she believes academic institutes are better equipped to do these experiments than farmers and, in the end, could help agroecological farmers to know what they need to know when starting their business to be financially viable.

When comparing the findings in this section to the conceptual model, it can be concluded that next to alternative financing and AFNs, an entrepreneurial mindset - which is helped by the habitus of new farmers - crowdsourcing and research also helps to promote agroecology.

5. Conclusion & recommendations

The main research question of this thesis was focused on exploring how agroecological farmers in the Netherlands establish financial viability in the starting phase of their enterprise and the additional insights the case for Arbres could provide concerning the subject. To do this, four secondary research questions were formulated. The following paragraphs outline and summarize the answers to these questions. Finally, a conclusion is given to answer the main question by looking at how the findings relate to the conceptual model and placing this in the broader research context surrounding financing agroecology. Subsequently, recommendations are made to policymakers, NGOs, farmers and other stakeholders and, after reflection on research limitations, for future research.

What are the inhibiting factors surrounding financial resources for agroecological farmers in the Netherlands?

Public financial resources for agroecology are scarce compared to conventional farming (Oppedijk van Veen et al., 2019). This contrasts all governmental levels' mission statements that a transition to sustainable agriculture is on the agenda (UN, 2015; European Commission, 2022b; Rijksoverheid, 2022b). This is due to the lock-in surrounding the subject, resulting from the created path-dependencies since the 1950s when the incentive was created by governmental institutions through information campaigns and subsidies to intensify agricultural enterprises (Oppedijk van Veen et al., 2019). Farmers have gotten used to this system; it became their habitus and field (Runhaar et al., 2020). Currently, electoral pleasing and powerful lobbies are also working against changing these pathways (Huitema, 2005; Boumans, 2022).

Furthermore, in the private sector, bank loans are unavailable for agroecological farmers in the Netherlands due to current path-dependencies (Oppedijk van Veen et al., 2019). Land availability is limited and expensive in the Netherlands. Without the availability of bank loans, agroecological farmers are often forced to enter unfavorable lease and rent constructions (Oppedijk van Veen et al., 2019).

Arbres' members see these factors. Their ideas to generate extra income are restricted by the current inflexibility of zoning plans (F. de Gram, personal communication, 31 May 2022; J. de Kleer, personal communication, 24 May 2022). Furthermore, current regulations are not designed for agroecology; Frank mentions that regulation around archeological worth prevents them from planting trees in certain areas of their plot and having archeological research done to lift this regulation is too expensive for Arbres (F. de Gram, personal communication, 31 May 2022). The norms around nature-inclusive agriculture were thought to not apply to food forests and consequently, Arbres' agroforestry request was delayed (J. Feenstra, personal communication, 24 May 2022). Generally, the respondents noted subsidies are insufficient for supporting agroecological start-ups (F. de Gram, personal communication, 31 May 2022; J. de Kleer, personal communication, 24 May 2022). Moreover, conventional agriculture receives ongoing subsidies to keep them going from the CAP (LNV, 2018). This feels unfair. Arbres was unable to get a bank loan from Rabobank (F. de Gram, personal communication, 31 May 2022). The respondents believe research could increase the availability of public and private financial resources (J. Feenstra, personal communication, 24 May 2022; A. Driessen, personal communication, 3 June 2022).

What are the financial resources available for agroecological farmers in the Netherlands in the public sphere?

On a global level, it is acknowledged that agroecology addresses several SDGs, the temperature limit set during the Paris Climate Agreement and aims formulated during the Convention on Biological Diversity (UN Climate Change, 2022; FAO, 2018a). There is no funding or subsidies available for agroecology in the Netherlands on this level (LNV, 2018).

On a European level, the EU has formulated the F2F strategy as part of their Green Deal (European Commission, 2022b). It aims to support sustainable agricultural projects by increasing public awareness and, consequently, demands for sustainable food and through new scientific discoveries and technologies; through funding Horizon2020-related projects. When it comes to direct financial resources for farms, subsidies to promote agroecology in the Netherlands were implemented with the renewal of the Dutch CAP in January 2023, with the basic payments receiving an added €54 per acre for farms under 40 hectares (which agroecological farms usually are in the Netherlands) and newly added eco payments (RVO, 2022a, 2022b).

When asking the members of Arbres questions on policies and financial aid on the international level, it became clear that the level of knowledge was generally low. Usually, the respondents said they had no knowledge on the topic concerning agroecology (F. de Gram, personal communication, 31 May 2022; M. Meijer, personal communication, 24 May 2022; J. Feenstra, personal communication, 24 May 2022). Awareness campaigns on this topic could be beneficial for the agroecological community.

Apart from the CAP subsidies, in the Netherlands, due to the nitrogen crisis a transition fund is being set up for rural and natural areas with €24.3 billion to contribute to meeting the 50% reduction goal (Rijksoverheid, 2022b). At the time of doing research, it is not yet known if this money will be invested in a transition toward agroecology. Concerning Gelderland specifically, in May 2022 an agroforestry subsidy was released, specifically targeting agroecological forms that use trees (J. van Gerven, personal communication, 16 May 2022). There is also an agrifood subsidy applicable to all agroecological forms, directed at purchasing new technology, new research and product design, education and means to promote sales of agricultural products (Provincie Gelderland, n.d.).

Arbres is using the basic payments but was not aware of the new eco payments. They have also applied for and got appointed the agroforestry subsidy (F. de Gram, personal communication, 31 May 2022). They gave no sign they knew about the agrifood subsidy. In general, the members of Arbres indicated that public financial resources for agroecology were scarce and insufficient and a general hopelessness regarding improvement could be felt in several interviews (F. de Gram, personal communication, 31 May 2022; J. de Kleer, personal communication, 24 May 2022; M. Meijer, personal communication, 24 May 2022; J. Feenstra, personal communication, 24 May 2022). It was clear they suffer from the effects of the lock-in.

What are the financial resources available for agroecological farmers in the Netherlands in the private sphere?

Private financial resources for agroecology in the Netherlands can mainly be found in alternative financing (Oppedijk van Veen, 2019). Starting capital can be amassed through private funds. Occasionally, debt financing is extended through venture capitalism to enable farmers to receive a bank loan (University of Cambridge, 2022; Nabisubi et al., 2020). The construction at Arbres differs. Arbres was rejected for a loan at the Rabobank and was given the reason that the risk threshold for investing in them was too high (F. de Gram, personal communication, 31 May 2022). The case study respondents think that amassing proof for the success of agroecological models would change the position of banks (J. Feenstra, personal communication, 24 May 2022; A. Driessen, personal communication, 3 June 2022).

Additionally, Arbres negotiated with the private fund Nationaal Groenfonds about funding. However, in the end, Arbres had a loan extended to them through venture capitalism by Golden Bird. This loan was sufficient to buy land, and thus not used to gain a bank loan (F. de Gram, personal communication, 7 March 2022). Arne mentions that crowdfunding is also usually used to try to amass starting capital, but that it is likely to be unsuccessful (A. Driessen, personal communication, 3 June 2022). Arbres used crowdfunding early in their existence to amass extra finances, which was successful (J. de Kleer, personal communication, 24 May 2022).

What other possible means of income are available for agroecological farmers in the Netherlands besides these two forms?

Business models chosen by agroecological enterprises usually involve CSA (Oppedijk van Veen et al., 2019; Nabisubi et al., 2020). CSA enables farmers to share financial responsibilities and amass finances. There are two kinds of CSA: subscription and shareholder (Adam, 2006). Arbres has also chosen CSA and fits into the subscription CSA, through their oogstgenoten system. CSA was chosen to pay off Golden Bird loan more rapidly (F. de Gram, personal communication, 31 March 2022).

Agroecological farms generally use AFNs to sell produce. They tend to work with SFSCs (Renting et al., 2003). These AFNs share three concerns: the length of the chain (to cut out costs for intermediaries), the environmental concern (shorter physical distance to clients means less pollution) and embeddedness (insight into the production process to ensure ethics) (Renting et al., 2003). Three kinds of SFSCs were defined: face-to-face (direct contact between customer and seller), proximate (often consumer coops and CSAs, where multiple partners are involved in managing a business; locality is important) and extended (regional products are sold outside regional bounds, usually regional delicacies) (Renting et al., 2003; Adam, 2006). Arbres uses a proximate SFSC; they rely on CSA. They do however also have the element of face-to-face CSA; their produce sales are on-site (M. Meijer, personal communication, 24 May 2022). They also offer other products on location, like pear tree sales and tours (F. de Gram, personal communication, 31 May 2022; Waalgaard, 2021d, 2021c, 2021e). Furthermore, Frank offers paid food forestry design advice to other farmers and donations can be made via their website (F. de Gram, personal communication, 31 May 2022; Waalgaard, 2021f, 2021g).

Arbres also uses a care model, which provides the majority of their income compensating for the lack of harvest during the agroecological starting phase; they employ people with occupational disabilities, for which they receive institutional funding (J. Lardinois, personal communication, 19 May 2022). A downside of working with this group is that it can lead to a loss of harvest when things are implemented incorrectly (J. Lardinois, personal communication, 19 May 2022). This is a new concept for a commercial agroecological farm that can provide a partial solution to the shortage of financial means in the starting phase of agroecology.

Overall, the members of Arbres continue to try to innovate to gain more means of income; they see entrepreneurship as a key factor to survive as an agroecological farm (J. de Kleer, personal communication; 24 May 2022; J. Feenstra, personal communication, 24 May 2022). They believe research can aid innovation. They also try to save money by crowdsourcing. These two factors were not mentioned in the literature on the topic; they could be key contributors to a successful agroecological business model.

How do the agroecological arable farmers of Arbres, in the area of Nijmegen, establish financial viability in the starting phase of their enterprise?

Linking back to the conceptual model based on theoretical exploration, it was found the lock-in is enabled by sociocultural factors, analyzed through Bourdieu's (1990) concept of habitus and field (see 2.2.2). Additionally, institutional factors enable it, which is linked to the concept of path-dependencies (Dosi, 1982) (see 2.2.1). Two main problems associated with these path-dependencies are that they lead to a lack of government financing on an international, national and local level and a lack of bank loans. Furthermore, this lock-in negatively influences the transition toward agroecology (see 2.2). Alternative financing and AFNs were found to be positive influences on financing for agroecology (see 2.3).

Additionally, the case of Arbres confirms that sociocultural factors in the form of habitus, formed by years of government steering towards intensive agriculture, are what stop conventional farmers from going agroecological (Oppedijk van Veen et al., 2019). However, it should be noted Arbres is trying to use this habitus to promote agroecology by implementing conventional elements in their system hoping to create a field to appeal to these farmers (F.

de Gram, personal communication, 31 May 2022). Furthermore, Arbres shows that the habitus of new farmers can positively influence the transition, because they are not bound by conventional ideas about agriculture and therefore it is easier for them to be innovative (J. Feenstra, personal communication, 24 May 2022). This can be observed in their entrepreneurship and crowdsourcing. This ties in with Oppedijk van Veen et al.'s (2019) research, which found that the ideals of new farmers bring them to agroecology, for which they try to find new ways to run their farms. Furthermore, it is suggested that more research on business models and biological phenomena of agroecology could also promote agroecology by providing useful information to farmers on how to generate additional income (J. Feenstra, personal communication, 24 May 2022).

Additionally, the findings confirm the negative relationship between institutional path-dependencies, surrounding the lack of bank loans and government financing, and financing agroecology. Moreover, established norms in the form of the habitus of the developers of the agroforestry subsidy, around what is and is not a commercial farm, challenged if Arbres could receive the agroforestry subsidy. Joke believes that scientific proof on agroecology may alter this habitus towards positive attitudes regarding agroecology; she believes the same for acquiring bank loans (J. Feenstra, personal communication, 24 May 2022). Additionally, regulation restricting possibilities to generate income was also mentioned. This ties in with Linares Quero et al.'s (2022) findings where regulatory restrictions were experienced by nine out of fifteen agroecological farm cases throughout Europe. However, the Netherlands was not included in these. The care model contrasts with the conceptual model since it shows that government financing - in this case, in another sector - can enable agroecology since it is Arbres' main source of income during their starting phase. In Oppedijk van Veen et al.'s (2019) extensive research into financing agroecology, this form of government financing was not encountered.

It also displayed the positive relationship between alternative financing and enabling agroecology, in the form of crowdfunding and a venture capitalist fund for the Waalgaard, whereas they lease the land for their Grootstal location and materials are paid for by a private investor. Moreover, Arne has indicated that alternative financing can help enable bank loans (A. Driessen, personal communication, 3 June 2022). Additionally, the positive relationship between AFNs and agroecology is found in this case. Arbres runs a farmer cooperative, which is often associated with proximate SFSCs in an AFN (Adam, 2006). Arbres also has features of face-to-face SFSCs, because they use B2C for most of their day-to-day income-related activities (Renting et al., 2003). Branching out in the form of advisory services has been a helpful factor for Arbres that the conceptual model did not include and contrasts Orlando's (2018) findings on the day-to-day income generation of agroecological farms.

Based on the findings the following recommendations could be made to policymakers, NGOs, farmers and other stakeholders about what can be done concerning financial resources to accelerate the agriculture transition.

First of all, the issue of shortage of public financial resources should be tackled. The number of subsidies aimed at aiding the agriculture transition, such as the new basic payments, eco-schemes and agroforestry subsidies could benefit agroecological farmers more if the costs of an agroecological start-up and the income gap in the starting phase of these farms would be taken into consideration in the height of the subsidies. Informing government personnel working on financial instruments of the existing body of research into agroecology through education could also contribute to them being able to choose the financial source for their subsidy so that the rules applying to the subsidy can be made to include agroecological farmers. Furthermore, regulations inhibiting policy change encouraging the agriculture transition need to be addressed.

Secondly, the shortage of private finances should be tackled. When extending loans, banks indicate needing proof of financial viability of agroecological farms (F. de Gram, personal communication, 31 May 2022). More research into their success could provide this security for banks. Currently, farmers turn to alternative financing in the form of private funds

(Oppedijk van Veen et al., 2019). These funds do extend loans to farmers. However, this research found that the option of direct funding through venture capitalism is also available. It could help to inform aspiring agroecological farmers of their options when it comes to acquiring starting capital in the private sphere.

Finally, there should be more information on successful business models to educate aspiring farmers on what they can do to have a financially viable business. CSA and AFNs are usually mentioned throughout the literature (Orlando, 2018; Goodman & Goodman, 2009; Adam, 2006). However, individual innovations such as Arbres' care model, other entrepreneurial ideas and the incentive to save money by crowdsourcing are specific knowledge that is more difficult to access for the average aspiring farmer. Joke proposes knowledge exchange networks between farmers to exchange these kinds of ideas (J. Feenstra, personal communication, 24 May 2022). Facilitating these could make a valuable contribution to the agriculture transition.

In conclusion, the case of Arbres helped gain some useful insights regarding generating income in the starting phase of an agroecological farm in the current political system in the Netherlands and additional insights into successful business models and possibilities for innovative exploits for agroecology. Nevertheless, it also confirmed the lock-in mechanics seen in the conceptual model; this lock-in remains a global problem that is mainly caused by path-dependencies around policy, which leads to habitus on a socio-cultural level that inhibits private and public funding in the area. The findings of this case study are not generalizable, since the chosen method is case study and the selection and interpretation of data used is influenced by the researcher's positionality. Consequently, further research is needed to see the experiences of other agroecological farms concerning factors inhibiting and enabling income for them. For instance, elaborating on Linares Quero's et al.'s (2022) research into regulatory influences on agroecological farming or on research like Niggli et al.'s (2023) and Oppedijk van Veen et al.'s (2019) on public and private financing of agroecology. Furthermore, future research could test the findings related to business and land management practices gained through this research to see if it proves useful to generate income for other agroecological farms on a regional, national and international level. Generalizing these findings could be an addition to the findings of the agroecological business model literature review of WUR & LNV (2019).

Additionally, this thesis' focus was limited to farm-level income generation, but during the interviews, several respondents mentioned concerns related to supply chains (A. Driessen, personal communication, 3 June 2022; J. Feenstra, personal communication, 2022). Arne observed through his funding throughout Europe that the lack of bulk buyers and food manufacturers creates income barriers for agroecological farmers and usually stops conventional farmers from transitioning (A. Driessen, personal communication, 3 June 2022). Further research into this could provide relevant knowledge for the agriculture transition. Additionally, van Gerven (16 May 2022) mentioned that research by the Province of Gelderland found that consumers often go for the cheapest product in supermarkets, which is an additional income barrier for agroecological farmers (J. van Gerven, personal communication, 16 May 2022). Therefore, further research into how to stimulate the incentive to buy agroecological produce is needed. An interesting addition would be to build on Drion et al.'s (2020) recommendations for agroecological farmers regarding true cost accounting (TCA) in agroecology by testing if TCA works when applied to customers of longer food supply chains.

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