FRAMING AGROECOLOGY IN THE NETHERLANDS

Identifying strategies being used by progressive farmers and farming organisations and how policy and scientific debates align with them.

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Abstract

This research aimed to identify and analyse strategies being used by progressive farmers and farmer organisations to promote and practice agroecology in the Utrecht region of the Netherlands. A secondary aim of the research was to also critically analyse the discourse currently on-going within policy and scientific debates. In the end that goal was then to reflect on these two worlds and scrutinise whether they are aligning. The study followed a research strategy that was composed of qualitative analysis with the use of semi-structured interviews and a critical analysis of relevant policy and debates in sustainability and transition sciences on sustainable agriculture.

The farmers contacted as part of the researched practiced various forms of agriculture but all shared the same goal of farming sustainably as well as exhibiting some amount of agroecology in their practices. Similarly, the farming organisations operated differently but all had the same goal of supporting and encouraging progressive farmers.

The analysis of policy documents including agroecology as well as the sustainability and transition science discourse allowed for scrutinization of whether there was alignment in the two worlds. What was observed is that the term 'agroecology', has been included in the latest vision of 'circular agriculture' of the Ministry of Agriculture, Nature and Food Quality although this has been followed by few concrete actions and weak implementation thus far. Moreover , a specific type of 'agroecology' in that of 'food forestry' has gained much policy attention too.

Many opportunities and limitations experienced by farmers and organisations working in this way were identified. Moreover, different strategies were being used or were available to different farmers and organisations.

Contents

List of abbreviations

AeIS – Agroecological Innovation System

CAP – Common Agricultural Policy

CSA – Community Supported Agriculture

EU – European Union

FAO – Food and Agriculture Organisation

IT – Information Technology

MLP – Multi-Level Perspective

NGO – Non-Governmental Organisation

SDG – Sustainable Development Goals

TIS – Technological Innovation System

Chapter 1: Introduction & Research Questions

1.1 Background

The Netherlands has been distinguished as a global agricultural giant, being the 2nd largest exporter of agricultural products behind the USA (Government of the Netherlands, 2020). However, while being internationally recognised for being technologically advanced and efficient, there is, at the same time, a growing global consensus on the adverse effects of the current industrial agricultural system in terms of the emission of greenhouse gases, a decline in soil fertility, a loss in biodiversity, in both food and wildlife, and the fact the food you eat could be contaminated with chemicals from synthetic fertilizers (Rodriguez et al., 2004). In the Netherlands specifically, according to law, there is currently an issue of excess nitrogen emissions and depositions in the soil that has been met with conflict between farmers and government actors on how it is being managed (Galloway & Cowling, 2021). Furthermore, there is a challenge in the forecasted increase in the world population reaching 9.1 billion by 2050. An estimated 30% more food will be needed in this case. With these major challenges faced by agriculture on a local and global scale there is a planetary need to develop agriculture in a way that is simultaneously environmental friendly, socially fair, and economically beneficial (Alexander Wezel et al., 2014). With this in mind and in light of the Netherlands' position in world agriculture, exporting services, education and training as well as products, the question can be raised on what role the Netherlands could potentially play in the transition towards sustainable agriculture: Could the Netherlands be an example of sustainability in agriculture, and lead the way to a global transition?

Options for alternative, sustainable forms of agriculture range from practices that aim to reduce the intensification of agriculture, centred around the biological aspect, to technology intensive practices that aim to increase the efficiency of the intensification of agriculture. With regard to the technology intensive side, there are practices such as 'climate smart agriculture' (Chandra et al., 2018) and 'sustainable intensification' (Campbell et al., 2014). However, there is a lack of conclusive agreements surrounding their merits for environmental sustainability (Alexander Wezel et al., 2014). Biological forms of agriculture on the other hand are increasingly recognised as having more beneficial outcomes for soil health, biodiversity and nutritional value of food (Rodriguez et al., 2004). Agroecology is seen as one of these forms of agriculture, and has been gaining an increasing level of recognition in policy and science circles as part of an alternative to the current agri-food regime in Europe attracting the growing interest of farmers, scientists, researchers (Ajates Gonzalez et al., 2018; Levidow et al., 2012; K. Schiller et al., 2019) and institutions such as the EU and FAO (European Commission & Directorate-General for Agriculture

and Rural Development, 2018; Recanati et al., 2019). For instance, in 2012, France launched 'The Agroecology Project' that aims to accommodate a transition from the present intensive, mono-cropping agriculture to an alternative high performance production system with agroecology at its heart (Ajates Gonzalez et al., 2018).

However, in spite of increased scientific and policy interests, and attempts of governments to support and expand agroecological practices, policy still leans in favour of the current, dominant agri-food paradigm of industrial, large scale, intensive agriculture. As well as the aforementioned French example, the U.K. (Ajates Gonzalez et al., 2018) and Nicaragua (K. Schiller et al., 2019) have had notable attempts of digging further into agroecology on a policy level. Unfortunately, within these examples, it has been shown that the use of agroecology within policy documents and government plans has been followed by weak implementation (Ajates Gonzalez et al., 2018) This has led to doubts among farmers about the risks and economic viability involved in changing from conventional to agroecological farming. Furthermore, there is a sense among activists and critical scientists of 'co-optation' in governments' adoption of ideas of agroecology when compared to that of the grassroot movements whom the agroecology movement is rooted in and how they see and promote agroecology. La Via Campesina, a transnational social movement formed of rural organisations and peasantries (Rosset & Martinez-Torres, n.d.), for example, have long stood by the concept of agroecology as a method for sustainable agrarian reform. To them, and other scholars, it is known as a social movement as well as a science and a practice aiming to have marginalized voices heard and change the whole system of food production and distribution. Debates over agricultural models and conflicts over agricultural resources such as land water and seeds can result in territorial conflicts in all possible dimensions: economic, social, political, theoretical and ideological, and manifests itself in farmers and grassroots social movements on one side and agribusiness with its government allies on the other (Rosset & Martinez-Torres, n.d.).

Despite the contested debates on the meaning of agroecology and the doubts about governments' intentions to really support agroecology instilled in farmers' thoughts, there is a small but increasingly active agroecological community in the Netherlands. Actors within it are practicing and promoting agroecological practices to varying degrees, seeking to work within and towards an alternative and more truly agroecological ethos in agriculture. In this light, the question arises as to how this small community in the Netherlands, working with little policy and funding, practice agroecology and how they strategize and communicate in order to create a space for

themselves in the agricultural landscape and push towards a more sustainable future in agriculture. Due to the Netherlands being a global agricultural leader, with a large focus on international agricultural development (Netherlands Enterprise Agency, 2020); the proper integration of existing initiatives in policy and the implementation of policies supportive of agroecology in the Netherlands could pave the way for sustainable agricultural transition worldwide.

1.2 International Development Relevance

The Netherlands, much like many other European countries, has experienced a transformation of its agricultural landscape as a result of the development and growth of agriculture in terms of scale enlargement and agricultural intensification. The characteristics inherent in large and intensive forms of agriculture are associated with such things as habitat loss and decline in species and biodiversity as well as a lack of crop diversity (Runhaar, 2017). Agroecology as an agricultural practice is gaining an increasing amount of interest from farmers and institutions alike across Europe and The Netherlands is included in that. There, farmers and communities that work on agroecology have joined forces with some researchers and scientists (Rosset & Altieri, 2017) and have formed a foundation of agroecology practice and research that has started grass-root initiatives and encouraged the scientific community to support the agroecological movement in the Netherlands, co (Alexander Wezel & Bellon, 2018).

Considering Netherlands' position in agriculture on a global level in agribusiness, research and technology, the case is made that alternative, environmentally friendly agricultural operating in the Netherlands should be studied in order to provide a good basis for export and international development. It goes without saying that a "business as usual" with regard to agriculture development is sustainable and knowing what we know about our planetary boundaries (Rockström et al., 2009) and the negative effects of conventional and mechanised agriculture (Rodriguez et al., 2004), as well as the connected issues of population growth and over reliance of fossil fuels (Beuchelt & Virchow, 2012) is unacceptable from an environmental perspective. Therefore, analysing the agroecology community here in the Netherlands is a good starting point for exploring and potentially developing an alternative international development discourse on agriculture. To emphasise this point, the concept of food sovereignty, coupled within the concept of agroecology, has been supported and highlighted by grass-root initiatives like La Via Campesina (Holt-Giménez & Altieri, 2012) as an alternative concept and way of thinking to the current neoliberal free-trade based model that is underlying the dominant paradigm in the development in agriculture that has led to the marginalization of smallholders. In saying this, the concepts and

underlying philosophy of agroecology and food sovereignty can potentially inspire a new trajectory of agricultural development in contrast to the current neo-liberal trajectory of agricultural development (Beuchelt & Virchow, 2012).

The challenge of improving the dominant, large-scale, export orientated agri-food system in an environmental and social context is a challenge that depends on the developing and industrialized countries alike and through the development of agroecological practices in the Netherlands could be used by the Netherlands to promote such practices on a global scale thus improving Netherlands' role in international development.

1.3 Research Objective & Research Questions

The aim of this research is to contribute to growing body of literature on agroecology and sustainable agriculture in the Netherlands. To do this, this research explores the opportunities and limitations experienced by farmers and agricultural organisations who seek to advance sustainable agriculture as well as studies the strategies employed by them to promote and communicate about agroecology. My aim is to gain an overview of the 'positive' and 'negative' elements that support or prevent agroecology initiatives from developing and growing in the Netherlands. On one hand there is the aim to identify how farmers themselves and organisations are operating, independently and with each other. On the other hand, a secondary aim is to analyse existing policy in the Netherlands in order to analyse whether the two worlds, practice and politics, align or show any signs of coming together.

In order to achieve these objectives the following research question (RQ) was developed:

How do progressive farmers and farming organisations seek to expand and promote agroecology; and how do these initiatives align with science and policy debates on agroecology?

In order to answer the main RQ a set of sub-research questions (sRQ) will need to be addressed first. They are as follows:

1. How do progressive farmers and farming organisations practice agroecology in the Netherlands?
2. What strategies do farmers and farming organisations have to achieve their goals; how do they seek to promote and communicate about agroecology; how do they build connections with like-minded policy makers and scientists?
3. How do policies seek to support sustainable agriculture in the Netherlands?

4. How do scientists conceptualise agroecology and give meaning to the initiatives of farmers and farming organisations?

Throughout the next section the theories that the RQ and sRQ's and following analysis are based on are discussed.

Chapter 2: Theoretical & Conceptual Framework

2.1 Agricultural Trends in the Netherlands

The Netherlands is considered a global agricultural giant in the sense that is the second largest exporter of agricultural goods in the world, with the USA being the first (LEI Performance and Impact Agrosectors et al., 2019). Furthermore, they have achieved such an accolade in productivity and efficiency while having not so favourable conditions in the form of a discommodious climate, limited light for large portions of the year and a small cover of arable land (27%) in an already small nation. 57% of the amount of the land allocated to farmland is poised for agricultural and horticultural services while 40% is covered by grasslands. As a resource-, knowledge-, and technology-intensive industry, alongside the fact that it has been an extremely successful and productive, the Dutch agricultural industry is seen as boasting the most cutting edge processes and technologies in the international community (Zheng, 2018).

In light of the intensive nature of the Dutch agricultural sector, it contributes the largest portion of the total Dutch emissions of greenhouse gases (86, 75 and 74 per cent of the total national NH3, CH4, N2O emissions respectively) as well as a significant portion of the total particulate matter emissions (24%) (Rijksoverheid, n.d.). While these emissions have decreased through the period 1990 – _2018 they are still the main contributing factors to the adverse effects of agriculture on the environment (Rodriguez et al., 2004). Interestingly, on the 9th October 2018, Urgenda, a foundation working towards a fast transition towards a sustainable society, won a historic court case in the Dutch Supreme Court. The winning case ordered the Dutch government to reduce its greenhouse gas emissions by 25% by 2020 (compared to 1990 levels) on the grounds that the current levels of pollution is a violation of Dutch citizens' human rights (Urgenda, n.d.). A target that has not yet been reached. There is also the even more recent problem of excess nitrogen in the Dutch environment raising further issues to the environment and farmers.

As part of a solution to these problems agroecology could support a restructuring of the agri-food system with agroecological practices an integral part to improve soil health and air quality to name just two of the potential benefits (Francis et al., 2003). Furthermore, in line with the goals and

objectives in the Paris Agreement and the SDGs, the Dutch agri-food sector needs to do more in order to contribute to the global push to hamper and reverse the effects of anthropocentric climate change and make moves on changing their agricultural image to the international onlookers and in their international development discourse. Agroecology, and the adjoining concept of food sovereignty, are together an appropriate inclusion in both the Netherlands and for their international development policies (Beuchelt & Virchow, 2012).

2.3 Agroecology

Agroecology brings together the production of food with an ecologically friendly management of soil and crops as well as land cultivation (Alexander Wezel et al., 2014) in which ecosystems services are maintained, restored, or at a healthy and productive level (Casagrande et al., 2017). There is also a social aspect to the concept of agroecology rooted in the social movements and peasantries that promoted agroecology as an alternative to conventional agriculture and highlighted the importance of traditional and local knowledge (Francis et al., 2003). Hence, agroecology can then be seen as a science, a movement and a practice (A. Wezel et al., 2009) and, encompassing all three of these parts, agroecology has for a long time been seen as an alternative to conventional agriculture and has been practiced and promoted by social movements such as La Via Campesina, a transnational social movement on the forefront of the promotion of true agroecology (Rosset & Martinez-Torres, n.d.) In the view of such social movements, the concept of food sovereignty is nestled within the concept of agroecology which refers to the "right of communities and peoples to independently determine their own food and agricultural policies. The importance of this concept in relation to agroecology is in its ability to combat hunger and poverty issues on a global scale (Beuchelt & Virchow, 2012).

There is however contestation on the definition of agroecology and how it is used in practice and whether it can be used to conform to or transform the current agri-food regime. On the one hand of conformance, there has been researched and cited incidences in the research community that agricultural policy is steered in directions that stray away from agroecological practices and has not recognized agroecology as a realm for mainstream agriculture (Giraldo & Rosset, 2018; Levidow, 2015; Levidow et al., 2012, 2014). Critical scholars have pointed out that the term agroecology has been used to 'greenwash' dominant agrobusiness' practices nestling agroecology and its related practices in conformity of the dominant agri-food regime and redefining it as a narrow set of technologies to remedy the sustainability crisis in agriculture while allowing the existing paradigms of power to remain unchallenged (Giraldo & Rosset, 2018). On the other.

hand, in the past decade or so agroecology has been rising in popularity in the circles of farmers, scientists and civil society organizations whom all share a view that some form or another of agroecology of agroecology having a more transformative potential (Levidow et al., 2014). The transformative role is a much harder role to take in incidents like this. Organisations, like La Via Campesina mentioned earlier, and people who have promoted agroecology have had to relentlessly defy agri-business lobbies and face being marginalized in these spheres of international agricultural policy making (Giraldo & Rosset, 2018) are a testament to this struggle.

The difficulty farmers face in adopting agroecological practices in their farming, or starting up as an agroecological farmer, is also rooted in policy. On a European level, with examples of case studies in France and the United Kingdom, policies that do incorporate agroecology firstly include the least radical elements of agroecology, rather than being implemented in a way that incorporates it as a legitimate framework for a deeper transformation of current agricultural policies (Ajates Gonzalez et al., 2018). Secondly, from these examples it can be concluded that the socio-political pillar of agroecology in favour of the more controllable aspects of the scientific and agricultural pillars as a result of suffering from path dependencies in the political sphere (Ajates Gonzalez et al., 2018).

However, even with few policies to help along the way there are many domestic bottom-up agroecological initiatives along with national or continental movements and networks (Alexander Wezel et al., 2018) that support farmers' knowledge exchange (Levidow, 2015). In the Netherlands specifically there are the Green Deals (Green Deal, n.d.) that focus on very specific things. One such thing is food forests in which the associated Green Deal aims to analyse and solve regulatory barriers for the development of food forests in the Netherlands (Green Deals, n.d.). Additionally, there is an aim to bundle existing research together and formulate an appropriate research agenda to provide scientific evidence for the social, economic and ecological benefits of a food forest (Green Deals, n.d.; Green Deal, 2017) for example. While this is a positive step forward in policy for agroecology in the Netherlands more needs to be done in order to support farmers within the whole of the agroecological niche.

In relation to policy making, the science and research domain is an important catalyst for ideas and concepts of agroecology. Scientists are interested in agroecology because they see in it a potential way to challenge – or even partially or wholly replace – the dominant unsustainable system of industrial agriculture. Ideally, agroecology could function as a place of innovation, a 'niche', that could chakllenge the dominant model of the agricultural development, the 'regime',

and produce a new future of agriculture through alternate power structures and underlying policies and regulations, a new 'landscape'. These ideas are underlined, for instance in the Multi-Level Perspective (MLP).

2.4 Science-policy debates on agroecology

2.4.1 the Multi-Level Perspective

The Multi-Level Perspective (MLP) is a heuristic framework that has come to the fore in conceptualizing sustainability transitions. The MLP theory dissects the processes of profound regime reconfiguration that has the potential to shift from one sociotechnical system to another (Wezel et al., 2014). In this case, it is the potential of the agroecological niche to reshape or influence the current, conventional agri-food regime, both of which are theoretically defined below. A visual representation can be seen in figure 1 below.

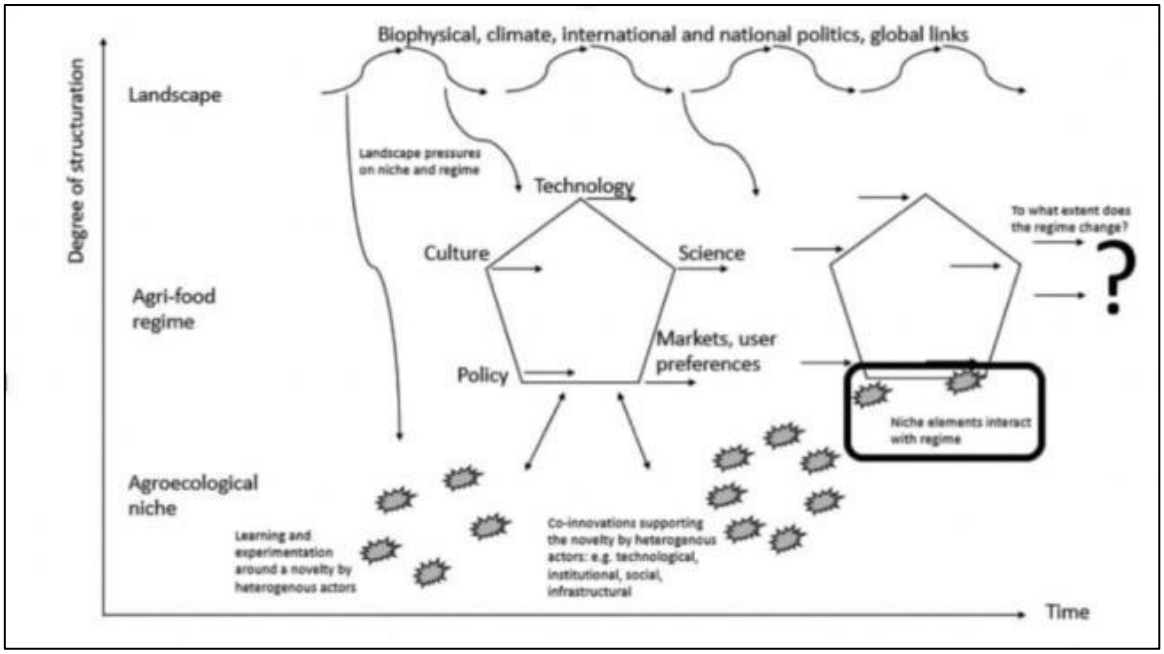

Figure 1: Conceptualisation of the Multi-Level Perspective including the 'niche', 'regime' and 'landscape' elements as given by (El Bilali, 2019).

The MLP is composed of three analytical levels; the niche, the regime and the landscape (El Bilali, 2019). In general, the niche level is defined as the new and novel initiatives, incorporating new rules, regulations and possibly technologies, instigated by a network of actors (Bui et al., 2016; Darnhofer et al., 2015; Loorbach, 2007). There is a high level of diversity between niche actors and corresponding worldviews which creates potential barriers to internal niche processes and development (Davidson et al., 2016). This is evident within the agroecological niche with many

pieces of literature commenting on the confusion of the definition of agroecology and lack of cohesion in policy ideologies and support (Levidow et al., 2014; Rivera-Ferre, 2018). The transformative ambition of a niche and the individuals working within the niche is an important aspect to take into consideration when analysing niche growth and niche-regime interaction. The ambition in the minds of the actors involved will influence the pace and effectiveness of a potential transition at regime level. An abstract representation of the possible routes a niche could take is shown figure 2 below.

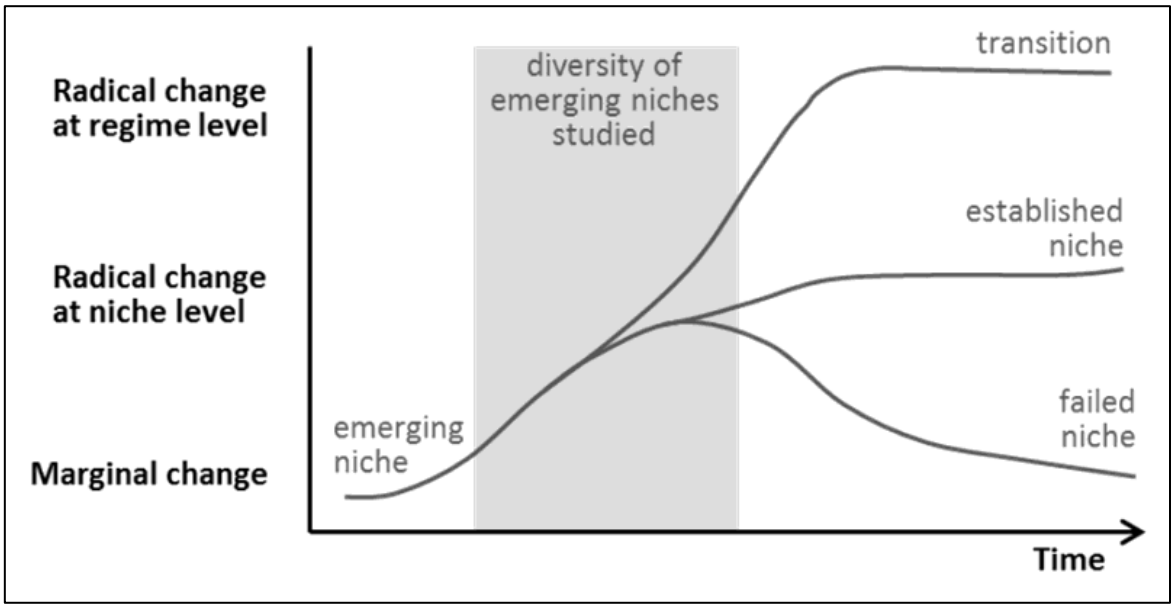

Figure 2: The trajectories a potential emerging niche can take as outlined by (El Bilali, 2019).

The regime in the MLP framework describes the overarching and dominant system that has established the current practices and governing rules. The regime can be seen as the more tangible and measurable consisting of market shares, infrastructure and public opinion to name a few, Both the regime and the niche include intangible elements including, but not limited to, beliefs, rules of thumb, and social expectations and norms (Darnhofer et al., 2015). In this context, the regime is the intensive and industrial monocrop agricultural system including the business codes and regulations, food safety laws, existing business networks, logistics transport, and infrastructure (Hinrichs, 2014). Furthermore, included in this regime would be governmental actors and their associated institutional structures in the agriculture sector alongside the current discourse in politics surrounding agricultural development as well as how farming is currently practiced (Järnberg et al., 2018) which all act as their own sub-regime. With their own dynamics,

these sub-regimes act interdependently allowing only for innovation to happen slowly and incrementally and for lock-ins to occur (Darnhofer et al., 2015).

The landscape aspect of MLP theory is perhaps the most abstract. Comprised within the landscape level are the long-term exogenous trends including, but not limited to, demographic trends, political ideologies, societal values, macroeconomic patterns and climate change (Darnhofer et al., 2015) as well as dietary trends and lifestyles (El Bilali, 2019). The landscape has the capacity to 'stimulate' changes and developments within and between the niche and regime. Interactions between the niche and regime that have the potential to cause change and development is termed 'anchoring' (Darnhofer et al., 2015) and is pivotal in any transition. The function of the socio-technical landscape can be seen as twofold: to put pressure on the regime to change and to create opportunities for niches to develop, often happening in conjunction with each other (El Bilali, 2019).

As can be summarised from the discussion of the MLP theory; it is a heuristic framework that allows for meaning and a sense of place to be given to 'agroecology initiatives' in a larger context of agricultural development. However, it is important to realise that these meanings may not reflect the views and aspirations of practitioners of agroecology themselves. In the context of this research, the agroecological sphere is acting as the niche, attempting to interact with and anchor onto the agri-food regime in order to create and succeed in a transition to more sustainable agriculture. Of course, it is reasonably stipulated that there will be actors within the niche who will not be pushing for a transition to a more sustainable form of agriculture and, instead, could well be happy operating on the side-lines of the greater system. This too will be interesting to analyse and will add to the research.

2.4.2 Technological & Agroecological Innovation System

Another influential concept in science debates is to see agroecology as a system of 'innovation'. An innovation can be defined as a successful amalgamation of hardware, software and orgware, where orgware refers to the various components of the innovation system (Smits & Kuhlmann, 2004). Innovations within any given system, and the speed in which innovations happen, is a key determinant for long term development and especially for more efficient use of resources, less stress on the environment and regeneration of already damaged parts of the environment (M.P. Hekkert et al., 2007).

The concept of an 'innovation system', and that of the 'innovation system approach', is a heuristic attempt to analyse subsystems, containing actors and institutions contributing to innovation within a system, in society. It has been increasingly used by scholars to study processes of socio-technical change (Hekkert & Negro, 2009). Specifically for researching innovations like that in agriculture, the technological innovation system (TIS) approach is the most appropriate (Hekkert & Negro, 2009). A TIS is characterized as the combination of interrelated actors and organisations, and power structures and regulations that characterize the rules of behaviour and the knowledge infrastructure connected to it (Hekkert et al., 2007). The analysis of technological change should focus on systemically mapping the activities that take place in an innovation system resulting in technological change (M.P. Hekkert et al., 2007).

The agroecological niche is the TIS in this context or can be dubbed the Agroecological Innovation System (AeIS), and in terms of innovation systems analysis can be seen as a subset of the national agricultural system (Schiller et al., 2020). An innovation systems approach enables analysis of factors within the AeIS that are hindering or boosting development of agroecology. The way this is achieved is through examining the performance of "functions" or factors operating in the AeIS (Schiller et al., 2020). Furthermore, there are also "structures" within any TIS which an innovation systems analysis distinguishes as the elements that make up the system. The structures within the AeIS can be delineated as actors, institutions, interactions and infrastructures and create the arena within the AeIS in which communication and governance takes place. The performance of the 7 functions mentioned previously, are examined through the different ways these structures enable innovation through the presence (or absence) and quality (or capacity) of said structures, and, in turn, how the presence or quality of these structures impact the 7 functions that are needed for socio-technical change and a transition towards a more sustainable agriculture regime.

2.5 Conceptual Framework

A graphical representation of the conceptualisation of how the theory detailed above relates to the research is shown in figure 3 below. The figure illustrates where the AeIS is positioned in relation to the regime and the wider landscape and is adapted from El Bilali (2019). The figure illustrates how the niche, the agroecological initiatives and organisations, could potentially interact with the regime, the dominant agri-food paradigm and governing structures, with the expectation, or hope, of growing positively as the transition to sustainable agriculture develops. Also illustrated in the figure is how the 'landscape' will interact with both the niche and regime to different extents

through various external elements highlighted in the figure. In the figure, the landscape elements are represented by the double-ended black arrows that can be seen to influence both the AeIS and the agri-food regime. The AeIS is represented by the green circles while the regime is represented by the yellow circles. The interactions, both definite and potential, between the AeIS and the agri-food regime are represented by the full or dotted red lines. The focus of the research mainly took place in the green circled area labelled AeIS.

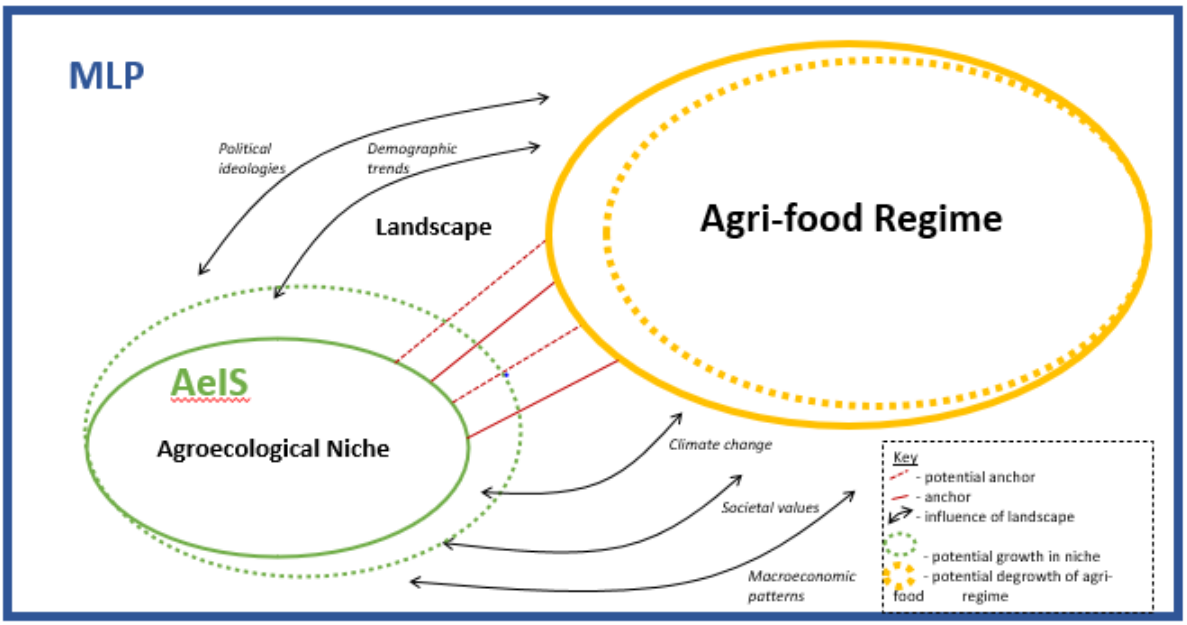

Figure 3: Conceptualisation of the theoretical framework (Authors own, adapted from (El Bilali, 2019)

Furthermore, below figure 3, adapted from (Bergek et al., 2008) focuses more on the internal mechanisms of the AeIS as well as the involvement of the functions and therefore the focus of the research. The actors focused on are farmers, agroecological organisations and actors who influence policy. It is understood that some actors could be operating as more than one structure. A farmer who is heavily active in an agroecological organisation or an organisation actor who is involved for lobbying for policies in favour of agroecological practices for example. The rounding arrows in the middle of the figure represents the interactions between the actors and the infrastructure that may help or hinder these interactions. Infrastructure being data sharing platforms or lobby groups of agroecological policies for example, or access to agroecological seedbanks. The theoretical framework assisted in forming the methodology of how data was gathered and analysed as well as forming the research questions. Furthermore, a conceptual framework is shown in figure 4 below.

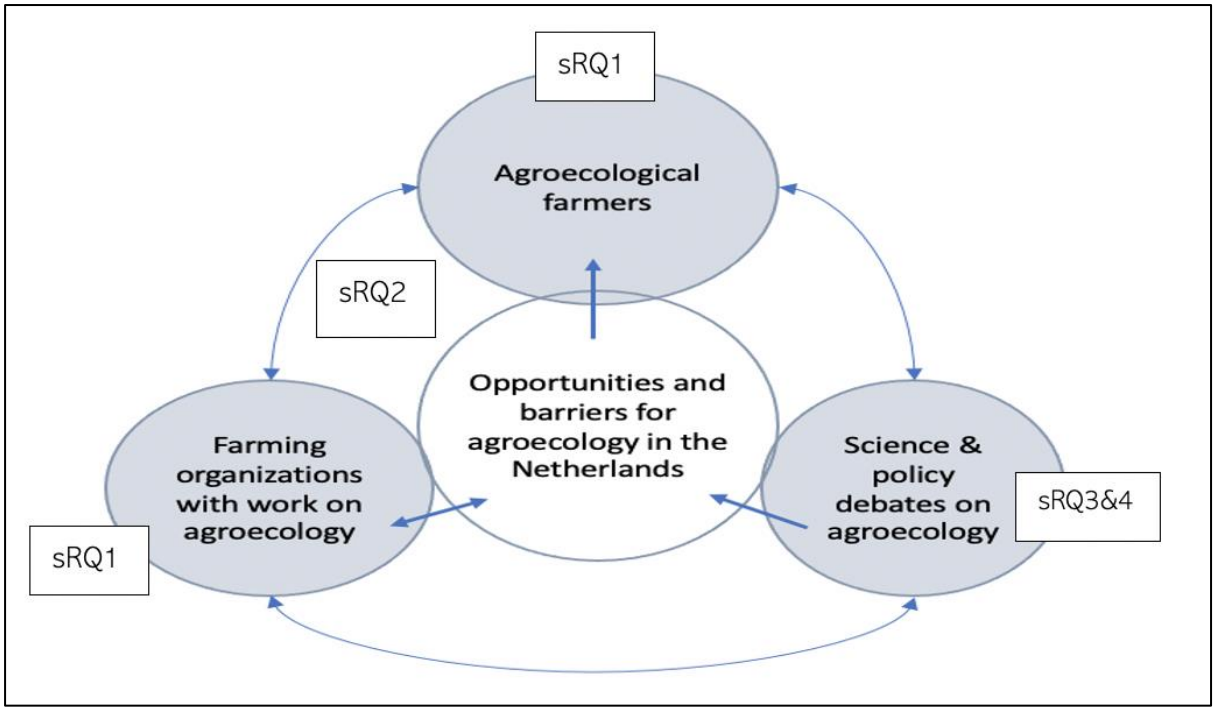

Figure 4: Conceptual Framework for research (Authors own).

The conceptual framework shown in figure 4 illustrates the various aspects of the research and where the sRQs were targeted to be answered. As can be seen, sRQ1 focused on both the progressive farmers and farming organisations using agroecological practices independently. sRQ2 then focused on the communication and connections between farmers and farming organisations in order to assess what strategies they were using to achieve their goals of practicing agroecology. sRQ3 & 4 then focused on the policy and scientific side of the agroecology debate to assess how they conceptualise agroecology and how they support initiatives of agroecological farmers and farming organisations. Coming all together, the answers to these four sRQs led the research to answer the main RQ. By identifying the opportunities and limitations further strategies used to circumvent issues experienced by farmers and organisations as well as use the opportunities to promote agroecology were highlighted.

Chapter 3: Methodology

3.1: Research Strategy

This research is a qualitative case study of the network of agroecology in Utrecht. Research is based on data gathered through scientific and grey literature as well as semi-constructed interviews. Proceeding these steps of research a policy analysis was also conducted.

The research started with a review of scientific literature gathered by using search terms such as; “agroecology”, “agroecological”; “sustainable”; “agriculture”, “farming practices”; “technological

innovation systems" as well as desk-based research searching for progressive farming organisations in the Netherlands. This initial research enabled a basis of relevant knowledge for the context of the innovation of the agroecological niche or system in Utrecht. This enabled criteria to be formed that would guide the selection of respondents for the first stage of the research.

Respondents were divided into two distinct groups. The first group are farmers. The farmers interviewed were contacted regardless of how they defined themselves and their agriculture. However, a list of criteria taken from literature was used to subsequently measure how 'agroecological' each respondent is. Criteria followed for this can be seen in Appendix A and was taken from (Koohafkan et al., 2012). This set of criteria was used to gauge how 'progressive' each farmer was in terms of agroecology and thereby sustainable agriculture. This aspect of the research was designed in order to observe whether different levels of innovation within a farming system effected the strategies available to the farmers.

The second group is the agricultural organisations or business' operating in the agri-food network. The main characteristic that this group had to maintain was that they were working towards a more sustainable food system and they had contact with farmers. What connects the two groups, aside from working in agriculture, is their missions for operating alternatively than the dominant regime. Respondents for this part of the research were gathered through a combination of desk-based research, a small network the research prior to the study, and ongoing snowball sampling throughout the interviews.

One source of data that proved very useful at this time was the 'Assessment and Planning of the Utrecht City Region Food System – Synthesis Report' (Haenen et al, 2018) that had compiled a comprehensive map of both farmers and organisations and business' that fit the criteria for this research. A subsequent Excel table was then made that listed farmers and organisations or business' that matched the various criteria. This table was used to gain points of contact with various actors in the network. More contacts were reached out to and communication formed, but due to corona and resulting time loss and complexity of the nature of reality not all were able to be interviewed for the research.

Semi-structured interviews where used in order to gather qualitative data from respondents and related grey literature was gathered in context to the respondent and their responses. As well as this, field observations were made with all the farmers contacted that coincided with the interviews. Interviews were prepared for both the farmers and the organisations that could be modified depending on the context of the respondent with some common questions across all interviews.

Furthermore, the interviews had to be adapted within the farmer and organisation groups due to the varying activities of the respondents. The interview questions were operationalised and composed based on the TIS and MLP theories.

As mentioned before, functions based on the TIS framework were used to construct research questions that help identify how all respondents were operating independently as well as part of the larger niche. Table 1 lists the functions for systematic analysis with a further explanation and indicators that were examined through the interviews. In all cases the aim was to analyse how active respondents were in each of these functions.

Table 1: Explanation of the functions listed by (Bergek et al, 2008) alongside indicators used to analyse them through interviews.

	Function	Explanation	indicators
F1	Entrepreneurial activities	Whether there are entrepreneurial activities operating within the niche indicates development and innovation.	How did they acquire resources? Where they supporting entrepreneurs in some way? Was there additional products made on site?
F2	Knowledge development	Whether the actors operating in the network are creating new knowledge that benefits the greater goal.	Did any actor develop new knowledge? How did they create this knowledge? Who was this knowledge beneficial to?
F3	Knowledge exchange	Whether the individual actors are connecting and communicating with other actors in their network and to what to degree	Was there sharing of knowledge between actors? How did actors acquire relevant knowledge? In what ways could actors help other actors in the network? How did communication develop?
F4	Guidance of the search	Whether there are activities within the system that have or can influence the clarity and visibility of the niches practices.	Is there any policy that was beneficial to the actors? Can actors avail of subsidies? Is there research being done on the topic?
F5	Market Formation	The ability of the actor to form or reach a market for their product.	What market is an actor aimed at? Does the actors have an economic incentive? How do actors reach their market? Do actors help each other?
F6	Resource Mobilisation	The ability to mobilise or make use of physical, human, financial and knowledge resources.	What resources do actors need? How do actors acquire resources they need? Does the network they have help in acquiring resources? What resources are hard to acquire? Are there barriers to mobilising resources?
F7	Creation of Legitimacy	Whether there activities that are further deepening support for sustainable agriculture.	Inclusion of agroecology in policy? Commitments made be the government?

A further explanation on how each of the functions were treated with respect farmers and farming organisations follows in this section.

<u>F1 Entrepreneurial activities</u>

The farmers contacted for this research were assessed on whether they exhibited entrepreneurial skills to get to the point they were and if so to what extent where they entrepreneurs. Indicators in this function included; whether they were experimenting with any of their land and did they use it for demonstration purposes, whether there were other services provided and the agricultural land, such as environmental or social, where they from a farming family or not, whether they processed or added value to any of their produce on-site, how they created their market base.

This function was analysed with regard to whether the organisation supported or participated in entrepreneurial activities. Firstly, whether the organisation was directly active with farmer. This supplied indicators in terms of whether the organisation helped in various things such in any operations that supported the entrepreneurial activities of farmers or whether the organisation itself exhibited entrepreneurial skills itself. Indicators in this function included: in order to create and share knowledge or create or provide any other services that benefit the development of the system.

F2 Knowledge Development

In this function farmers had knowledge of a theoretical basis and that of a practical sense. In terms of theory, farmers were asked how they have acquired the knowledge they have regarding the agriculture they practice and why they decided to develop this knowledge. On a more practical level, whether they continue to develop any sort of unique knowledge that benefits the niches' development in terms of model examples or educational work or collaboration. Furthermore, whether any knowledge development occurred on an individual, farmer to farmer, or farmer-business basis is also important to analyse for this research.

For organisations it was similar with regard to this function. Whether organisations were active in developing unique and novel knowledge was the primal indicator here. Carrying on from this then, it was analysed what actors within the niche this knowledge benefitted. What is also of interest is whether organisations are collaborating with each other or farmers in order to develop knowledge that benefitted individual or groups of farmers and this effects the development of agroecology, sustainable agriculture and the niche in general.

F3 Knowledge Exchange

What the focus was on in this function was the network that the farmers and organisations were actively participating in in order to exchange knowledge. Whether the farmer or organisation was also developing knowledge to share or not was also a point that was considered further in this

function, highlighting the interdependencies that can occur between different functions. Again, whether the exchange of knowledge was on an organisation-organisation, farmer-farmer, farmer-organisation or organisation-farmer basis was important to analyse here. Furthermore, another aspect that was important to consider was how far the network spread. Basically, whether the knowledge exchange was on a local or international level and was it through online means or real-life demonstrations or other.

F4 Guidance of the search

This function deals with activities in the system that help in guiding the development of agroecological practices in sustainable agriculture. In this function, indicators that show activity are the creation and use of beneficial subsidies, regulations and policies, the amount of research being done on the topic, or the creation of different agroecological platforms. Farmers for instance could be members of a policy group or an organisation could involve itself in influencing policy or working with lobby groups.

F5 Market formation

This function deals with the market a farmer has access to in terms of their inputs and outputs as well as how organisations operate in order to support farmers in this area. Analysed here was how the farmer accessed the products they needed as inputs for their farm such as seeds and fertilizer and how they accessed a market for selling their produce. What can be learned from this function is also connected to the entrepreneurial activities and knowledge exchange functions.

F6 Resource Mobilisation

The mobilisation of physical, financial, human, and knowledge resources falls under this function. With regards to the farmer group, to what scale where they are participating in activities related to these resources was analysed. Indicators here included resources such as land, capital means to finance their agriculture, resources they used to set up in terms of seeds and a knowledge base. Through what means farmers were mobilising their resources and how this connects them to their wider network was of interest under this function also.

F7 Creation of legitimacy

Activities that farmers participate in or happenings that occur help in securing acknowledgement that agroecology is a legitimate element in the transition to a more sustainable agricultural regime is what is analysed for this function.

Field observations were taken with regard all the farmer group. Collecting data like this enabled a better sense of the farming methods used by the farmers and allowed for an accurate connection between the farmers and the agroecological criteria. Data like this also helped in analysing the functions the farmers were active in could potentially be active in. Grey literature was also analysed but this was mainly for the organisation group. Data was gathered through organisation websites as well as documents retrieved from there or as a result of a respondents interview.

One of the interviews was conducted with a PhD researcher in the Copernicus Institute of Sustainable Development called Nico. This is the first source of data for the Policy & Science section of the research. Nico is researching sustainable agriculture as part of his PhD and was thought to be a valuable source of data for this research. As an outside observer and actor in the sustainable agriculture niche Nico was deemed to hold important information regarding the strategies used by farmers and their connection with their larger network and the direction science is taking in this area in Utrecht. The policy analysed as part of the research was identified through the processes of desk-based research and the responses of the respondents. Two policy documents were analysed as part of this process. They were 'Realization Plan Vision LNV: On the road with a new perspective'[1] (now referred to as the 'Vision') (Ministry of Agriculture, Nature & Food Quality, 2018), a document detailing the vision and commitment to circular agriculture of the Dutch government, and the Green Deal Food Forest[2] (now referred to as the Green Deal or GD) which is a policy document as part of the Green Deal initiative being run by the Dutch government (Green Deals. 2017). The documents were published in 2019 and 2017 respectively. These policy documents were deemed appropriate for this purpose as they are both inclusive of agroecology in their outline. The policy analysis was done in order to create a logical comparison of what the farmers and organisations where experiencing in real life with the commitments being made in policy regarding agroecology and sustainable agriculture.

A graphical representation of the research strategy is illustrated in figure 5 below.

[1] Realisatieplan Visie LNV: Op weg met nieuw perspectief

[2] Green Deal Voedselbossen

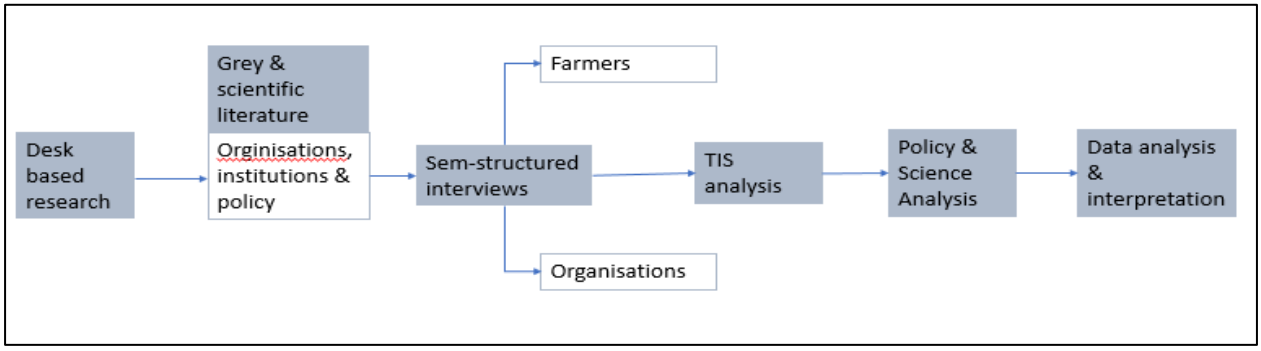

Figure 5: Research strategy (Authoors own).

3.2 Data Collection & Respondents

The data collected formed a broad analysis of a large network in the agri-food system. In line with Bergak et al. (2008), if an analyst is new to a field of study, or the field of study is quite young itself, it can be necessary to have a broad starting point. From a broad understanding, further research can much easier narrowed down, as the understanding of the TIS increases. A total of four farmers were interviewed covering three different approaches to 'sustainable farming' as well as three organisations, one business and a PhD researcher representing the role of science and the university as an institution in the network. A table briefly summarising the respondents can be viewed below in table 2. Templates used for the interview guides for the various farmers and organisations can be seen in Appendix B and C respectively.

Table 2: A brief summary of respondents.

Farmers				Organisations & Institutions				Science
Jacob	Maarten	Mieke	Michel	ASEED	L2L	NAV	TB	Nico
-Mixed farmer with Jersey bulls for meat and grain for feed and other products. -Unique and regenerative -One additional part-time worker -Certified organic	-Food forest grower so quite radical agroecology -Farms perennial crops including nuts, fruits, vegetables. -Biodiversity rich form of farming with added social benefits	-Certified organic growing mostly vegetables and a small amount of fruit -More conventional in their produce -Acts as a care farm which provides an income	-Certified organic growing mostly vegetables and a small amount of fruit -More conventional in their produce -Acts as a care farm which provides an income	-International NGO/Collective -Educating, raising awareness and running campaigns on various negative elements of conventional agriculture - Current campaign on the use of fossil fuels to make fertilizers	-Business that develops IT solutions for farmers and SFSCs. -Connects with farmers to support in creating products, ideas and markets	-Arable farming union -Holds a favourable position on circular farming -First union to form as a result of separation from LTO -Farmer led on a volunteer basis	-Represents new entrant farmers -Formed on agroecological ideals -Represents an international peasant movement, La Via Campesina	-PhD researcher on sustainable agriculture -Research funded by some external parties

Farmers were contacted through a combination of desk-based research and through a small network established by the researcher prior to the research. Maarten was contacted through an already established relationship with the researcher from prior research, while Jacob, Meike and

Michel were successfully contacted through the initial desk-based research. Semi-structured interviews took place on site of the farms in all cases. As well as interviews, field observations and notes were taken during a walk-about of the farming operation. The field observations and notes particularly helped in comparing the farmers' practices against the agroecological checklist taken from literature. Semi-structured interviews then allowed for data to be gathered more focused on how the farmers were operating in the functions as set out by (Bergek et al, 2008), and how, from a farmer's perspective, they were connected to actors in the wider agri-food system. Furthermore, the strategies being used independently by farmers and organisations as well as how they strategize together could be identified in this way. Below is a description of what was looked for during research in terms of each of the functions. In all cases, data gathered through the semi-constructed interviews was analysed in order to gain insight into what scale the farmers where operating in each function and whether there were functions that were more or less beneficial than others. Furthermore, this was done in order to analyse what functions have helped the farmer in being successful in what they do and in connecting with their network.

Organisations and businesses were successfully contacted through the initial desk-based phase of the research and through the compiled Excel sheet as well as being mentioned by farmers. All interviews with organisations or business' took place through a video call on a laptop. Furthermore, data was retrieved from respective websites as well as documents The aim of talking with such actors was to understand more deeply their position in the niche, what their mission was in relation to sustainable agriculture and how they were connected to farmers. Of course, analysis was only based on data gathered from the respondents in both groups but will be used to present mechanisms occurring between all types of farmers and other parties in the Discussion section of this thesis.

The decision to include the university as an institution and interview a PhD researcher came later in the research process as a result of comments made by a couple of farmer and organisation respondents. The role of the researcher and universities in the agroecology niche, as well as the dominant regime, was highlighted as an interesting avenue to research. A researcher acts as an outside observer to the happenings and innovations that may be occurring in the niche and also has the potential to guide or direct a topic such as sustainable agriculture. Again, the functions operating within a TIS were used in order to guide the interview.

In using the functions as a guidance for the analysis the strategies being used, supported or hindered in the context of farmers, organisations and overall network could be identified. This formed the first sub-chapter within the results section. Below is a further break-down of how the functions were treated with respect farmers and organisations.

Lastly, data was collected for the policy analysis aspect of the research through critically reading of the Dutch government's 'Circular Agriculture' Vision and the Green. This, along with the data gathered through the PhD interview forms the second part of the Results chapter. Forming two Results sections like this allowed for a comparison of the practical realities of the agroecological niche, in terms of opportunities and limitations as well as strategies used by the farmers and organisations, against the over-arching and external points of influence on the niche itself.

Chapter 4: Practices of Farmers and Farming Organisations

In this chapter, I show how farmers and organisations are operating in terms of the functions that potentially limit or support the growth of sustainable agriculture as well as affect the strategies that are available to them. As well as this, how being active in these functions connects farmers with other farmers and organisations and vice versa. After this chapter, I analyse in the Science & Policy chapter the direction in which science and policy are going in terms of sustainable agriculture, and I present a comparison and discussion in the concluding chapter of the thesis.

All farmers contacted for the research were based in the Utrecht region. The organisations however were not all strictly Utrecht based. All of the organisations were operating nationally if not internationally to some degree. One of the organisations operated more as a business than a farmer- or volunteer-led organisation like the others. All farmers and organisations were alike in that they were working with the goal of a more sustainable agriculture regime. Similar to table 1, table 2 below gives a description of each respondent with more detail as a result of the research findings.

Table 2: A more detailed summary of respondents with reference to research findings.

Farmers				Organisations & Institutions			
Jacob (1)	Maarten (2)	Mieke (3)	Michel (4)	ASEED	L2L	NAV	TB

-Mixed farmer with Jersey bulls for meat and grain for feed and other products. -Unique and regenerative -One additional part-time worker -Certified organic -Seeking private funding for regenerative project -Earns from CAP	-Food forest grower so quite radical agroecology -Farms perennial crops including nuts, fruits, vegetables. -Biodiversity rich form of farming with added social benefits -Seeking to develop philanthropic fund for agroecological farming practices	-Certified organic growing mostly vegetables and a small amount of fruit -More conventional in their produce -Shows some agroecological practices -Acts as a care farm which provides an income -Does not earn from CAP	-Certified organic growing mostly vegetables and a small amount of fruit -More conventional in their produce -Acts as a care farm which provides an income -Does not earn from CAP	-International NGO/Collective -Once offices globally, now office in Amsterdam only -Educating, raising awareness and running campaigns on various negative elements of conventional agriculture - Current campaign on the use of fossil fuels to make fertilizers	-Business looking to make profit -Develops IT solutions for farmers and SFSCs. -Connects with farmers to support in creating products, ideas and markets.	-Arable farming union -Holds a favourable position on circular farming -First union to form as a result of separation from LTO -Farmer led on a volunteer basis -600 members -Connects with farmers through calls, workshops, farm visits	-Represents new entrant farmers -Formed on agroecological ideals -Represents an international peasant movement, La Via Campesina -Recently received funding for workers and innovations

The data retrieved from both interviews and associated grey literature (websites, yearly reports, project proposals) allowed for an analysis that shed light on the functional activities of the relevant actors in the niche. Throughout the transcripts of the interviews the data was coded using the functions (F1, F2 and so on) as well as other tags such as whether one coded bit of information influenced another function in the same data set or whether data in one interview connected with data in a different interview.

Following in this section is a further break down and analysis of how each respondent was operating in the functions. All quotes and references within this section are taken from the interviews with the respondents unless otherwise specified.

4.1 Farmers

In total, four farmers as well as four organisations were interviewed for the research. All of the farmers and the farms were located in different locations around the city of Utrecht. A map depicting each of the locations can be seen in figure 6 below.

Figure 6: Map of farmer respondents; (1) Jacob, (2) Maarten, (3) Meike, (4) Michel.

The contacted farmers practiced varying forms of sustainable agriculture while also exhibiting the use of agroecological methods to varying degrees. Firstly, the level of agroecological practices ranged from quite a radical agroecological model, food forestry, to a mixed farming approach that implemented many agroecological practice, and organic farmers that implemented fewer agroecological practices. Below are individual descriptions of how the farmers operated in their farming model, as well as in terms of the functions which gives an insight into the strategies they are using and how they are connecting with other actors in the niche.

Jacob

Jacob is the farmer of a 130 hectare mixed farm in the Bilthoven area of Utrecht. He operates a mixed farm with Jersey bulls for meat and grows grains for feed for his cattle as well as other products such as flour. The money made from the meat of his cattle is his income. Involved on the farm with Jacob is one full-time worker, a few who work in the shop and someone who helps him part-time with his grain. The meat aspect of his farm was his initial entrepreneurial endeavour in agriculture after spending time working in IT and is the main source of income on his farm. In addition, the grains aspect of his farm is a relatively new endeavour. The grains are used for

feeding the cattle as well as a small portion being sold to local food retailers as flour. When asked what type of farm he operated, Jacob stated;

"Mixed, because of the strength of that [agroecological] system. We have Jersey bulls for meat and we have grains for feeding them. We are getting the straw from our own land, to try and be circular"

The land on which the farm is located is rented from the landowner. Jacob mentioned that he was able to organise a lower price for the land compared to the first few years he was there because he convinced the land owner he could *"do more with the soil"* in a regenerative way if he had more money to invest in it.

Entrepreneurially, Jacob had to build up his livestock from none to 140 presently. As well as this, it was always his goal to sell the meat himself as he stated that otherwise *"you get a very low price for the meat"*. Currently, Jacob sells his meat on his farmyard alongside 10 independent organic shops in the Utrecht area stating that being able to name your own price makes him and the product stronger. Carrying on with this point, Jacob did also express the difficulty in defining the way he farms a he stated that;

"it is difficult to say [how I should call my farming practice] because all of the terms being used [in public debates] are also being misused. Nature inclusive of course, circular…certified organic. Organic is maybe the most precise definition because it is certified."

That fact that Jacob rears Jersey bulls for meat is a unique and novel approach in agriculture as is the mixed model of farming and altogether exhibits many agroecological characteristics. As well as growing his own grain Jacob is active in introducing new grains to the organic certification. This is agroecological in the sense that it makes use of local and improved crop varieties (Koohafkan et al., 2012). Furthermore, Jacob uses his own manure which is an efficient use of resources. Considering these comments as well as observations made while on his farm, Jacob matches 10 of the 10 criteria for agroecological practices as described by Koohafkan et al. (2012).

On developing his knowledge base, Jacob was firstly an agricultural student. However this knowledge was conventional. While Jacob knows the *"conventional world very well and it is an advantage to know it"*, more networking and collaborating in order to gain access to the knowledge that is required for his novel and unique way of farming.

"there are maybe four farmers who I receive bull calves from, they are a little older than me and have had their farms in their families for hundreds of years. So I gain much practical information

and knowledge from them about diseases and problems in the crops or the land. It is getting less important for me but was very important at the start. Now it is more with organisations that are trying to help farmers."

Furthermore, the aforementioed part-timer who helps Jacob with the grain is a valuable knowledge source for Jacob;

"I have one person who helps me with the grain, he has a lot of knowledge and he is helping me learn how to do it from the start to the end. So that is very important for me."

As well as learning from his peers Jacob is also devloping unique agricultural knowledge that is valuable to the sustainable agriculture transition in general and encounters barriers in exchanging it with others;

"I have a lot of people who come and ask if they can come work a day on the farm to learn what you are doing cause they want to try it themselves. But that doesn't work for me because I spend my whole day explaining and I don't get my work done. So there are people who want to learn from me but I do not know how to do that because it takes so much time"

In order to make his work on the farm a possibility Jacob makes use of subsidies that account for approximately 10% of his income. He stated that;

"The European subsidies help me do the things I do but they do not tell me to do it. I could also buy a new car every year but that is not what I do with it."

This is of particular interest because Jacob is not being rewarded for his regenerative and circular practices. He states that the subsidies are;

"not on the funding of the farm, we have it on the management of the fields. For the grain we get a yearly money per hectare to not use pesticides and to not grow corn on it."

He goes on further to mention that he used to make use of an organic subsidy but that is now gone and that the European subsidies don't discriminate over what type of agriculture is being practiced which thereby values conventional and sustainable farming as the same.

Currently, Jacob is undergoing a regenerative project on his land. The soil on his farm is degraded as he "*inherited degraded soil from the last two farmers over the last 100 years or so"* and he wants to restore it. He has encountered obstacles to this due to the aforementioned lack of subsidy support and is seeking funding privately.

Maarten

Maarten is a farmer of an approximately 20 hectare food forest in the West Utrecht region. Food forestry is a radical form of agroecology. Maarten works alongside one other farmer. The workload in a full-time year differs significantly from the other farmers interviewed. The farm is also neither of the farmers main source of income. Maarten is also a lecturer in Leiden University. Crops in their food forest include perennial plants, shrubs and trees that produce fruit, nuts and vegetables as well as herbs. How they acquired the land for their nature-inclusive form of agriculture was through *"friends of friends"* in a large network of like-minded people Maarten had already established. Finding land for their project was a barrier at first and Maarten highlights the difficulty entrant farmers can incur when looking for land;

"We knew friends who knew some people in an organisation who had land with some of the land still unplanned. If we didn't have friends in that organisation it would have been very hard or impossible. But this is kind of a lucky shot, not everyone is lucky enough to make the break we did."

The food forest has been growing for approximately 5 years and follows a different business model than that of the other farmers interviewed. As the food forest is in an early stage of production, not so much is currently produced. In terms of an income from the forest, at the moment the farm supplies;

"direct to consumers who come and pick food in the forest, business to business, we are a business, and we sell it too other businesses, and to restaurants who we sell directly to. There is a fourth business opportunity, but we still have to develop that. That will be kind of reproducing the trees that we have in the food forest. That will be an income, but it is not yet."

The food forest grows quite slowly so a large investment in time is needed until it is fully productive and potentially profitable. It is a very knowledge intensive start-up in terms of ecological and biological aspects of agriculture. This allows the two farmers to invest their time on the food forest for education and exchange of knowledge purposes through consistently offering up their time to students, researchers and the public in order educate about the food forestry and agroecology. There is much room for experimentation within a food forest and the subsequent knowledge development.

Maarten states that what he thinks is needed is *"different kinds of [agroecology] showcases where people can come and go"* to learn farmer-to-farmer and in practice:

"different farmers come to see these practices. a farmer might see these things and decide 'oh cool very interesting I will try this next year'."

Maarten's food forest is well suited to act as one of these showcases and in fact does act as a hub for people to gain knowledge about agroecological practices. Prior to this research, the researcher had visited the food forest and been involved with Maarten for other projects where other researchers were often met. Additionally, Maarten participates in active engagement with some farming organizations. Food Forestry Netherlands[3] is an important organization for Maarten to be involved with as they have been active in much policy work regarding food forests beside being a source of knowledge for entrant farmers. The organization was involved in the creation of the Green Deal Food Forest which was analyzed as part of this research. On being engaged with Food Forestry Netherlands, Maarten stated that:

"they're at a very high level. They're talking to the minister and they created the Green Deal for food forests. So, they are in the ministry and they try and organize things from that side. They make sure that it is being taken seriously within the government.".

Maarten also proved to have a good knowledge of various subsidies in which he could utilize. Nonetheless, he still highlighted that being successful in accessing funding through subsidies is very time consuming:

"Again, you have to talk to lots of people. We talked to maybe 25 people within the local municipality to ensure some things were organized. And they were very enthusiastic about it but in the end it was very hard to even get a cabin [for storage] at our food forest".

Furthermore, Maarten goes on to state that the government should do more on the matter of allowing space for agriculture like food forests.

"the government should step in and realise that there is more local food produced around the city so therefore make sure to buy land from developers or downgrade the land to local production land and land then becomes available for these kind of projects. In the same ring that developers or speculants have land, waiting for the soil to become more valuable, is the same ring in which local production should take place. So, it would alleviate a lot of pressure if

[3] https://www.voedselbosbouw.org/

the government would find that this is part of their responsibility. At the moment they believe that the market will fix it."

It goes to show that Maarten, as a farmer, thinks that more should be done in terms of helping farmers than subsidies and other policies. Planning laws and regulation should consider agriculture too.

In terms of acquiring funding, Maarten has recently enlisted a financial advisor to "*find out if she can interest philanthropists in setting up a food forest fund.".* Maarten goes on to say that:

"this is the kind of financial structures that are needed to get good initiatives off the ground to pay people's wages during the time in which they are trying to get the project off the ground. We need people with serious interest in the landscape. And I don't know whether this is going to be with payback or not and this is something our financial advisor has identified as a big hurdle."

The food forest also offers much to the social aspect of sustainable agriculture as the farm is in a public area and open for people to walk freely around it. Since the food forest started growing, the biodiversity of the area has increased significantly with regard to flora and fauna. Furthermore, due to the fact that food forestry is a radical form of agroecology, Maarten matches all criteria as listed by (Koohafkan et al., 2012).

<u>Meike</u>

Meike is an organic certified market gardener with an approximately one acre site. It is a CSA (Community Supported Agriculture) set-up in which paying community members collect their vegetables and fruits on a weekly basis. It is run as a 'care farm'[4] and employs two people altogether; Meike and an employee on the 'care' side of the operations. They also accept volunteers throughout the growing season to help weed and harvest.

From observations made during the interview and farm visit, it was clear that Meike identified most closely with organic farming. In saying this, she matched with 3 out of the 10 criteria for agroecological practices outlined by Koohafkan et al. (2012). On the practices she uses, Meike mentioned that she uses her own compost and cow manure. Furthermore, she uses no fertilizer of a chemical basis, not even those allowed in organic farming:

[4] The farmer hosts clients suffering from burn-out or other mental issues (Hassink et al., 2014).

"we use our own compost and cow manure. Of course, no fertilizer no chemical fertilizer. I never use any herbicides or pesticides, not even those allowed in organic farming because I think we are in such a balanced ecosystem here. the surroundings are very favorable for birds, toads' snails et cetera. When something does go wrong, we have so many other things growing that I just leave it to go. I try to let nature help me in my gardening"

Going beyond what organic asks and considering the natural ecosystem in such a way is characteristic of agroecological practices. However, Meike identifies mostly as an organic farmer in terms of her main practices and model as well as in the network she engages with. She is involved with an organization called 'the Biotuinders'[5] which is "*made up of all sorts of gardeners and vegetable growers"* and has been running since 2016. Within the organization and its activities there are opportunities for knowledge exchange through meetings and farm visits. This organization came to be when gardeners and farmers alike wanted to mobilize together in response to the accrediting body of organic certification, SKAL. Small farmers like Meike wanted smaller prices for membership:

"It is very expensive to subscribe to be certified by SKAL so that's how it started, to get together as a group of gardeners and farmers and approach SKAL to get a smaller contribution [for membership] for smaller farmers. So, then we thought it was good to get together and continue to represent the voice of many farmers. That was the first-time gardeners like myself were united together."

Meike mentions that a network like that offered through the Biotuinders is *"very important" for "inspiration and support"* as well as knowledge exchange.

Meike operates in a transparent and inclusive manner with her CSA network:

"Every year we have a meeting with our CSA network. In the meeting we are transparent about financial matters and they can give feedback on all the vegetable bags and things like this. They can suggest some vegetables to be grown next year perhaps."

This model of working allows for bridging of the gap between farmer and consumer and adds to the social capabilities of sustainable agriculture. Furthermore, Meike accepts volunteers for working on the farm year-round and hosts events such as a yearly pumpkin harvest and lunches.

[5] 'de BioTuinders': http://www.debiotuinders.nl/

Interestingly, the previously mentioned 'care' aspect of the farm accounts for approximately two-thirds of the farms income as it is a government scheme.

Meike also proclaimed that she would like to expand the area in which she produces but stated that it was impossible doing so on the same area she works on now. When asked whether she would like to expand she said:

"I am thinking of that [expanding] all the time but expanding the area here is quite impossible. We would have to grow more on the same site which would mean growing more intensively than we do already."

Correspondingly, Meike also touched upon the difficulty of accessing land, especially if you want to farm sustainably as it needs a longer time scale for investment.

"I think the biggest problem is the access to land. It is not so hard to find a piece of land for a few years, but you need to know if you are able to stay there if you want to farm sustainably. Because you want to be able to invest in your soil, buy some trees, invest in glass houses, barns and things like this."

Meike referred to this difficulty with regard to when she was starting as a farmer and searching for land as well as for her desire to expand her operations. This is similar to especially Jacob and Maarten who cited similar issues with accessing land.

Meike has been contacted by *"many organizations"*, one of which was loal2local, looking to work together to try and develop the short food chain in the area. Meike declined all of this type of collaboration stating that her chain *"is already shorter"*. Moreover, Meike stated that there is not enough supply to *"meet the demand for organic farming"*.

On her thoughts about the circular agriculture vision of the government, Meike stated that she didn't quite feel represented by the vision as an organic farmer but that the views outlined in the policy brief were good. Furthermore, similarly to other farmer and organization interviewed, Meike stated that she hasn't seen any concrete action regarding the new Vision.

"I have read the paper and the ideas in there are quite good. One negative thing is that she doesn't mention organic farming. But the ideas about circular farming are quite good. So yeah, so far I have seen nothing come out of it but something needs to come from it".

Furthermore, Meike stated that she is not eligible for subsidies as part of the CAP because she is too small. However, she mentioned a woman who is *"at the moment trying to see if it's possible*

to gather a few farms together and apply for the subsidy like that". Thus, alongside the creation if the Biotuinders in 2016, this type of innovation is active as gardeners and farmers like Meike guide the search of how they farm.

Meike doesn't involve herself in any added-value processes on site and sells all fruits and vegetables as they are. The main reason for this was that "*if you were to do any sort of processing then you have to adhere to certain hygiene standards and things like this".*

Michel

Michel has been farming for thirty years on a one hectare site in Amelisweerd in Utrecht. The farm operates as a market garden structure and has organic certification producing vegetables, fruits, herbs and flowers. The farm employees two employees, himself and his wife, and is the sole source of income for the pair. The farm also accepts volunteers in the appropriate time of the growing season in which there is a waiting list to volunteer on the farm. The farm also takes people for *"day-care"*, the same social care government initiative in which Meike partakes in that supplies two-thirds of the income for her farm.

The land Michel uses is rented through a foundation that rents land from the government. This is a unique occurrence out of all respondents and is something Michel thinks the government should do more of. When asked about this he stated:

"there is a foundation that rents from the government and we rent from the foundation."

What is more is that this set-up allows for security in the farmers practices. As Michel put it, *"this farm is eternal".* Furthermore, Michel is of the opinion that this is something the government should do more of, for farmers and farmer organisations alike, as it was a big help for him thirty years ago.

Michel has had organic certification for 30 years now and mentioned that over the last 10 years it has been becoming more difficult to be organic certified due to developing standards and a *"tendency to control everything more*" resulting in more paperwork and stress for the farmer. Furthermore, Michel had just finished a meeting with an organic certification officer when the researcher met with him. In this meeting it evolved that a new requirement could be implemented in 2021;

"there is a rumour that for next year I have to register everything I sell. It is impossible for me to register everything I sell. It is just too much, I can't do it. If it becomes too difficult I stop."

Luckily for Michel, the officer mentioned that he could be exempt from the new requirement. Moreover, if Michel had to abide by the new requirement he stated that he would stop with the organic certification that costs him one thousand euro per annum. The reason being that this additional registration of every product sold would be too difficult and in the fact that customers can very easily observe that Michel is farming biologically irrespective of whether he is certified or not:

"people can see what we do, so I don't need the certification."

Partly the reason for this is the CSA set-up of the farm in which there are 100 subscribers who collect a weekly vegetable bag between the months of May and November. Alongside this, the farm has a shop on-site twice a week during the same period in which the public can purchase fruit, vegetables and herbs.

Michel has noticed a significant increase in the demand for produce like his. is more than he can supply. In fact, the demand in all of Utrecht is more than farms like his can supply.

"the interest of the public is certainly increasing. But there is not enough companies like this in the region. We have too many customers and I cannot supply to everyone"

With his farm being the first of its kind in the area, Michel believes there are now approximately *"seven or eight now",* but this still not enough for the demand.

Michel participates in much communication between different farmers organisation. He mentioned being member of Toekomstboeren, the organic association and the biodynamic association. This proves that he is engaged in the larger sustainable agriculture community. The reasons he mentioned for being involved with them was mainly to keep update with farming matters, for knowledge and inspiration as well as having the feeling of being *"backed up"* by his community stating that to him this was the *"most important".* Lastly, Michel recognises and values the organisations' he is involved in role in being the farmers voice for policy matters.

4.2 Farming Organisations

The organisations contacted all varied in their operations and missions. Furthermore, they all had a slightly different understanding or perspective of sustainable agriculture. Only one organisation identified as adopting an agroecological framework to their operations while two organisations worked with agroecological farmers while not identifying as strictly agroecological themselves.

Lastly, one organisation was representing more conventional farmers while also contributing to sustainable agriculture through concepts such agroecology.

Below are individual descriptions of the contacted organisations based on the findings from the interviews as well as associated grey literature. All information, quotes and references in what follows are taken from the interview transcripts of the respondents unless specified otherwise.

Toekomstboeren

Standing for 'Future Farmers', Toekomstboeren are a farmer-led organisation that, according to their website, *"aims to make visible and strengthen the growing and flourishing movement of sustainable and socially responsible agriculture and food production. With the aim of bringing the future of widely supported ecological and social agriculture closer"* (Toekomstboeren, n.d.). They can be seen as the Dutch representation of the La Via Campesina (European Coordination Via Campesina, n.d.), therefore holding the values of agroecology as a practice and social movement at the core of the organisation. Set-up in approximately 2013, their establishment is reasonably new and up until recently has been completely voluntary;

"well for 7 years it has been voluntary. For the 7 years it has been set up it has had voluntary board members. Now, recently we have received money/subsidies from the government for innovative concepts and projects"

The subsidy will run for two years and has enabled the insertion of two coordinators in paid positions as well as a voluntary board. Before the organisation was only made up of the voluntary board and was struggling a little bit with aspects such as *"membership administration services or system for instance".* The lack of funding and the resulting voluntary basis of the organisation in the past has resulted in a barrier in recruiting new members so the arrival of funding like this is a positive step forward for Toekomstboeren in the goals they want to achieve.

Since its inception, the goal of the organisation has been to support and *"represent new farmers as a group".* As stated on their website, these new farmers "*develop new business models, enter into new and special forms of collaboration: they are energetic, innovative and very entrepreneurial'*[6] *(Toekomstboeren, n.d.).* In doing so, the aim is also to *"inspire each other with success stories or with things that we had to deal with as a special group of people".* To succeed

[6] "Ze ontwikkelen nieuwe bedrijfsmodellen, gaan nieuwe en bijzondere vormen van samenwerking aan: ze zijn energiek, innovatief, vernieuwend en ontzettend ondernemend."

in their mission Toekomstboeren engage in multiple activities to support new farmers and innovative practices. For instance, once a year they run an event in which connects established farmers with new farmers;

"for the last five years we organise an event in which farmers who want to hand over their farm to a young person or to have another younger farmer with them on their farm can meet."

Additionally, Toekomstboeren places posts on a regular basis on their website on a message board for the same purpose of connecting farmers who are either looking for land or have land, or a farm, to give up.

Toekomstboeren, and the farmers they support, are now also developing unique and innovative ways to make life easier for new entrant farmers. At the moment they are investigating whether they can *"organise land through the Commons"* so that a group of entrepreneurs get together to buy land rather than one farmer do it alone. This sort of innovation helps combating the high prices of land in the Netherlands. Furthermore, a member of Toekomstboeren succeeded in making a contract within the law that states *"a farmer who practises sustainable agriculture after six years will get automatic renewal".* This is significant because, as many of the respondents mentioned, the short time period which is the norm for renting land is a barrier to farming sustainably.

Toekomstboeren then share this with their members to provide a source of inspiration. Moreover, there has recently been the establishment of the 'Federation of Agroecological Farmers' in which six organisations, including Toekomstboeren, have come together for collaboration, support and knowledge exchange. The rest of this network is made up of *"the CSA network, the Biodynamic Association, permaculture gardeners the organic market gardeners and there is a vegan agricultural network that is trying to figure out how we can feed crops without animal manure".*

This mobilisation of many different networks is a new occurrence according to Toekomstboeren indicating a positive sign for the legitimacy and guidance of agroecology and sustainable agriculture. Furthermore, as previously mentioned, Toekomstboeren is a member of the international peasant movement La Via Campesina, run by the European Coordination Via Campesina in Europe. This established and growing international network is also important for Toekomstboeren to do what it does:

"I think it is important. Because if you listen to others in other parts of Europe and the world going through the same struggles in their location it helps with morale and spirit and we really

need this. This kind of network inspires us. Every country has their own circumstances, but we still help each other in that way."

The engagement in La Via Campesina movement includes representatives of Toekomstboeren attending yearly meetings who *"come back inspired and excited and with more knowledge"* so being part of this international movement is a good strategy to develop cohesion and legitimacy of the overall agroecology movement in the Netherlands.

Local2local

Local2local is a business with an overall goal to facilitate collaboration between farmers, legislators and other stakeholders in the food system in order to develop short food supply chains (SFSC) (local2local, n.a.). They were established in approximately 2014 and are now the *"leader in the Netherlands on the matter of regional food systems"* as stated by Mark Frederiks, the founder and managing director of local2local, who was interviewed as part of this research. To achieve their goals they develop information technology (IT) solutions and other smart platforms for transition to a more sustainable food system. As stated by Mark;

"We develop IT solutions for collaboration, new business models, short-term supply chains, crowdfunding platforms, matchmaking algorithms, data strategies. Basically, IT solutions and smart surfaces for transition. That is what our business is."

Some examples of local2local's innovations in regional food systems are the 'GAIN' transition model and the 'Blockchan' information sharing platform (local2local, n.d.). GAIN was set-up in 2017 by local2local as a result of collaboration with twenty farmers, with the aim of streamlining entrepreneurs to have impact at a national scale and farther. On their GAIN model Mark stated that;

"it's the model where you can be an individual value as an individual entrepreneur and all the way up to the European commission"

The model is based on 'game theory' where data and change of trust at a regional level are the fundamental to a change to a more sustainable system. Local2local believe that the European Commission's *"decision that the national government level is not important. It's about autonomy of the regions"* is an important step in empowering regions and allowing them to become more independent in decision making processes of an agricultural nature. The Blockchain platform is an

"instrument that enables or helps in the sharing of information. It can help facilitate the connection between consumers and farmers around these additional value models."

The 'additional value models' mentioned here refer to the specific *"craftsmanship"* of the farmer in terms of *"positive contribution to ecological, social and economic aspects of agriculture".*

Local2local view themselves as a 'plug-in' service that can be used as a template to be used in other regions to develop SFSCs.

"we see local2local as a plug-in surface for the smart region approach, that local2local can be implemented in other regions."

This exemplifies local2local's aim of forming and sharing knowledge on a national basis *"to facilitate plug-in services, knowledge for others to prosper, but have a mutual connection on sharing data and sharing inventory basically leadership expertise, tools, et cetra"*. This 'plug-in' service, having started in Utrecht, has now reached other regions such as Amsterdam, Flevoland, Texel, West Betuwe, Groene Hart, Gooi and Eemland.

During the interview local2local critiqued farmers and their capacity to successfully mobilize and create opportunities together.

"The last few years, there's one thing that was really an eye opener. A lot of initiatives started by farmers getting together and saying, 'well, we're going to do something short from the food chain or look for new opportunities. They started the corporation, they start doing all kinds of process work, but in the end, they failed because they are not aware of the real challenges ahead"

In saying this, local2local claim that farmers do not know how to develop and be successful without the help of a sort of middleman like local2local to provide support along the way. Furthermore, local2local highlighted an imbalance in the dynamics between the city and the countryside where most farmers are operating.

"you have a lot of power dynamics between the city and the countryside. they speak different languages. So, you have different focuses on sustainability"

Moreover, local2local claim that the connection between the Ministry of Agriculture, Nature & Food Quality and that of the regional, individual entrepreneur is also a major problem in the goal of improving regional food system.

"That's what the main problems and the dynamics between the layers of individual entrepreneur, regional collaboration and the government, the ministry of agriculture. They don't have any clue about what is happening in the regions, there's just no connection"

Locla2local's vision on how to solve this is for the city and countryside to organize *"as if we were an ecosystem"* and for there to be *"extreme transparency".* Contrasting their aforementioned critique of farmers, local2local also believe that farmers and agriculture could better facilitate our society if it was organized in this way. In order to support farmers, local2local do not discriminate against what type of agriculture farmers are practicing meaning that they will offer their services to agroecological and conventional farmers alike.

"Well, I always say we use small and big agricultural companies, so we don't judge them. We judge them on how transparent they are and if they are willing to change [to a sustainable food system]"

Local2local work with farmers in supporting them in adding value to their produce, selling farmers' products and telling their story. Thus, building a good relationship and trust between the farmer is the primal and hardest task faced by local2local.

"in the first stage is we sell these products and tell the story. That's the first step, because you have to practice what you preach…..it takes a lot of time to gain trust from farmers."

Locl2local then state that once this connection and trust is achieved a transformation of the regional food system *"together with businesses, government and farmers"* can occur.

ASEED (Action for Solidarity, Equality, Environment, and Diversity Europe)

Established in 1991, ASEED is an international campaigning organisation. Originally formed, according to their website, in *"response to the UNCED Earth Summit proceedings in Rio de Janeiro and aimed to forge alliances among young people committed to social and environmental justice" (ASEED, n.a.)*. For a time in the 90's the organisation had regional hubs across Asia, North America, Latin America, Africa and Japan they are now just operating from an office in Amsterdam. They are however still involved in international actions and knowledge exchange. They engage with other organisations, the public and farmers. For instance, they share 'Farmer Portraits' in which they tell stories of farmers who farm uniquely and sustainably across Europe as well as host a 'Reading Group' that explores topics such as agroecology and seeds (ASEED, n.d.).

Three employees, the fundraising and campaign coordinators and the bookkeeper, are employed directly through ASEED while four other employees as part of the *"core team"* are paid through funding as part of the European Solidarity Core Programme. The organisation also always has a stream of volunteers and inters that come and go. Other funding sources are from private entities such as Patagonia who run their *"1% programme"*, a programme that pledges 1% of their profits to the preservation and restoration of the natural environment (Patagonia, n.a.).

The organisations mission presently is one that targets "*the structural causes of environmental destruction and social injustice" (ASEED, n.d.).* In order to tackle such issues ASEED are involved in campaigning against multi-national corporations and their *"international influence spheres and control tools" (ASEED, n.d.)* as well as promoting sustainable alternatives to conventional agriculture and agricultural inputs. Their current campaign is on fossil free agriculture while the previous campaign focused on biodiversity in agriculture through the availability and exchange of seeds (ASEED, 2015). An overarching theme through the previous two campaigns is *"climate change and the relationship with agriculture"* as well as the promotion of food sovereignty. Commenting on their decision to target these issues ASEED stated that;

"in terms of transition work towards more sustainable farming a company like Yara doesn't have a position in it."

Yara here refers to a nitrogen fertilizer company in which ASEED gathered international groups together in order to blockade Yara's facilities with the aim of highlighting their role in the destruction of the environment. The aim of the action was to"

"highlight fossil fuel used in fertilizers and the damage of these fertilizers to soils. a lot of people are aware of Monsanto and other things but not many people are aware of how violently damaging fertilizers".

In participating in campaigns like these, ASEED engages with an international network of organizations and individuals and in doing so tries to keep a balance of doing activities that are Dutch focused and those that have a wider ranging focus. ASEED have previously worked with Toekomstboeren on various events such as the Food Autonomy Festival and in exchanging knowledge as well as connecting people to local farmers food initiatives through their website and presence at events.

ASEED interact with policy on a minor level. For the campaigns they run, ASEED prepares an official policy plan of recommendations for the government as well as working with the European

Young Greens on campaigning around the CAP. In recent years their direction has changed from being more involved with policy to now more informing the public about their campaigns:

"in the last few years there has been a step away in specifically targeting policy and a step towards really informing public how fossil fuels are used in agriculture. So, from fertilizer to farm equipment to processing and packaging and transport costs, we link agriculture to the climate movement in a much more serious way".

The Dutch Arable Farming Trade Union (NAV)

The contact person for the research was Keimpe van der Heide, the NAV spokesperson for the 'Central region' including the provinces of Flevoland, Gelderland and Utrecht.

The Dutch Arable Farming Trade Union (NAV) was formed in 1993 as an interest group made of and for arable farmers in the Netherlands and now are "*representing the interests of the farmers to the local and central governments and try to get the farmers a better position in the market and the supply chain*". The Union formed as a result of arable farmers feeling dissatisfied with the advocacy of interests by the established and dominant organizations (NAV, n.a.). As a result, NAV were the first union to separate from the Agriculture and Horticulture Organization Netherlands (LTO) and after other sub-sectors in agriculture followed such as livestock and poultry. As stated by Keimpe:

"many farmers thought their interests weren't well represented by such a general organisation. So NAV was the first organisation for one sector and then followed livestock and poultry"

Prior to the separation of NAV from LTO, LTO were the organization that represented all farmers in the Netherlands from sectors such as arable farming, dairy farming, bulb cultivation, greenhouse horticulture, arboriculture and pig farming (LTO, n.a.). Currently, NAV represents 600 arable farmers (NAV, n.a.) while LTO represents 35,000 farmers from sectors previously mentioned (LTO,n.a.).

As stated on their website, NAV's goal as an organization is to ensure a good income for their farmers in the short and long term. To achieve this, they implement a 'three-track policy' in that they work towards; good EU agricultural policy; a strong position for growers in the market; and a level playing field for arable farmers across the EU (NAV, n.a.). Furthermore, Keimpe went on to say:

"NAV is for the members, the farmers, to keep them informed and updated on what is happening."

On their website, NAV share opinion pieces and informative articles on topics such as 'nature-inclusive farming', the Common Agricultural Policy and the governments 'Circular Vision' on agriculture. Through this output, NAV shares its vision for agriculture and keeps it's members in the circle of the happenings in agriculture on a political and national level. Furthermore, in the interview, Keimpe stated that NAV also has more direct contact with farmers through the central board of NAV as well as regional boards and working groups. For example, Keimpe';s role on the board is with the *"climate working group for consumption potatoes".*

"We have a central board and we have some regional boards. Farmers are phoning and emailing with the regional boards. During winter we have meetings with our farmers to talk about many things such as the issues they are facing."

Moreover, NAV engages with communication with other unions such as dairy and poultry three or four times a year as well as with LTO once a year.

"three or four times a year we have meetings with the other unions; dairy, poultry and things like that. And once a year we meet with LTO, the large organisation"

Also, NAV operate an alternative website (*Akkerbouw Van Nu*[7]*)* that is especially aimed at citizens, consumers and policy makers that shares information on the economic, social and environmental and political side of agriculture (Akkerbouw Van Nu, n.d.). This shows NAV's commitment to spreading knowledge about alternative agriculture practices as well as the current status quo.

Interestingly, within the farmers NAV represent there are mixed farms. This means that as well as arable crops some farmers incorporate livestock into their farming model. The livestock that is incorporated into these farms is more often than not smaller livestock like chicken. It is not so common with cattle as it is too hard and expensive to invest in both sectors.

"Some now mix their crops with poultry but not with dairy, that is too hard. You have to invest in the mechanisation of both sectors".

On policy, NAV hold the stance that there needs to be a change in policy and trade agreements in order for arable farmers to make a living through growing their crops. As an organisation they are engaged in lobbying the government and EU for better trade agreements for arable farmers.

[7] http://www.akkerbouw-van-nu.nl

"there needs to be a change in policy and trade agreements in order to make it easier for farmers to gain a living by growing crops. Because at the moment it is quite hard for them to do so. We try to lobby to the central government and the EU that we need new and better trade agreements."

Interestingly, NAV takes this stance in tandem with the opinion that 'nature-inclusive' agriculture holds too much of a voluntary basis for arable farmers and that the market needs to be adapted so that farmers can make an income from these agricultural practices that *"go above the normal standards" in saying that:*

"When society is asking for nature inclusive agriculture the farmer has to do it with their own income. And there needs to be an income from that nature inclusive part of the farm and at present it is hard to get that. Basically the market is not paying for a farmer to have a portion of their farm aimed at birds and biodiversity"

Furthermore, on the current Vision of the government NAV voice their concerns in that *"there are no concrete actions to achieve this circular farming".*

4.3 Overall – farmers and organisations as part of the niche

Through the research, farmers and farmers organisations illustrated varying levels of activity in the functions and consequently exhibited the use of different strategies to accomplish their goals of promoting agroecology and sustainable agriculture. Furthermore, the connection and communication between the different actors in the niche differed amongst the respondents. Especially interesting was that the levels of communication different farmers and organisations had between each other and how this correlated with how agroecological a farmer or organisation is in their practices.

Table 3 below depicts – in the form of an initial shallow preview – the primary findings regarding the farmers and organisations in relation to the functions for systematic analysis provided by (Bergek et al., 2008). The table illustrates whether a respondent is simply active within each of the seven functions. An 'X' represents that the respondent *is* active in that function whereas an 'O' represents that the respondent is *not* active in that function. The purpose of this table is to give an initial indication of the activity of the farmers and organisations are active in using the functions. A more detailed description of the table follows below.

Table 3: Shallow indication of whether a respondent was active in a 'function' or not.

	Jacob	Maarten	Meike	Michel	ASEED	NAV	TB	L2L
F1	X	X	O	O	O	O	X	X
F2	X	X	O	O	O	O	X	X
F3	X	X	X	X	X	X	X	O
F4	X	X	O	O	X	X	X	O
F5	X	X	X	X	O	O	O	X
F6	X	X	X	X	X	O	X	X
F7	X	X	O	O	X	X	X	O

The table shows that 50% of both farmer and organisation respondents were active in entrepreneurial activities (F1) and knowledge development (F2). These are the lowest performing functions meaning that the least amount of farmers and organisations were involved in activities that related to these functions. In the case of the farmers, both Jacob and Maarten exhibited an entrepreneurial mindset in order to achieve, maintain and develop the complex farming systems they manage. While Meike and Michel didn't exhibit an entrepreneurial mindset as they followed the organic framework more strictly. In the case of the organisations, it was found that both local2local and Toekomstboeren were founded through entrepreneurs filling a gap in the market. For Toekomstboeren it is to give new entrant farmers a voice that they did not have before and supporting them in myriad ways. In local2local's case, their work on IT infrastructure for short food supply chain as well as their multi-faceted support to farmers fills this gap. Therefore, they both encourage and support entrepreneurial activities of the farmers. Interestingly, the same respondents active in entrepreneurial activities are those active in knowledge development (F2). Through implementing certain agroecological practices in their specific context in time and place, Jacob and Maarten create new knowledge specific to the area as well as valuable knowledge that can be used as an example in different geographical contexts. Toekomstboeren and local2local are quite unique organisations and so develop knowledge for their members and farther afield. 62.5% of all respondents were involved in activities that corresponded to guidance of the practice and concept of agroecology (F4), market formation (F5) and creation of legitimacy about agroecology (F7). With regard to activities that aided in guiding the practice and concept of agroecology and the creation of legitimacy, 50% of all interviewed farmers where involved while 75% of all organisations interviewed were involved. With respect to activities regarding market formation, 100% of the farmers were involved in such activities whereas only 25% of all organisations interviewed were active in activities that aided the formation of markets for farmers. Knowledge exchange (F3) and activities within this function were practiced by 75% of all respondents with 75% of farmers as well as 75% of organisations being involved in such activities.

The function dealing with the mobilisation of resources (F6) was the function in which most respondents were involved in through various activities in mobilising human, knowledge, financial, physical as well as natural resources. 87.5% of all respondents, with 100% of farmers and 75% of organisations, were active in mobilising some or many forms of resources.

In general, each of the farmers operated differently and were using varying degrees of agroecological practices in order to achieve the same goal of farming sustainably and locally. Interestingly, farmers exhibiting more agroecological practices were found to be more creative and innovative in their strategies and farming models. Moreover, the farmers operating with more agroecological practices exhibited the highest level of entrepreneurial activity. Jacob and Maarten operated a more complex agricultural system in which the products were also a little bit more niche. With this in mind, as well as their location not being as much in the public eye, Jacob and Maarten had to have a more entrepreneurial mindset in terms of securing a market and in developing their product. On the other hand, the location of both Meike and Michel's farms made it easy to reach their customers. Furthermore, Meike and Michel operated with a more strict organic framework and their produce was quite conventional with a more easily penetrable market base. This resulted in Meike and Michel having less need and drive for innovation in their practices.

It was Jacob and Maarten who also exhibited more interaction with more stakeholders in the farming community. Through being more active in innovation and sharing a more urgent necessity to search for funds for their endeavours, through private sources such as philanthropy, they were more engaged with organisations and other farmers than Meike and Michel who had very little contact with other farmers or organisations. However, as was evident from Meike the communication between farmers like herself is developing and increasing with the formation of a new organisation that she feels represents and connects farmers like her and Michel.

Furthermore, considering the complexity of their systems compared to Meike and Michel, they also had to be more entrepreneurial in selling it. As a result of their locations, Meike and Michel didn't encounter the same barriers in accessing a market and their products aren't as complex which also enlarges the potential customer base. All farmers stated that this beginning stage of 'becoming a farmer' is the hardest.

All organisations contacted were working in some way to promote more sustainable forms of agriculture. The primary function of three out of the four organisations interviewed was to directly support farmers in activities such as sharing knowledge on alternative forms of agriculture, adding value to produce and marketing. As a result, three organisations have regular communication with

farmers. Toekomstboeren is a farmer-led organisation which has deep contact with many agroecological and new entrant farmers, including Jacob and Maarten, as well as with other organisations such as ASEED. ASEED is the one organisation that follows a more indirect role with farmers targeting large agricultural corporations and agricultural issues that indirectly aims to positively affect farmers with their campaigns.

The farmers that each organisation either represented or worked with varied slightly. Toekomstboeren in particular represents agroecological, new entrant farmers and holds a vision aligning with La Via Campesina, an international peasant agroecology movement. They provided farmers with success stories for inspiration as well as practical advice and help with contract and land issues to name a couple. They have recently been able to provide two employees with a part-time income for their work with the organisation. NAV on the other hand represent established arable farmers in which the majority operate in a conventional manner and sell to the world market. In saying this, as an organisation NAV still voiced a need to be more 'nature-inclusive' in agricultural policy and practice. In fact,

Local2local was the only entity operating as a business interviewed as part of the research. All other organisations were either fully or part run by volunteers whereas local2local are developing a platform to make a profit from what they do. In saying this, they provide and are further developing 'IT solutions' for short food supply chains and have relationships with progressive farmers in which both parties benefit financially and environmentally.

Table 4 below details the opportunities and limiyations identified in the functions as a result of the research. Also in the table is the identified strategies that correspond to the seven functions.

Table 4: A detailed description of the opportunities, limitations and resulting strategies experience and used by farmers.

	Opportunities	Limitations	Strategies Farmers	Organisations
F1 – Entrepreneurial activities	- Focus on entrepreneurs in governments Vision on circular agriculture as well as inclusion of agroecology and food forestry specifically. - Development of the Green Deal Food Forests. - Experimentation present in the more agroecological farmers.	- Lack of governmental support and funding - Dominant policies still geared more towards conventional farming. - Time dependency to develop and prove the worth and success of alternative forms of agriculture.	- Farmers actively seeking funding for projects from private/philanthropic sources. - Formation and strengthening of farmer organisations. - Farmer engagement with farming organisations.	- Supporting encouraging farmers through information, events and other activities and forms of communication. - IT solutions for short food supply chains.
F2 – Knowledge development	- Development of unique and novel sustainable agricultural practices. - Platforms for various strands of farmers still emerging.	- Lock-ins of a conventional nature were present - Time dependency of creating and testing new knowledge.	- Collaboration between farmers organisations.	- Collaboration with farmers. - Sharing knowledge through online sources.

F3 – Knowledge exchange	- Active community in which they exchanged knowledge. - Collaboration amongst actors in the network. - Platforms for various strands of farmers still emerging. - Regional and international knowledge exchange through organisations.	- There were some missed opportunities identified between actors. - Time intensive nature of sharing knowledge.	- Participation in farmer organisations that can reach many farmers with knowledge dissemination.	- Relatively new formation of various farmer groups and business' that connect farmers and provide services.
F4 – Guidance of the search	- Active community working with sustainable forms of agriculture - Inclusion of agroecology and food forestry specifically in governments Vision on circular agriculture. - Development of the Green Deal Food Forests.	- Some farmers still do not feel represented by the current policies. - Vested interests in research - Confusion in defining agroecology and sustainable agriculture.	- Farmers dedication and commitment to farm sustainably. - Farmers actively participating in research. - Farmers actively engaging in experiments/innovations.	- Lobbying of the government for agroecology and sustainable agriculture
F5 – Market formation	- Growing demand for sustainable food products - Organisations and business' are forming that help in creating and securing markets with and for farmers	- Limited accessibility to sustainable produce i.e. supply is not meeting demand. - Farms not always close enough to city/public's eye.	- Forming and telling a story around the product. - Using organic certification. - Connecting the consumer with the farm(er).	- Supporting farmers in developing their product through technological innovations, IT solutions.
F6 – Resource mobilisation	- Active engagement of farmers in farming organisations.	- Land hard to acquire for new entrants. - Funding hard to find	- Engagement with farmer groups and increased communication between them	- Mobilising of farmers and supporting them through new farmer groups and organisations
F7 – Creation of legitimacy	- Inclusion of agroecology and food forestry specifically in governments Vision on circular agriculture. - Development of the Green Deal Food Forests. - Research on the topic of agroecology and sustainable agriculture.	- Weak implementation of agroecological policies in other country examples. - Lack of concrete actions by government on promises relating to agroecology.	- Creation of unique and novel agricultural models that can act as a showcase to others	- Lobbying of the government to legitimately consider agroecology and other forms of alternative agriculture

Chapter 5: Science & Policy

In this section, the results from the analysis of the two policy documents, the 'Realization Plan Vision LNV: On the road with a new perspective'[8] and the Green Deal Food Forest[9] , will be shown as well as the analysis of the current discourse in sustainability science including an interview conducted with Nico, a PhD student researching sustainable agriculture, with references to literature. Similar to farmers & organisations, the data gathered from the this interview and policy documents was with reference to the functions. In this way the policy and science issues and

[8] Realisatieplan Visie LNV: Op weg met nieuw perspectief (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2018)

[9] Green Deal Voedselbossen (Green Deals 2017)

merits can be identified and discussed with guidance from the functions outlined by Bergek et al. (2008). Furthermore, the analysis of science and policy and the happenings in this sphere allows for a good comparison against what is being experienced by farmers and organisations actively in the niche. The footnotes associated with this chapter are the original Dutch print in the policy documents to show the origin of the translations used by the researcher.

5.1 Policy

Both of the documents studied were inclusive of agroecology as part of the future plan for agriculture. Albeit, the Green Deal wholly incorporates agroecology in the concept of a food forest while the governments Vision on circular agriculture only includes it as part of their overall future plans.

The Green Deal initiatives are part of an interactive approach by the Dutch government to facilitate the development of sustainable and innovative initiatives for green growth through the development of food forests. The Deal was made in collaboration with government Ministries, NGOs, research and education institutes. They are designed to stimulate collaboration between government and society and remove bottle necks that may lie in legislation or regulation (Green Deals, 2017). The document defines 'food forestry' before outlining the benefits of them for nature and society which include but is not limited to; the production of a diverse range of high-quality food products, increase in biodiversity and building up soil fertility (Green Deals, 2017). The creation of such a Green Deal is evidence of positive activity in the guidance of agroecology's development. The Green Deal Food Forest (2017) firstly addresses the gap between agriculture and nature while also highlighting the fact that,

"food forests, especially in tropical parts of the world, have a respectable history of sustainable productive agro-ecosystems"[10]

Moreover, the Green Deal policy document states that *"creativity, entrepreneurship and innovation are essential"* in achieving 'green growth' that food forests encourage and allow. Hence, the Ministry, through the Green Deal is offering companies, citizens and organisations an accessible opportunity to work together towards 'green growth'.

This is all a good indication of positive and successful activity in that of knowledge exchange as well as a good step in further legitimising agroecology in future plans of the government. To achieve the mission of developing food forests, the government has set goals in the document

[10] "voedselbossen kennen in vooral tropische delen van de wereld een respectabele geschiedenis als duurzaam productieve agro-ecosystemen." (Green Deal, 2017)

including solving bottlenecks in policy, laws and regulations, formulating a research agenda, developing a knowledge structure and building lines of communication for interaction with stakeholders in society. Importantly, one of the actions listed in the Green Deal policy document to support the development of food forests is to *"include the development of food forests in the policy for nature-inclusive agriculture"*[11].

Furthermore, within the Vision set out by the Ministry of Agriculture, Nature and Food Quality, food forests as well as generally agroecology are mentioned as part of the future plans for agriculture in the Netherlands. As stated in the document, the minister was,

> *"committed to supporting the development of food forests, such as by exploring the possibilities to include the development of food forests in policy for nature-inclusive agriculture."*[12]

This point of the document is interesting as with the present Vision of the government on circular agriculture food forests are addressed as well as 'agroecology' and 'agroforestry'. As the Vision states,

> *"In the somewhat longer term, one can think of more far-reaching forms of precision agriculture such as strip cultivation and pixel cultivation, agroforestry (combining cultivation of trees crops or livestock for a positive interaction), food forests and other nature-inclusive crops."*[13]

The Vision goes on to say that the government wants to,

> *"develop together with parties that are already fully engaged in this sort of business and revenue models, for example for agroforestry and food forests support."*[14]

These sorts of commitments bare well as an indicator for the level of activity the government are playing in the transition to a more sustainable agriculture regime.

Overall, the Vision aims to *"produce valuable food with as little as possible effects on nature, the environment and climate"*[15] by reducing emissions in agriculture, promoting the better use of

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[11] "de ontwikkeling van voedselbossen mee te nemen in het beleid voor natuurinclusieve landbouw" (Green Deals, 2017)
[12] "LNV spant zich in om de ontwikkeling van voedselbossen te ondersteunen, zoals door het verkennen van de mogelijkheden om" (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2018)
[13] "Op de wat langere termijn kan gedacht worden aan verdergaande vormen van precisielandbouw zoals strokenteelt en pixelteelt, agro-forestry (teelt van bomen combineren met landbouwgewassen of vee met het oog op een positieve wisselwerking), voedselbossen en andere natuurinclusieve teelten."
[14] "Samen met partijen die hier al volop mee bezig zijn wil ik de ontwikkeling van bedrijfs- en verdienmodellen voor bijvoorbeeld agroforestry en voedselbossen ondersteunen."
[15] "Bij kringlooplandbouw is het doel om waardevol voedsel te produceren met zo min mogelijk effecten op natuur, milieu en klimaat."

biomass and strengthening the connection between agriculture and nature. The Vision brings light to a new group of farming companies that are emerging. While arable and dairy farming as well as horticulture and fruit growing are all established and traditional groups that have been present in agriculture thus far, the so called "*Herenboeren" ('Gentle or Caring Farmer'*). In the document these new Herenboeren are accredited with,

"combining multiple production branches and focusing on production of crops and livestock with an eye for social goals such as biodiversity, farmer-citizen relationship, nature and/or landscape. Their production methods are interpreted in different ways: nature-inclusive, agroecological, agroforestry, regenerative agriculture, natural agriculture, etc. Regardless of the name Of these systems, the integrated companies often opt for circular agriculture as the guiding principle for business operations."

Furthermore, entrepreneurship in general is a major focus of the Vision. There is an acknowledgment in the document of the importance of the innovations and the experiments,

"outside the existing paths and thus offer really new directions."[16]

And that these kinds of innovations and experiments,

"inspire conventional entrepreneurs and show that things can be done differently."[17]

This comment is alluding to the new and innovative paths that can steer agriculture away from its harmful convention that most farmers and companies tend to be involved in. These comments are a realisation by the government of the importance of experimentation and innovation of the Herenboeren and is a good indication mainly that these kind of farmers have a strong commitment to stimulate entrepreneurial activities in the niche and to promote agroecology as a whole. However, from the analysis of the document it seems that most of the responsibility to engage in innovative entrepreneurialism is put on the farmers themselves and minimal concrete actions have been put in place for the government to stimulate and reward such innovation and entrepreneurialism. As it stands, common reward systems for additional and "stackable" rewarding of farmers who practice environmentally beneficial practices such as that which,

[16] "Deze bedrijven ontwikkelen innovaties en experimenten buiten de bestaande paden en bieden dus echt nieuwe richtingen."
[17] Daarmee inspireren zij gangbare ondernemers en zij laten zien dat het anders kan.

"achieve positive results for soil quality and reuse of residual flows, optimal use of animal manure, animal feed, more diversity in crops and biodiversity"[18]

is the primary concrete action to create a positive environment for agricultural entrepreneurs in a transition that is *"complex and risky"*. Furthermore, in a commitment to entrepreneurs the Vision calls for work to be done together

"with other governments, government parties and ZBOs / agencies examining how land positions can be used for starting entrepreneurs who are at the forefront of the development of circular agriculture."[19]

Thus, the Vision sets out goals in order to enable entrepreneurs achieve their full potential. Other policy commitments in the Vision included an 'action programme' in order for to facilitate joint development, and a 'discussion table' with the entrepreneurs who have already taken initiative in circular agriculture to develop a good climate for further initiatives to develop. While these points within the new Vision addresses the need and importance of both Herenboeren to drive the transition to sustainable agriculture and for the entrepreneurialism and innovation to occur for its realisation, there is still identified "*confusion underneath entrepreneurs about these opportunities*".

This ambiguity is partly addressed in the Vision with policy commitments directed at creating platforms for knowledge development and dissemination. Two of the main policy commitments outlined in the Vision were commitments to making knowledge accessible through a 'national knowledge network' and in practical network and knowledge was transferred through research programmes. Regarding knowledge, the Vision goes on to state,

"Often there is already a lot of valuable knowledge in society and more specifically in the farmyard, and the aim is to ensure that that knowledge is further developed, disseminated, shared and can be applied in a business economic way. It is essential that knowledge also flows through education, the source of the professionals of the future and also the starting point for the retraining of existing entrepreneurs and land users."[20]

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[18] "waarmee zij positieve resultaten bereiken voor bodemkwaliteit, verminderen en hergebruik van reststromen, optimale benutting van dierlijke mest, veevoer, meer diversiteit in gewassen en biodiversiteit"

[19] "Ik wil met andere overheden, rijkspartijen en ZBO's/agentschappen nagaan hoe grondposities ingezet kunnen worden voor startende ondernemers die voorop lopen met de ontwikkeling van kringlooplandbouw."

[20] "Vaak is er in de samenleving en meer specifiek op het boerenerf al veel waardevolle kennis beschikbaar en gaat het er juist om te zorgen dat die kennis verder wordt ontwikkeld, verspreid, gedeeld en bedrijfseconomisch kan worden toegepast. Het is essentieel dat kennis ook doorstroomt via het onderwijs, dé bron van de professionals van de toekomst en tevens het aangrijpingspunt voor het bijscholen van bestaande ondernemers en erfbetreders."

In order to achieve this goal of developing and spreading knowledge the Vision commits to research that was to be conducted between 2019 and 2020 on the consequences of the Vision and to redesign the 'Green Knowledge Network' so that new insights are faster and more tailored to practice and become available for policy, education and business.

Considering the Vision was developed in close collaboration with farmers and other parties, it does address many of the main issues experienced by more nature-inclusive, sustainable farmers. An interesting finding, or link, that was made, was that the initially published Green Deal had a positive impact on the Vision of the government shown by the aforementioned policy commitments to agroecological forms of agriculture as a whole.

5.2 Sustainability Science Discourse

Through the Multi-Level Perspective is one way in which to view agroecology as is the Innovation System framework, as detailed in the theoretical one of many methods in analysing a system. Furthermore, the two individual theories are being combined more often in research. The science candidate for this research is a PhD student, called Nico, researching sustainable agriculture and also using the innovation systems framework as part of his PhD research. This means that Nico, and more increasingly in general in science , is engaging in transition theory science disciplines and consequently viewing the agricultural system as a model, often using assumptions to fill gaps in knowledge (REF?) and as a result neglecting the human perspective of the system. Presented here, in the science section of the results, is the findings from an interview with Nico as well as a table that illustrates, through a scientific lens, how each farmer rated in agroecological terms.

Nico is in a finalisation period of primary data collection in which he was interviewing farmers exploring what allows or prevents them from making considerable changes to their farming practice and business model. A further stage of his research will involve an innovation systems analysis of the broader system around farmers. As a researcher, Nico and other researchers operate as an outside observer to the activity in the niche. In saying that, Nico, as a researcher, exhibited potential to directly influence the development of agroecology and the sustainable agriculture niche.

Firstly, the research project Nico is involved in has the ambition to,

"not just to collect data and analyse it but to also help farmers gain new information in making steps towards regenerative agriculture. We don't just see it as something we want to know more about but something we want to do something with. We see our role as a team or as a bunch of researchers in trying to find out what farmers do, what they want to achieve and what they need to take additional steps. This is something we can sometimes have a direct role in, in helping them".

This indicates the role research and researchers can play in the transition to sustainable agriculture. In having access to a wide and diverse network of farmers, the researchers can purposefully link farmers together who they deem might benefit from each other. This acts as a good mechanism for knowledge exchange and for guidance of the development of sustainable agriculture. Furthermore, Nico stated that the research project makes use of regular meetings with farmers and farm visits as tools to develop and exchange knowledge.

Interestingly, Nico mentioned that some farmers claim to suffer from what he dubbed as 'research fatigue' – a sense of disheartenment caused by researchers often coming and going with no real, or at least tangible, benefit for the farmers. The research is combating this by the aforementioned platforms that have been created for knowledge exchange, by sharing the on-going findings of the research, especially on the bio-physical side, and by payment for time that the farmer has to give towards the research.

"So for instance if the farmer doesn't like the way in which we gather soil samples, for example, it takes too much time and will make life difficult. Well then we explain that we can compensate them for the time it takes them to do what we ask of them. It is a luxury we have."

As stated, this form of compensation is a luxury that enables rightful payment to farmers for their time and work. The money to make the compensation possible is supplied by the sponsors of the research. In this case for example, one of the sponsors is Rabobank. However, this compensation also comes with conditions that could have an effect on the outcome of the research. Sponsorship for research like this. As stated by Nico,

"under the terms of the agreement, the private sector parties, or basically all parties funding the research have to approve my research before it is admitted for publication. However, they are only allowed to ask for reductions or ask for changes if it pertains to patentable information."

Following on from this, Nico stated that this type of involvement of the sponsors might have an effect on the published material due to their interests on the matter.

Overall, Nico is acting as an external observer to the agroecology niche and as a researcher in a prominent university potentially has influence on it in some way. Especially in relation to the guidance and legitimisation of agroecology, it is clear that research within sustainability science can potentially influence this depending on how the research is framed and what actors have influence on its direction although it is hard to measure considering the complex and abstract reality of the matter. A more interactive process with farmers at the helm of the research would go a long way in helping this case.

Table 5 below details the agroecological criteria that corresponds to that outlined by (Koohafkan et al., 2012), and that can be found in Appendix A, with regard to the farmer respondents. This table of criteria identifies sustainable agroecological trends in which farmers and their agricultural models need to meet, according to Koohafkan et al. (2012) so to advance agricultural development towards a sustainable trajectory for the future.

The case of 'research fatigue' suggests that farmers are sceptical about interaction with scientists; they don't really see how it helps them to promote agroecology. To further examine how this works, I briefly analyse how sustainability scientists translate the practices of farmers into their own conceptual framework, and how that provides visibility (or not) to the iniatives of farmers. Table Y below presents an analysis by using a set of pre-conceived criteria – a typical practice among sustainability scientists – and it shows how practices are made visible.

Table 5: Farmers assessed against agroecological criteria as given by Koohafkan et al, (2012).

Criteria		Farmers			
		Jacob	Maarten	Meike	Michel
1	Use of local and improved crop varieties and livestock breeds so as to enhance genetic diversity and enhance adaptation to changing biotic and environmental conditions.	Yes	Yes	No	No
2	Avoiding unnecessary use of harmful agrochemicals and other technologies (that adversely impact on the environment and human health).	Yes	Yes	Yes	Yes
3	Efficient use of resources, reduced use of non-renewable energy and reduced farmer dependence on external inputs.	Yes	Yes	Yes	Yes
4	Use of agroecological principles and processes such as nutrient cycling, biological nitrogen fixation, allelopathy, biological control via promotion of diversified farming systems and harnessing functional diversity.	Yes	Yes	Yes	Yes
5	Making productive use of human capital in the form of traditional and scientific knowledge and skills to innovate and the use of social capital through recognition of cultural identity, participatory methods and farmers	No	Yes	No	No

	networks to enhance solidarity and exchange of innovations and technologies to resolve problems.				
6	Reduce the ecological footprint of production, distribution and consumption practices, thereby minimizing GHG emissions and soil and water pollution.	Yes	Yes	Yes	Yes
7	Promoting practices that enhance clean water availability, carbon sequestration, conservation of biodiversity, soil and water conservation, etc.	Yes	Yes	No	No
8	Enhanced adaptive capacity based on the premise that the key to coping with rapid and unforeseeable change is to strengthen the ability to adequately respond to change to sustain a balance between long-term adaptability and short-term efficiency	No	Yes	No	No
9	Strengthen adaptive capacity and resilience of the farming system by maintaining agroecosystem diversity, which not only allows various responses to change, but also ensures key functions on the farm	Yes	Yes	No	No
10	Recognition and dynamic conservation of agricultural heritage systems that allows social cohesion and a sense of pride and promote a sense of belonging and reduce migration.	No	Yes	No	No
	Overall	7/10	10/10	4/10	4/10

As can be seen in table 5, Maarten and his food forest model met the 10 agroecological criteria as listed by Koohafkan et al., (2012). This makes sense as food forestry is a relatively established form of agroecological farming, especially in the Netrherlkands. Jacob and his 'circular' and 'regenerative' model of farming met 7 of the 10 criteria meaning that through his agricultural model he employs agroecological practices through the rearing and production of his cattle and crops respectively. Both Meike and Michel with their organic farming model met the lowest amount (4) of the list of criteria as they followed organic agriculture framework and philosophy more strictly.

However this criteria is wholly based on the ecological aspect of agroecology and the human and overall social perspective is failed to be taken into consideration adequately. Moreover, it could be argued that Meike & Michel would have scored higher in such an assessment that included a more human perspective because their farming model connected with the consumer and general public more so than Jacob or Maartens' farming model. This is partly due to location but is nonetheless interesting as through the scientific lens such as that of Koohafkan et al's (2012) criteria, Meike and Michel are considered not so agroecological while a lot can still be learned from them in terms have implementing an agroecological system. Furthermore, throughout the research and as is evident from the results, not all farmers operating in an 'agroecological' way identify wholly or at all as agroecological farmers. The farmers identified themselves all as

something different yet. Jacob and Maarten operated extremely different farms but scored the same when matched against the criteria. This goes to show that confusion that can be caused with these sort of sustainability science criteria, theories or concepts.

The resulting influence science and research can potentially have on directing the development of agroecological practices and therefore sustainable agriculture. Following is the findings of the policy analysis before all results will be brought together in the Discussion chapter of this report.

Chapter 6: Discussion

Within this section a synthesis of all the results will be discussed. This is done in order to critically analyse the findings of the research with reference to the research questions set out at the beginning of the process. Following in this section are sub-chapters that will discuss the limitations and theoretical implications of the research as well as suggestions for further research.

The main objective of this research was to identify and analyse the strategies being used by progressive farmers and farming organisations to practice and promote agroecology in their mission to achieve a more sustainable agricultural system. A secondary aim of the research was to analyse relevant policies that are inclusive of agroecology in the Netherlands along with the current discourse in sustainability and transition sciences in relation to agroecology and 'sustainable' agriculture. The benefit of having these two aims was that a critical reflection on whether the missions, goals and actions of farmers and grass-root initiatives aligned with that of current policies and debates in sustainability and transition sciences regarding an agricultural transition.

The geographical focus of the research was intended to be on the Utrecht region. While this remained true for the farmers contacted as part of the research it was less so for the organisations who held more national and international connections in the greater agri-food system. Nevertheless, all organisations proved to be operative in the Utrecht region to some degree through collaboration with farmers or through work that indirectly effected farmers, namely that of the international campaigns against industrial fertiliser companies run by ASEED.

It was observed during the research that various strategies were being used by farmers and organisations to practice and promote agroecological practices and philosophies in their goal of achieving a more sustainable way of farming. A diverse and active community of like-minded,

progressive farmers and organisations, all with the goal of achieving a more sustainable agricultural system, is forming and strengthening, and the communication between this network is seemingly increasing. The results of the research also exhibited different opportunities and limitations experienced by farmers and agricultural organisations. In some cases, the opportunities and limitations experienced by the respondents were the same or similar while in other cases one respondent was uniquely experiencing a limitation or opportunity. Consequentially, farmers and organisations have had to utilise innovative and creative strategies to promote and practice agroecological methods and philosophies in order to farm sustainably.

On the matter of natural capital, all farmer respondents mentioned acquiring land, as well as its general availability, as an obstacle in farming sustainably for new entrant farmers as well as established farmers hoping to expand their farming operation. Moreover, what was highlighted by farmers and Toekomstboeren as an even bigger obstacle for farmers farming sustainably was the tenant laws, allowing farmers to only rent land for a maximum of six years in most cases. This amount of time was deemed inadequate for farmers to operate sustainably by farmers and organisations especially considering the infertile soils inherited by Jacob and farmers alike as a result of a long history of mono-crop, intensive farming. The problem is seemingly made worse by the occurrence of land speculation – the theoretical valuing of land over time done by landowners so to gain the most value from it – mentioned by Maarten that means contracts last even shorter than six years before a farmer must move on, creating instability and uncertainty in their work and livelihood. However, strategies are being used by farmers and organisations in order to circumvent these issues. The example of the innovation and entrepreneurialism a member farmer of Toekomstboeren showed in successfully creating a contract that creates support and incentives to farmer to farm sustainably is a good example of positive and progressive strategies that farmers and organisations are using. Furthermore, it is an indication of the benefits of the connection and communication between farmers and organisations for the development and dissemination of knowledge that supports and promotes agroecology.

It is this connection between farmers and their chosen, or relevant, community of like-minded farmers and organisations that all farmers noted as being the most important supporting factor in being able to achieve what they have in their farming. This aspect was cited to provide inspiration and encouragement to new entrant and established farmers as well as a source of knowledge and access to land in some cases. Furthermore, connections that farmers make specifically with organisations has the potential to act as the farmers voice to policy makers which farmers find comfort in. Moreover, this is an aspect of agroecology and sustainable agriculture that is seemingly

neglected by policy makers. Therefore, a focus on developing the larger network, that goes past the individual farmer and entrepreneur to farmer-led organisations, needs to be implemented in any plan by the government going forward.

Financially, Jacob and Maarten, the two most 'agroecological' farmers, have both sought private funding for their sustainable agriculture business' to rent land or for funding a sustainable project. Maarten has even started, with the aid of a financial advisor, research into the possibility of a philanthropic fund for the funding of farmers wanting to farm similarly to Maarten, in an agroecological and sustainable manner. On the other hand, Meike and Michel, the two more 'organic' farmers, have been established on their land for many years which was secured through a foundation that rents land from the government in the Amelisweerd region of Utrecht. The comparison between these two strategies of funding their farms, especially for the acquisition of land, indicates that currently not enough is being done by the government through their policies and initiatives to secure productive and well positioned land for farmers. This links with what Maarten mentioned about how the government should buy land on the outskirts of cities, like what they have done in Amelisweerd, in order for farmers to gain easy access to fairly priced land for a more appropriate time frame for sustainable farming.

Another obstacle faced by farmers is the lack of accessibility experienced to the current subsidies and reward systems for sustainable farming. The reasons cited by the farmer respondents being that they were too small farm wise, and thereby ineligible, as well as there being a lack of concrete action to date on the related promises to farmers in the governments Vision on circular agriculture. This has led to further creativity and innovation amongst the farmers and farmer organisations to circumvent these limitations. For instance, a group of small organic farmers are mobilising together in order to apply for existing subsidies as one large farm or entity. The results of this strategy are yet to be seen but it is promising for farmers that such initiatives are occurring. The circular agriculture policy does include further measures to reward farmers for practices that are environmentally friendly however many farmer and organisation respondents only had criticisms for the new Vision. Mainly in the fact that there was and still is a lack of action on behalf of the government.

Positively however, the emergence of the Food Forest Green Deal is carving a positive path for agroecological practices. Established before the publication of the circular Vision, food forestry, as well as agroecology more generally, are mentioned many times in the Vision policy document. This is a positive development for agroecology in the Netherlands however more concrete action

and support from the government needs to come in order to meet the farmers half-way. What is more is that farmers and organisations, mainly local2local in this case, have expressed their concerns in the disconnect between the city and the areas in which food is mainly produced as well as a lack of communication between farmers and policy makers and the government. In the governments circular farming framework, there is a lot of responsibility put on farmers and entrepreneurs to innovate and to create a sustainable agriculture landscape rather than focus put on tools and strategies that will support and encourage them to do so. As can be seen from the results from the research, some farmers are innovating irrespective of the government's plans and policies. However, as stated by Jacob and alluded to by local2local, farmers are not ready, or do not have the capabilities, to sell their own produce. Enabling farmers to do this would strengthen them financially. It is important that the Ministry of Agriculture, Nature and Food Quality continues in the realisation of their plans set out in the Vision document so that weak implementation of agroecological related promises does not occur as in the case in the French and the United Kingdom previously mentioned. Furthermore, more of an emphasis should be put on how to enable productive entrepreneurialism rather than simply encouraging farmers to do so. Moreover, considering agriculture is very knowledge and time intensive, more support from the government in this way would enable farmers like Jacob and Maarten – who are using arguably the most ecologically sustainable and novel farming practices – to give more time to the exchange of knowledge gained from their valuable experiences and knowledge so that other, less experienced farmers.

Lastly, the interview conducted with a PhD student researching sustainable agriculture, as well as the use of various theories and criteria connected with sustainability or transition sciences throughout the research, enabled the inclusion of a critical reflection of sciences role in the development of agroecology. According to the MLP theory used as a means of conceptualisation and reflection, the 'agroecology' is an 'emerging' niche meaning new farming groups and initiatives are forming that share a goal more orientated towards agroecology and supporting agroecological farmers. Furthermore, the TIS framework aided in the research through providing a 'systems thinking' technique to identify the opportunities and limitations experienced by farmers and organisations as well as the strategies being used by them. However, through the use of these theories and frameworks there was an experienced lack of an acknowledgement of the human and social perspective of agroecology in the eyes of sustainability or transition sciences. Furthermore, it was identified that some farmers were experiencing 'research fatigue' which raises the question of whether the relationship between science and a 'transition' to a more agricultural

framework in society needs to be re-evaluated. In saying that, especially considering what was mentioned before regarding the network of farmers and organisations a farmer holds being the most important factor for a farmer to farm sustainably, the farmers operating progressively within the system need to be the focal point of an agricultural transition.

6.2 Limitations

As with any research limitations were encountered. The primary limitation exits through the emergence of the COVID-19 virus in approximately March of 2020 and the proceeding national restrictions delayed the start of the research and restricted movement to farms and organisations and businesses. This effected the number of respondents that were able to be contacted, mainly in terms of visiting farmers on their farms as well organisation and business respondents in their offices, reducing the capacity of face-to-face interviews. If COVID-19 had not affected the research in this manner, more respondents would have been reached and thus could have made the research more robust and valid.

As the research developed the broad nature of the analysis proved to be difficult to navigate given the short time frame. This in turn proved to be a limitation in achieving more focused and precise research on a more defined topic. However, the research still does provide a unique and novel insight into the workings of farmers and organisations in the agroecology niche as well as how they stand against the science and policy back drop.

Some limitations were encountered due the language barrier present as a result of the researcher not being a native Dutch speaker. This was encountered during one interview with a farmer as well as one interview with an organisation representative whose level of English restricted a more in-depth interview that was achieved with the other respondents. Nonetheless, valid and important data was still gathered from these respondents.

6.3 Potential Further Research

This research could be considered a broad and shallow analysis that shed light on the strategies being used by farmers and farming organisations of the agroecological movement in the Utrecht region. Henceforth, future research could take a similar approach but with an aim to delve deeper into the opportunities, limitations and resulting strategies in a different region of the Netherlands or the entirety of the Netherlands.

Further research should be done more alongside farmers rather than with farmers as the subject allowing for a more casual approach in which tacit knowledge and other more personable knowledge could be considered valuable for the analysis and the development of the sustainable

agriculture arena. This would enable more natural and appropriate access to farmers knowledge and expertise as well as hearing what they truly need from agricultural policies. This would encourage a more human, or social, perspective to be implemented alongside the lens of sustainability sciences.

For the benefit of international development, further research could also be done in order to assess how the positive elements of the development of agroecology here in the Utrecht, and potentially the Netherlands, be adapted into international development discourse where agriculture is concerned. The benefits to this could be two-fold: one being that the Netherlands could be a forerunner in sustainably orientated agricultural international development

Chapter 7: Conclusion

There is an increasing acknowledgment of the detrimental effects of industrialised and intensive mono-cropping farming methods that make up the majority of the agricultural system in the Netherlands and across the globe. Furthermore, the Netherlands is understood to be a global leader in agriculture in terms of agricultural produce exported, technological innovations as well as agricultural knowledge and services. Henceforth, it is argued that the Netherlands develops a robust and environmentally friendly agricultural framework that could be used to improve the situation in the Netherlands as well as further afield in international development projects in agriculture. Agroecology involves agricultural practices that brings together the production of food with an ecologically friendly management of soil and crops as well as land cultivation in which ecosystems services are maintained, restored, or at a healthy and productive level and can be seen as a healthy alternative to the current dominant agri-food paradigm.

This research aimed to analyse the strategies being used by progressive farmers and farming organisations in Utrecht to practice and promote agroecological practices in their respective work, farming or within a farming organisation or business. After illustrating the results and presenting the discussion, some conclusions can be made about the research. Firstly, through the eyes of the MLP framework the agroecological 'niche' can be defined as 'emerging' due to the relatively new formation of farming groups, organisations and business that aim to support progressive farmers in farming sustainably through agroecology. New entrant farmers are also emerging and happen to be managing unique, innovative agroecological systems and practices within their farms. communication between farmers is an activity and strategy that is used for farmers to gain inspiration or for knowledge exchange between each other. However, time is an issue that has

been flagged by farmers in the sense that it takes too much time to provide time, often for no financial gain, to others when the farmer already must give so much time and energy into their own endeavours. A finding from the research then was that farmers are experiencing 'research fatigue' in which they are simply getting tired and fed-up of the no concrete results appearing to help them. Connections and communication between farmers and organisations is increasing with the ongoing establishment of new organisations representing farmers or business' attempting to help development and innovation. This is a positive sign as farmers are mobilising themselves with each other and organisations to have a louder voice and to be taken more seriously.

The strategies being used by farmers and organisations are very much led by the farmers themselves and other grass-root initiatives through entrepreneurialism, creativity and innovation as well as their sheer commitment and determination. Left to seek philanthropic sources of funding for progressive and regenerative farming practices that encompass agroecological practices and philosophy, farmers are trying to make it possible to farm in sustainable manner so biodiversity, soil fertility and more social cohesion with our food. Policies so far have not fully adopted a truly sustainable framework as far as agriculture is concerned and the future plans don't seem to provide true hope for the farmers and organisations contacted. One positive note to take from existing policy is the existence of the Green Deal Food Forest, which came to life through a grass-rooted food forester, and the effect it has seemed to have on the circular agriculture vision of the government.

As far as scientific institutions are concerned in the there needs to be a deeper connection to the human perspective of the agricultural system. The manner in which system thinking and natural sciences can frame the issue at hand can often neglect the true centre of the issue, the farmer. The farmers needs and knowledge need to be considered more appropriately in research and in policies going forward. Once the Netherlands has a strong and progressive hold and understanding of sustainable agriculture, as a nation they will be more readily available to contribute to a healthy transition to sustainable agriculture in the Netherlands and further afield.

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Appendix

Appendix A

Criteria for agroecological practices as given by (Koohafkan et al., 2012)

1. Use of local and improved crop varieties and livestock breeds so as to enhance genetic diversity and enhance adaptation to changing biotic and environmental conditions
2. Avoid the unnecessary use of agrochemical and other technologies that adversely impact on the environment and on human health (e.g. heavy machineries, transgenic crops, etc.)
3. Efficient use of resources (nutrients, water, energy, etc.), reduced use of non-renewable energy and reduced farmer dependence on external inputs
4. Harness agroecological principals and processes such as nutrient cycling, biological nitrogen fixation, allelopathy, biological control via promotion of diversified farming systems and harnessing functional biodiversity
5. Making productive use of human capital in the form of traditional and modern scientific knowledge and skills to innovate and the use of social capital through recognition of cultural identity, participatory methods and farmer networks to enhance solidarity and exchange of innovations and technologies to resolve problems
6. Reduce the ecological footprint of production, distribution and consumption practices, thereby minimizing GHG emissions and soil and water pollution
7. Promoting practices that enhance clean water availability, carbon sequestration, conservation of biodiversity, soil and water conservation, etc.
8. Enhanced adaptive capacity based on the premise that the key to coping with rapid and unforeseeable change is to strengthen the ability to adequately respond to change to sustain a balance between long-term adaptability and short-term efficiency
9. Strengthen adaptive capacity and resilience of the farming system by maintaining agroecosystem diversity, which not only allows various responses to change, but also ensures key functions on the farm
10. Recognition and dynamic conservation of agricultural heritage systems that allows social cohesion and a sense of pride and promote a sense of belonging and reduce migration

Appendix B

Template farmer interview guide

Introduction

This research is being conducted in order to assess what strategies are being used to promote sustainable agriculture by actors working in sustainable agriculture, on a practical and organisational level. The aim of the research is to see whether these strategies are limiting or supporting the growth of sustainable agriculture against conventional agriculture. I am conducting this research as part of my MSc thesis in Sustainable Development in Utrecht University. I am particularly interested in the communication between three actors of the sustainable agriculture arena; farmers, actors working in sustainable agriculture organisations and actors working on policy, also, how the interaction and communication between these actors might influence the success of certain strategies. The questions I will ask you throughout this interview are questions I have designed for the farmers. The questions posed to the other actors will change accordingly. Data taken from these interviews will only be used as part of my research and you will be kept anonymous throughout. You have already consented to the interview with the consent form. Do you have any questions before we begin?

Background information

Age:

Size of farm [ha]:

Type of farm (i.e. arable, livestock, mixed): mixed

Education?
where? Agriculture or other?

How many work with you on the farm?
probe: full time, Part time, Interns, Students, Labourers, volunteers

Opening questions

1. Since when have you been working in agriculture? Can you tell me a little about how you started farming?
   probe: what year, family farm, through friends, to work in nature, change of career

2. How would you describe the way you farm?
   probe: agroecological, conventional, organically, nature inclusive, list of agroecological methods

3. Do you use a mix of agricultural methods? Could you give a brief description of the methods you use?
   probe: conventional, traditional vs agroecological, organic, nature inclusive, with nature

4. (Since when have you been practicing agroecological practices?)

5. Why did you start to adopt agroecological practices?
   probe: farmer-farmer knowledge exchange, market/economic, social, environmental reasons, agricultural conference/event

6. How do you access agroecological inputs for your farm? And are there any difficulties?
   probe: seeds, fertilizer, infrastructure,

Middle Questions

7. Who do you have contact with about agroecological agriculture/more sustainable farming methods?
   probe: entrepreneurs, organisations/network, policy, consumer/customers

8. If yes, where does this contact take place? (How do you communicate with your network)
   probe: experimentation sites, conferences, symposiums, online, locally internationally, market side
   If not, why not?

9. How are important is your network for the way you farm?
   probe: seeds, other agroecological farm inputs, knowledge, novel practices, consumer base

10. What is shared in these incidences of contact?
    probe: anecdotal stories, novel methods, empirical findings, policy workings

11. How is access to markets for agroecological produce like for you?
    probe: easy, hard, large, small, economically supportive, supermarkets, value chains, value added, local, CSA

12. Do you have access for customers/the general public on to the farm/land?
    probe: to sell produce, establish local market, social aspect, share knowledge

If yes, what is their attitude towards the way you farm? Could you give me some examples?
probe: does it vary, interested, want to get involved, they end up purchasing your produce, they enjoy the nature area you provide

13. Is there added value on any of your produce on- or off-site?
probe: juice from apples/pears, alcohol from potatoes, baked goods,

14. How do you finance your agriculture?
probe: CSA, committed customer base, crowd funding, personal

15. (Do you have access/make use of any government subsidy for agriculture?)

16. How does current policy influence the way you farm?

17. What is your attitude towards the governments involvement in agriculture? And does it affect you in the way you farm?
probe: policies, subsides, ….

18. What is your attitude towards farmers/agroecology organisations?

(If no, what more could they do judging from your experience?)

19. Could you comment on the ease of access/resistance farmers have in accessing/partaking in types of farming (alternative) like yours?

(Is there resistance within your circles/networks to farming like you/agroecologcally?

Closing Questions

20. What has been the most helpful to you in helping you farm agroecologically?
probe: yourself, locality, customers, organisations, government

21. Do you have any ideas/thoughts of what could be done in the future (by government, policy, organisation) to help farmers like you succeed in practicing agroecology?
probe: by yourself, by the public, by organisations, by government

22. Do you have anything else to add?

Appendix C
Template organisation interview guide

Introduction

This research is being conducted in order to assess what strategies are being used to promote agroecology by actors working in agroecology, on a practical and organisational level. The aim of the research is to see whether these strategies are limiting or supporting the growth of agroecology

against conventional agriculture. I am conducting this research as part of my MSc thesis in Sustainable Development at Utrecht University. I am particularly interested in the communication between three actors of the agroecology arena: farmers, actors working in agroecology organisations and actors working on policy, also, how the interaction and communication between these actors might influence the success of certain strategies. The questions I will ask you throughout this interview are questions I have designed for the farmers. The questions posed to the other actors will change accordingly. Data taken from these interviews will only be used as part of my research and you will be kept anonymous throughout. You have already consented to the interview with the consent form. Do you have any questions before we begin?

Background information

Age (of organisation):

Type of organisation (consultancy, farmer-led etc.):

Opening questions

1. Why was the organisations set up?
   probe: goals, mission, vision

2. Are there criteria for farmers/producers to be involved with you? Please elaborate on this criteria and why it is in place.
   probe: sustainable, agroecological, organic

3. Has there been an increase in the amount of members/represented farmers with you?
   probe: yearly, from start to present

   If no/yes, what do you think the reason for this is?
   probe: more farmers coming to you, promotion, seeking producers

4. Is there a diverse range of types of farmers involved with Toekomstboeren? Could you elaborate on the different types present?

   Middle Questions

5. What type of activities/operations are you involved in? Especially in relation to farmers, agricultural projects and policy.
   probe: supply chains, research, direct with farmers, market research, added value, knowledge sharing

6. Do you work or collaborate with any other organisation with the same/similar goals and ambitions?

   If yes, what do you do with them?

7. Do you receive government funding/subsidy schemes? Elaborate,
   probe:

8. How else do you finance yourself?

9. Does your organisation work on policy/aim to influence policy?
   probe:

   If yes, how so?
   If no, why not?

10. Do you work closely with/collaborate/help any other organisation?
    probe: NAV.nl?.....??

11. It is mentioned on your website that the main problem for future farmers is acquiring land.
    Could you elaborate on this?
    What are some common ways in which future farmers acquire land?
    What does Toekomstboeren do in this regard?

Closing questions

12. Do you have any ideas/thoughts of what could be done in the future (by government, policy, organisation) to help farmers succeed in practicing agroecology?
    probe: by yourself, by the public, by organisations, by government

13. Do you have anything else to add?