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Sustainable Development - Earth Systems Governance

# Understanding the role of banks in overcoming financial barriers to agroecological transitions from a systems thinking perspective.

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# Abstract

Intensive agricultural practices have contributed to global sustainability challenges such as climate change, biodiversity loss, water scarcity, soil degradation, food insecurity and groundwater pollution (Skaalsveen et al., 2019; El Bilali & Allahyari, 2018; Xu et al., 2018; Leip et al., 2015; Postel, 2000). Agroecology, a pathway to "green" agriculture through the application of ecological principles, has been proposed to increase the sustainability of food-systems and agriculture (Gliessman, 2018). The problem central to this research is that financial barriers hinder systemic transition of agriculture towards agroecology (Anibaldi et al., 2021). The financial barriers established in the literature are insufficient economic (dis)incentives, lacking transition funds, and limited access to finance (Vermunt et al., 2022). This research seeks to understand what practical solutions or innovations can be implemented by banks to overcome these barriers, and gain insights as to the systematic transformation potential of banks towards agroecological transitions. To do this, two banks were selected, Rabobank and Triodos, and key stakeholder groups therein were identified. Data was collected through semi-structured interviews and analysed to establish existing and proposed solutions to the financial barriers. The Motivation, Capability, Implementation and Results (MCIR) framework was subsequently employed to analyse the adoption of solutions and innovations within the banks (Chai & Yeo, 2012). Comparative analysis of the banks resulted in inter-organisational and field-wide learning opportunities. The analysis identified 19 solutions and innovations across both banks, 10 within Rabobank, and 9 within Triodos. There were substantial differences in the solutions of the banks, attributed to differences in organisational form, values and principles, and bank size. Through implementation of the MCIR framework, shortfalls in overcoming the systemic barriers within the banks were established.

# 1.0 Introduction

The need for change within agricultural systems, particularly within European countries, is well documented, with agricultural systems having a strong relation to sustainability challenges such as climate change, biodiversity loss, water scarcity, soil degradation, food insecurity and groundwater pollution (Skaalsveen et al., 2019; El Bilali & Allahyari, 2018; Xu et al., 2018; Leip et al., 2015; Postel, 2000). European farming landscapes have changed considerably throughout the past six decades, with a strong emphasis within farming on intensification and scale enlargement, driven by large-scale availability of synthetic fertilisers, mechanisation, and farming subsidies (van Zanten et al., 2013). Increased globalisation within agricultural commodity markets and the introduction of subsidies by European nations, aimed at self-sufficiency of agricultural production, has led farmers to increase production efficiency in order to remain competitive (van Zanten et al., 2013). Unsustainable practices in agriculture, e.g., simplified crop rotations, high use of artificial fertilisers, pesticides and herbicides, and reductions in non-crop habitats, have become increasingly present within agriculture in order to sustain ever higher yields (Stoate et al., 2001). The associated sustainability challenges of agricultural systems can cause widespread disruption to local ecosystems forming feedback loops negatively affecting farmers' ability to sustain their businesses; at a time when *the good farmer* image is being challenged by changing societal attitudes as a result of the associated environmental problems (McGuire et al., 2013). The outbreak of COVID-19 and subsequent pandemic has similarly renewed calls for change within agriculture owing to the widespread disruption caused within the global food system (Altieri & Nicholls, 2020).

## 1.1 The need for an agroecological transition

Agroecology is a proposed pathway to "green" agriculture through the application of ecological principles for more sustainable and resilient food systems (Gliessman, 2018). It represents radical system-wide change to address global challenges associated with industrial agriculture, and increase the resilience of the agricultural system to external shocks through reconciliation of the agricultural industry with nature-inclusive practices (Runhaar, 2021).

The definition of agroecology has changed over time, encompassing the application of ecological concepts and principles to the design and management of sustainable agroecosystems, or the science of sustainable agriculture (Altieri, 1995; Gliessman, 1990,

1998, 2013). Agroecology first emerged in the 1980s, and was described by Gliessman (2018), a leading scholar in the field of agroecology, as being seen as:

> "a form of resistance and an alternative to the changes sweeping through the food system as a result of the green revolution, simplification through monocultures, industrialization of all aspects of food production, processing, and distribution, and the increasing corporate control and dominance of the food system"

Gliessman writes that the early focus of agroecology was on the individual farm level, however that during the 1990s, this expanded to encompass the ecology of the entire food system (Francis et al., 2003). In this modern format, agroecology seeks to "confront and develop alternatives" (Gliessman, 2018) within industrial food systems to avoid path dependencies caused by a push for productivity increases at the expense of environmental sustainability and the recovery of biodiversity. Institutions which have developed are attuned to industrialised farming, such as farming policy, which further limits the freedom of farmers to pursue alternative farming methods. Thus, agroecology is a key element of an emancipatory movement to increase farmer autonomy and control over their own production, and is best understood "not as a set of recipes, but... as principles applied in accordance with the unique reality of each farmer" (Mier y Terán Giménez Cacho et al., 2018). As such, agroecological practices are not prescribed, but generally fit on a spectrum whereby the end goal is independence from purchased inputs that may have environmentally harmful effects and lock farmers into reliance on globally fragile systems and industrial practices.

From the literature, there are themes or practices which are broadly present in agroecological food systems that distinguish them from traditional or industrial systems. Firstly, that agroecological systems ought to draw upon farmer and peasant knowledge (Mier y Terán Giménez Cacho et al., 2018). Recognising farmer and peasant knowledge is considered crucial to change the dominant discourse on agriculture through social movement dynamics (Teixeira et al., 2018). Practices should allow farmers to exchange and acquire knowledge of agroecological farming and its methods that are inclusive of spatially specific local knowledge. A second theme present in agroecological systems is the inclusion of both cultivated and non-cultivated biodiversity (Mier y Terán Giménez Cacho et al., 2018). This includes integrating crops, trees, and livestock across plot, farm and landscape levels, and rewilding farmland areas to allow, for example, wildflower meadows. Agroecological systems also aim to wholesale disentangle farmers from reliance and dependence on external and/or purchased inputs. The use of internal or local inputs within farming contributes to the autonomy of farmers and food-producing communities, alongside

increasing the resilience of food systems to global disruption. A final theme is the inclusion of input substitution strategies. This entails replacing artificial, synthetic or manufactured products with natural alternatives, such as replacing synthetic fertilisers with commercial compost. Input substitution strategies are often substituted themselves, however, with the redesigning of systems to avoid the need for chemical inputs entirely (Francis & Porter, 2011). Nonetheless, input substitution is included within the scope of agroecology (Mier y Terán Giménez Cacho et al., 2018).

## 1.2 The (financial) barriers to agroecological transitions

There are barriers which hinder the transition of agriculture towards agroecology and broader sustainability (Anibaldi et al., 2021). They are identified differently within differing academic papers, with often interchangeably used terms including: barriers, systemic problems, and blocking mechanisms (Anibaldi et al., 2021; Vermunt et al., 2022; Aare et al., 2020; Ranjan et al., 2019). Within this field, Gliessman (2018) identifies a social-change aspect of agroecology. This aspect is partly related to the changing or modifying of the economic system which sustains lock-ins that have led to industrial farming. The dominant global economic system is capitalist, and this determines the relationship between farmers and broader society (Feola, 2020). Intrinsic features of the capitalist economic system, such as: supply-and-demand; market economics, private ownership of the means of production; and economies of scale, each influence and steer farmers towards what are considered economically viable pathways (vis-à-vis industrialised farming). Barriers exist, therefore, to agroecological transitions related to the economic system, and features therein.

One such feature is the financial system, wherein literature explores barriers related to the financial system. The first of the barriers is insufficient economic (dis)incentives (Vermunt et al., 2022). Farmers with a business model that includes agroecological or sustainable farming rely upon selling a product for a price premium on the consumer market in order to cover the cost of lower farming intensity and decreased production efficiencies, however; there is only limited demand for products with such premiums. Additionally, externalities are not adequately integrated into pricing. As a result, agricultural practices with externalities which negatively impact the environment are not priced, and ecosystem services additionally provided above and beyond typical food production (such as increased biodiversity or clean air and water), are not adequately compensated.

In Vermunt et al. (2022) the focus of the research is ‘nature-inclusive agriculture’; which is theoretically similar to agroecology. Here it is stated that by adopting nature-inclusive

practices may imply a decrease in farming intensity, an increase in production costs, or both. This is an issue for many farmers, as it impacts bottom-lines, which are not currently compensated by premiums (i.e., sufficiently high price premiums or high enough demand for products with such premiums). Nature-inclusive practices also provide ecosystem services and other beneficial externalities which are inadequately compensated by traditional market mechanisms. As such, payments for such services can come from other sources such as state funding or private finance. Bank strategies to enable agroecological transitions could help factor in externalities within financial products or lending criteria to redress the unbalanced playing field within the current market. Internationally, green funds focussed on providing funding for sustainable and agroecological practices have been established to help compensate for positive externalities and encourage a transition to sustainable agriculture. For example, AGRI3 (a collaboration initiated by UN Environment, Rabobank, the Dutch Ministry for Foreign Affairs, and other partners) "aims to mobilise USD 1 billion of financing... to enable a transition to more sustainable practices in agricultural value chains and avert deforestation" (AGRI3, 2020).

A second financial barrier indicated in Vermunt et al. (2022) is insufficient transition funds. This barrier is indicative of limits to entrepreneurialism that have occurred due to path dependencies and is best illustrated by Dutch dairy farmers having €12,700 of debt per cow on average. This high level of debt, combined with low price margins in the consumer market limits the choice of farmers when it comes to implementing agroecological or sustainable practices. The avenues for capital expenditure required to implement sustainable farming practices are limited; for dairy farmers, switching to grass-based feedstock may require additional hay storage, for example. Similarly, Aare et al. (2020) state that the high level of indebtedness amongst Danish farmers hampers new development pathways, with diversification strategies that may increase the resilience and economic sustainability of farms similarly requiring capital expenditure that is often unavailable due to pressures for industrial farming. Diversification (or other sustainable farming practices) may not be economically feasible within the current regime due to increased costs from "increased workload, equipment, capacity, advisory service, logistics, investment, administration, knowledge" (Aare et al., 2020). Furthermore, a transition to agroecological practices may imply a more extensive farming sector; one that produces less crop from a larger amount of land. Overcapacity of storage for product or fertiliser or barns for livestock, on which loans are yet to be paid off, means farmers must decrease revenues whilst these loans are paid off. Banks could help farmers make such transitions by supporting farmers to overcome these costs.

A final barrier is limited access to funding. Availability of finance "contributes to increased income, productivity improvements, and efficiency improvements" (Wulandari et al., 2017). It is not only the case, however, that different financial institutions have different policies when it comes to distributing finance, but also that there is a requirement for farmers to have knowledge of the different requirements considered important from differing financial providers. The financial outcomes of farmers also rely upon interplay effects of other domains, such as "experimentation skills, improved practices of ecosystem management and group interactions" (van den Berg et al., 2020). It is thus important that financial lending strategies are aware of the risks of farmer experimentation and innovation in the field of sustainability. Strict lending criteria by banks based on risk assessments or skewed towards profitability may further limit farmer access to credit. This in turn limits access to transition funds.

These are the three main identified types of financial barriers considered within this research paper. It is not to say that other financial barriers do not exist, but that specific emphasis is given to these three within the academic literature currently available.

## 1.3 The role of banks

The role that banks can play in enabling agroecological, and more generally sustainability, transitions is well documented. They are "pivotal in achieving the Sustainable Development Goals (SDGs)", including Goal 12 (ensuring sustainable production and consumption), Goal 14 (life below water), and Goal 15 (life on land) which are pertinent to the agricultural domain (Zimmermann, 2019). Such transitions towards sustainability require fundamental shifts in the way macroeconomic banking, money, and finance operate (Seyfang & Gilbert-Squires, 2019). Values-based banking (VBB) and similar models that incorporate social, ethical and environmental objectives alongside profitability have emerged to enable societal transitions to sustainability; although, as of 2019, it is said that sustainable innovations have not diffused widely among major banking groups (Seyfang & Gilbert-Squires, 2019). The importance of all banks in supporting a global sustainability transition, including within the European agricultural sector, is however nonetheless clear (Migliorelli, 2019).

A bank is a financial organisation that offers the provision of deposit and loan products (Hefferman, 2004). They are organised in such a way to deliver profit, and these profits are made either through interest income or non-interest income. Interest income is derived through lending, for example, the interest applied to a loan provides a bank with a set income

amount providing expected loan repayment. Non-interest income typically derives from traditional services charges placed on products and services issued by the bank (Lepetit et al., 2008). Banks matter, as lending in part implies an expectation on behalf of the bank that the purpose of the loan is commercially sustainable; banks lend with the expectation of the loan being fully repaid, thus a bank choosing to lend to any given actor is a sign that the bank is confident that such an actor will be able and capable of paying back that loan. When it comes to commercial sustainability, factors such as environmental and social sustainability are often overlooked, that is to say, they do not determine whether loans will be repaid or not (Ziolo et al., 2019). However, recent movements within the banking sector place greater emphasis on sustainable governance within banks (Avrampou et al., 2019). It is critical that private financial organisations shift towards sustainable models of lending as public finance is inadequate alone to raise the capital necessary to finance sustainability transitions (Havemann et al., 2020).

Greater emphasis on sustainable governance within banks has led to increasing attention on strategies for sustainability within banks (Zimmermann, 2019). Strategies can be defined at various institutional and organisational levels, and the Mintzberg (1987, p. 11) definition is useful for the study of how banks can overcome the three financial barriers. This defines a strategy as a consciously intended course of action, a set of guidelines to deal with a situation. It is additionally the case that motivations play a large role in a bank adopting a strategy, with three principal motives for sustainability being identified: social, environmental, and business rationales (Zimmermann, 2019). Varying combinations of motives underlie which strategy is likely adopted, yet also illustrate why certain sustainability practices are disregarded.

Understanding what motivations exist within banks that encourage the adoption of agroecological transition strategies, what practices and capabilities underpin these strategies, and how they can realistically be implemented and evaluated forms an important set of questions considering the recognised importance of banking and finance in enabling sustainability transitions.

## 1.4 Focus on Dutch banking sector

This paper will explicitly focus on the Dutch banking sector. When considering the specific limitations towards research on this topic, there are inevitable trade-offs between intensity and geographical focus (National Research Council, 2002). The justification for geographical scope has two primary reasons.

Firstly, this work intends to extend the corpus of existing research. Existing research on the Dutch financial sector and its relationship with agriculture is limited in three ways, namely: the temporal period of historical research; the brevity of research (specifically, a large-N study of non-state actors pursuing biodiversity contributions); and the mode of governance that is the focal point of research (specifically, public-private, centralised, or decentralised modes of governance) (Eiselin et al., 2020; Hendrikx, 2018; Hyung & Baral, 2019). Similarly, literature on agroecology, agroecological transitions and other variations of sustainable agriculture (nature-inclusive agriculture, etc.) in the Netherlands is fairly extensive. This includes writing on barriers which exist to agroecological transitions and the political economy of agroecology, but does not explicitly study the relationship between banks and farmers as a self-governing mode of governance (Verburg et al., 2022; Runhaar, 2021; van der Ploeg, 2020). This means that a focus on the Dutch banking sector specifically can build on existing literature, tying together academic threads to culminate in a useful and novel area of study.

Secondly, accessibility and time limitations, coinciding with the desired depth of research, limit the geographical scope. This research has been undertaken in the Netherlands, and over a timeframe that restricted international travel. As a result, the available geographical area was limited and had to be defined by an additional criterion, namely: the anticipated impact of the work taking place. The Dutch political, economic, and agricultural landscape is ripe for further investigation. Civil society organisations have successfully taken the Dutch government to court over its failures to meet environmental targets, whilst farmers have protested against state regulation and for better incomes (Poppe, 2020). There is a clear need within the Netherlands for practices and strategies for reconciliation and compromise to overcome what has been called a "systemic failure and a lack of transformative capacity" (Poppe, 2020; p.7).

## 1.5 Problem statement and knowledge gap

Issues related to the unsustainable practices present in farming have been exacerbated by an ever-deepening understanding of climate change, and the effects it will have on people, the environment, and economies. Agroecological transitions in farming present a solution to this issue, but clear barriers exist hindering such transitions. The financial barriers previously outlined require banks to act in order for them to be overcome. Banks have on the whole failed to set sufficient climate change commitments, and increasing pressure on them to address this issue brings each sector of the economy for which banks provide services into

question (Ainger, 2022). As a result, a body of research linking farming practices and bank behaviour has developed.

The scientific literature points, however, to an overall lack of research into the role of finance in aiding sustainability transitions (Turnheim et al., 2020). However, it is nonetheless clear from the literature that the role of finance is important (Turnheim et al., 2020; Rode et al., 2019; Carolina Rezende de Carvalho Ferrei et al., 2016). It is additionally clear from the literature that (financial) barriers to agroecology exist and should be overcome in order to further agroecological transitions. What requires further research is what banks do explicitly to overcome the financial barriers: the literature points to barriers or blocking mechanisms to agroecology of a financial nature, but not to what is concretely being done by banks to overcome them.

## 1.6 Research aim and questions

This research aims to improve the understanding of existing approaches taken by Dutch banks to overcome the financial barriers by taking a systems thinking perspective. It is first important to understand how banks operate and what stakeholders are responsible for agroecology-aligned strategies within the Dutch banks. Understanding this aim may provide a benchmark for data collection and analysis into what these stakeholders can do to overcome the aforementioned financial barriers of *insufficient economic (dis)incentives, lacking transition funds,* and *limited access to funding.* As will be further explained within the theoretical framework chapter, this research uses a systems thinking perspective, which requires a shift in thinking from event orientation (linear causality) to shining a spotlight on internal system structures (circular causality); accepting the notion that the underlying system structure is a probable root cause of the problem (Chai & Yeo, 2012). To study the role of banks in overcoming the financial barriers, the Motivation, Capability, Implementation, and Results (MCIR) framework was utilised, as having previously been used to overcome institutional barriers within an interdisciplinary field (Chai & Yeo, 2012). The framework was used to highlight the interconnected nature of the barriers, and differs from historical approaches where barriers were assessed individually (Chai & Yeo, 2012). Assessing the barriers and responses to them by key stakeholders within banks simultaneously allowed this research to identify weak links and provide discussion and inter-organisational recommendations on methods to improve bank strategies. A full explanation as to what this framework is detailed within the Methodology section. The main research question that can realise this research's aim is thus:

*How can banks overcome the theoretical financial barriers to agroecological transitions in practice, and what insights can be gained through analysis of these solutions through a systems thinking perspective?*

To arrive at an answer to this question, the research must further be broken into several sub-questions, each of which provide a logical narrative to arrive at an eventual, overall, answer:

*RQ1: Which stakeholders are responsible for agroecology-aligned strategies in Dutch banks?*

*RQ2: What can these stakeholders tell us about how banks overcome the three financial barriers to agroecological transitions?*

*RQ3: What can the MCIR framework tell us about the strategies banks have to overcome the three financial barriers?*

*RQ4: What can the banks learn from each other considering the MCIR framework insights?*

## 1.7 Scientific and social relevance

As discussed, agroecological transitions and wider sustainability transitions in agriculture within the Netherlands are vitally important; the current practices undertaken by farmers are unsustainable and have significant negative externalities on the wider ecosystem and the environment. Dutch authorities have already been taken to court over their failings to meet vital climate change commitments (Poppe, 2020). The Sustainable Finance Lab has indicated that the Dutch financial sector is a major player in global biodiversity loss, and has a predominant focus on climate change, rather than ecological principles (van Tilburg et al., 2022). Therefore, understanding how the barriers to agroecological transitions are overcome is of social relevance. Identifying what solutions exist, areas where solutions are lacking, and what knowledge has been generated that can be useful for other banks, can help speed up these sustainability transitions. It also helps facilitate introspective assessment of solutions which already exist and their efficacy.

This research is also the first to use the MCIR framework to assess systemic barriers in the financial sector. The authors of the MCIR framework call for it to be used in different industries, bearing in mind that it may need to be refined for industry specific dynamics (Chai & Yeo, 2012). The aim of this research, however, is not to contribute to the development

of the MCIR framework, yet insights and lessons learned from implementation are further discussed.

## 1.8 Paper outline and research framework

Thus far this paper has introduced the relevant background knowledge and research aims. Following this is a chapter on the theoretical framework, which explains the relevant theory, introduces the MCIR framework as a systems approach, and explains its suitability to this field of research. The third chapter introduces the methodology that was used, data collection methods, and how the MCIR framework is operationalised. The fourth chapter shows results, and is followed with the fifth chapter comparing and discussing those results, and linking the results of this paper to the broader theoretical background and relevant discussions within the field. The sixth chapter discusses the limitations of this research and future research opportunities. Finally, the seventh chapter is the conclusion, displaying the findings and providing an answer to the overall research question.

The steps necessary to undertake this research have been presented in the research framework in figure 1:

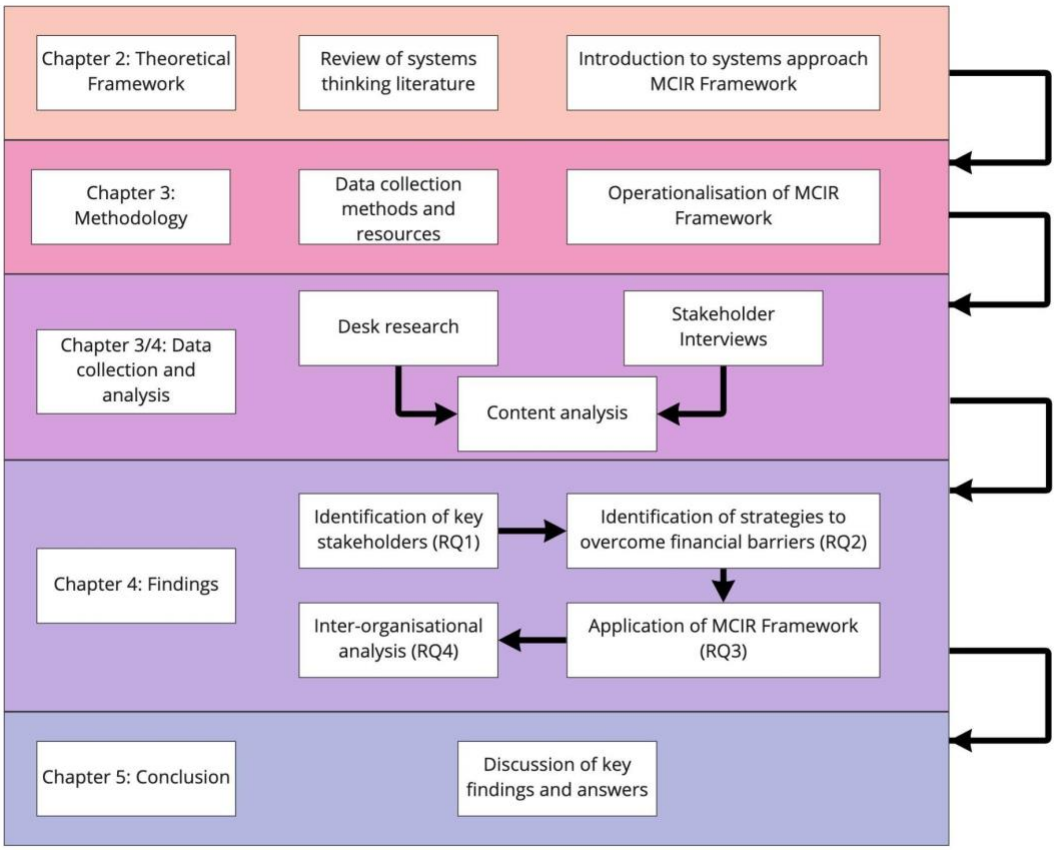


Figure 1: Research Framework

# 2.0 Theoretical Framework

This chapter on the theoretical framework defines and explains relevant theoretical concepts and how they relate to each other in the context of this research. Firstly, innovation science for sustainability transitions will be outlined in 2.1 with relation to agroecological transitions. Secondly, section 2.2 explains what, considering the relevant theoretical literature, a systems thinking approach is. The third section justifies why an innovation systems approach is relevant for this paper, and finally, the systems approach (MCIR) framework is introduced as a theoretical concept that can be used to assess how structural barriers to agroecological transitions can be overcome.

## 2.1 Innovation science for sustainability transitions

Innovation plays a key role in fostering sustainability transitions, having a positive impact on sustainability performance among private actors (Kuzma et al., 2020). The extraction and use of resources continue to grow, therefore, organisations require sustainable innovation systems "that allow for increasingly rational consumption" (Kuzma et al., 2020). Sustainability transitions require the development and integration of social and technological innovations; new technologies, behavioural changes from stakeholders, and the development of new institutions (Geels et al., 2008). As has been elaborated, the agricultural system is in need of sustainability transitions, of which a transition in line with the aims of agroecology is one such pathway to sustainability. Many governmental and organisational actors have shown interest in agroecological transitions, however there is "intense debate" over which kinds of innovation are needed for such transitions (El Bilali, 2019). The size of this debate is an indicator of the complicated relationship between innovation and the agro-food industry.

The definition of innovation is varied, being defined in different ways and meaning different things (El Bilali, 2019). When researching the definition of innovation, the OECD and Eurostat definition appears frequently. The OECD and Eurostat *Oslo Manual* defines innovation as "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)" (OECD, 2018). This general definition, however, does not couple innovation with sustainability. Whilst organisations are highly interested in business sustainability - extending continuity indefinitely; the ability of firms to respond to their short-term financial needs without compromising their (or others') ability to meet their future needs (Kuzma et al., 2020; Bansal

& Des Jardine, 2014) - many do not consider the social or environmental factors of sustainability. Kuzma et al. (2020) write, however, that notions of business sustainability ought to be entangled with social and environmental sustainability; that if done, innovations will have a positive impact on "the development of our more sustainable production cycles, products, and services, and even on new business management models". Sustainable innovation couples the traditional notion of innovation (as new ways of doing things) with the inclusion of an array of new ideas; connecting global and grassroots efforts, integrating systems thinking, building sustainability minded institutions across an organisational form and corporate culture (Leach et al., 2012; STEPS Centre, 2010).

Knowledge is strongly linked with innovation and is considered to be fundamental in sustainable transitions, specifically within the transition to sustainable food systems (Kuzma et al., 2020; Grin et al., 2010; Loconto, 2016) . This knowledge is often inconclusive, inconsistent, or unavailable (Caron et al., 2014). Schot and Steinmueller (2018) state that the existing knowledge bases within the fields of innovation studies for sustainability transitions are "unfit" for the task, especially considering governance and policy approaches; although such sweeping statements have been criticised (Fagerberg, 2018).

Innovation can also play a role kick-starting transitions in socio-technical systems (referred to commonly as systems innovations (Kusma et al., 2020)), with transitions defined as "a fundamental change in structure (e.g. organizations, institutions), culture (e.g. norms, behavior) and practices (e.g. routines, skills)" (Loorbach & Rotmans, 2010). Considering modern necessity for sustainability, the notions of transitions were adapted with this in mind, thus forming *sustainability transitions*. Sustainability transitions within agricultural and food systems stress the inter-/trans-disciplinarity of the sector (Kusma et al., 2020; Pigford et al., 2018; Ollivier et al., 2018). The knowledge-inputs required for such a transition are multi-directional, crossing divides between science, policy, and agricultural practice. Transitions literature therefore stresses that governing sustainable transitions relies on a multitude of actors and cannot be achieved with solely top-down governance (Köhler et al., 2019). Within the existing literature, the predominant focus is policy approaches/policy making; both within general sustainability transitions and the literature on sustainable transitions in the agricultural system, with papers primarily focusing on government sustainability policy, state and regional policy, local policy, and city-wide policy. Such focuses often overlook the role that private organisations can play in governing sustainability transitions; either as organisations created by business or civil-society, or public-private partnerships (Abbott, 2012). Transitions require "decisive interventions" from both state and non-state actors (Markard et al., 2012), and calls for greater state and

international organisational support of private sustainability governance have been made (Abbott, 2012). Greater recognition of private sustainability governance, according to Abbott (2012), would "help international institutions pursue their sustainability missions more effectively, promote the emergence of effective and legitimate private schemes, manage fragmentation, promote experimentation and learning, and enhance citizen participation".

## 2.2 Understanding a systems thinking approach

A systems thinking approach views a complex system in a holistic manner, emphasising the interaction and relationships between system components and constituents (Senge, 2006). Chai & Yeo (2012) write that the power of a systems thinking approach lies in its ability as a problem solver to identify underlying systemic structures and patterns of behaviour that may or may not be similar in different cases. There are two types of systems approaches: hard and soft. These different approaches are applicable in differing circumstances and can be originally traced to Peter Checkland's Soft System Methodology (Hernández-Orozco et al., 2021; Checkland, 2000). Hard systems thinking approaches are characterised by easily definable objectives, definable decision taking procedures, and analysing performance through quantitative measures (Checkland, 1999). The application of hard systems thinking approaches gained steady criticism for being inadequate at analysing complex systems with high degrees of human interaction (Hernández-Orozco et al., 2021). Human systems are subjective, and within the social world conflicting worldviews characterise social interactions. Hard system approaches based on quantitative analysis of clearly defined parameters were clearly unable to analyse systems distinguished by subjective human interactions. As a result, soft systems thinking approaches were developed in order to address the issue of human subjectiveness; "in soft systems methodology the social world is taken to be very complex, problematical, mysterious, characterized by clashes of worldview" (Checkland, 2000).

Soft systems thinking approaches therefore are used when there is uncertainty about what the problem may be, and/or an appropriate solution (Stephens & Hess, 1999). What constitutes a problem, or an acceptable solution, is shaped by the perspective of the individuals, in accordance to their worldview, experience, and purpose. As a result, differing systems arise relevant to concerned stakeholders. The effect of a solution to a problem may be viewed differently by differing stakeholders; thus, the inclusion of maximal possible stakeholders is important to avoid the exclusion of alternative perspectives (Ison et al., 1997).

A system is commonly understood as a "complex whole of related parts", and what makes something a system is dependent on how individual persons think about the system (Cabrera et al., 2008). Understanding and thinking about systems is a method of communicating the dynamic complexities and interdependencies embedded within a system (Anderson & Johnson, 1997). The agricultural-finance (agri-finance) nexus is a novel way of thinking about farming and farmland inclusion and incorporation into financial markets (Ouma, 2016). Recently, authors have been said to have used the concept of financialisation, that is, the "growing and systemic power of finance and financial engineering" (Blackburn, 2006, p.40), to understand why the financial sector has had an increasing focus on agriculture and agricultural domains. This agri-finance nexus represents a sub-system of the broader agricultural system, with the agricultural system being a complex collection of other systems (Cusins, 1994). There has been growing awareness within financial institutions of the links between finance and biodiversity loss, with a focus in the wider finance-sustainability sphere on the creation of new financial products or investment opportunities to counter environmentally harmful practices (Kedward & Ryan-Collins, 2022).

## 2.3 Suitability of a soft systems approach

The suitability of a soft systems approach for the topic of overcoming financial barriers to agroecological transitions is clear due to the interlinkages between interdisciplinary, multilevel, and multi stakeholder interactions, lack of easily definable solutions, and human subjectiveness. Specifically, three justifications for using a soft systems approach can be demonstrated. Firstly, the interaction between the disciplines of agroecology/agrifood and finance. Secondly, the complex, subjective, human stakeholder interactions which contribute to the solving of problems (overcoming of barriers) within the agri-financial sector. Lastly, the need for barrier-barrier interaction consideration within the system.

Firstly, the topic appears to clash two non-complementary fields; radical system-wide change to agricultural systems and profit-seeking financial organisations commonly considered foundational to institutionalising ecologically and environmentally harmful practices across many socio-economic sectors (Makortoff, 2021). Initial systems thinking research into agricultural settings took place solely to analyse the farm as the key unit (Darnhofer et al., 2012). It was later recognised that to better understand farming, agriculture and food production systems, the scale of analysis had to be widened. The research objectives morphed from understanding crop production and animal husbandry methods towards "farmer pluriactivity, civic food networks, and how cultural landscapes are

shaped by farming activities" (Darnhofer et al., 2012). This change is indicative of a shift from the easily definable objectives, decision-making procedures, and easily quantifiable objectives of hard systems thinking approaches, towards integrating subjectivity, human perceptions, and the qualitative research of a soft systems thinking approach.

## 2.4 Understanding stakeholders

Stakeholders are defined as "social actors who are influenced by the outcome of a decision, or who have a strong interest in the outcome of policy" (Beierly & Cayford, 2001; Shi et al., 2019). Stakeholders can be individuals or groups (Achterkamp & Vos, 2007). Deciding who a stakeholder is means to draw a line as to who is deemed to be involved in a system, and who is not (Vos, 2003; Achterkamp & Vos, 2007). According to Achterkamp & Vos (2007) this process of deciding who is and who is not a stakeholder can be considered a 'boundary critique'. The work highlights the importance of not identifying stakeholders of organisations as a whole, but on stakeholders of projects within any given organisation. The theory of boundary critique emphasises the importance of diversity and variety in stakeholder views when defining and analysing problems (Midgley et al., 1998). A commonly cited definition of what a stakeholder is is from Freeman (2010):

> A stakeholder in an organization is (by definition) any group or individual who can affect or is affected by the achievement of the organization's objectives

However such a definition is broad, and in reality could apply to a great number of groups or individuals. As a result, boundaries are applied: "what parties are to be included in, or excluded from, a system of stakeholders?" (Achterkamp & Vos, 2007). If boundaries are not included in understanding what constitutes a stakeholder "the system designers quest for comprehensiveness is endless" (Ulrich, 2001). This search for boundaries in stakeholder identification has led to categorisations of stakeholders; of interest to this research is Ulrich's (1987) three sources of influence: sources of motivation, sources of control, and sources of expertise. Sources of motivation are concerned with whose values and principles are being served, sources of control with who has the power to decide, and sources of expertise with who contributes the necessary expertise (Achterkamp & Vos, 2007).

The stakeholders of interest within this study are actors who fit the above definition, and fall into either of the three sources of influence, within a bank. Furthermore, it is important to connect this understanding of stakeholders within the paradigm of the Dutch banking system; the chief focus of this study. In particular, the recognition that Dutch governance is predominantly stakeholder-oriented (de Graaf & Stoelhorst, 2009). Stakeholders in a bank

within de Graaf and Stoelhorst's article on the role of governance in Dutch Finance are studied as "formal positions of different stakeholder groups in the governance structures of the firms". When discussing the role of stakeholders, de Graaf and Stoelhorst emphasise the relation between stakeholders and the governance structure of any given bank. For example, within de Graaf and Stoelhorst's work, four banks are studied ABN AMRO, ING Group, Rabobank Group, and Triodos Bank. These banks have differing corporate governance structures, namely: publicly quoted, cooperative, and privately held. The impact and relation of these governance structures on the impact that stakeholders had on corporate social responsibility and the policies of each of the banks.

A final point to make is that unstructured problems, such as the problem of systemic financial barriers to agroecological transitions, are characterised by uncertainty, multiple actors, and multiple perspectives. As such, different stakeholders will have different perspectives and viewpoints on the boundaries and solutions to problems (Pluchinotta et al., 2022). Different stakeholders will frame a problem differently, and these differences can lead to polarisation and conflict, which in turn can reduce the effectiveness of a strategy (Giordano et al., 2017). This is in part affected by stakeholder knowledge of the system that they manage; understanding and assessing the knowledge that stakeholders have, and sharing such knowledge, can foster instances of learning and improvements in decision-making (Pluchinotta et al., 2022).

## 2.5 Systems approach (MCIR) framework

The systems approach (MCIR) framework was developed by Chai and Yeo (2012) in response to a lack of existing theories on systemic barriers; in their case, towards energy efficiency barriers. Rather than using a theory-testing approach that tests hypotheses using quantitative methods, Chai and Yeo used inductive and qualitative methods to develop a generic conceptual framework for the adoption and implementation of practices to overcome systemic barriers within a field. The systems thinking approach is said to have helped develop and refine the MCIR framework, with the framework being capable of both reflecting the process of adoption of innovations to overcome systemic barriers, and enabling discussions as to shortfalls within a given sector or organisation. The authors, whilst explicit in their work on energy efficiency and transitions within the energy sector, state that future research is needed in alternative industries, and that owing to the inductive and qualitative research approach, the framework ought to be tested and adjusted when used in different industries. As a result, the framework has been adapted considering the

background information and systems thinking theoretical knowledge to the financial sector with agroecological transitions in mind.

The generic conceptual framework is a staged process with a feedback cycle, following four distinct stages. Firstly, *motivation*, which is concerned with the organisations' interest in pursuing agroecology (and thus overcoming the financial barriers to agroecological transitions), and their awareness of the environmental benefits of agroecology as an alternative to industrial farming. *Capability*, the second stage, is concerned with the ability of the organisation to pursue and implement innovations which can overcome the three financial barriers to agroecology competently. This stage logically follows from motivations, as awareness of the benefits of agroecology and overcoming the three financial barriers ought to cause organisations to consider what capabilities they can access. The third stage is *implementation*, which is where organisations take a further step to implement services or projects in line with agroecology, and understanding whether the capabilities identified in the earlier stage can or have resulted in meaningful services or projects. The final stage is *results*, whereby the outcome of implementing projects in line with agroecology are assessed by organisations (top management) to be considered worthwhile. Whether organisations have been able to quantify the results/effects of their projects, and how they assess such results, is a fundamental part of analysing the *results*. The final feedback mechanism concerns whether any positive or beneficial results (from the perspective of the organisation) have led to further motivations to further pursue such projects. Positive and convincing results are considered likely to have a positive feedback effect on decision-makers and responsible stakeholders to further consider and plan for services. The framework, as shown in figure 2, illustrates questions related to each of these four stages and the processes by which innovations for overcoming financial barriers to agroecology can have a positive feedback loop within the banks to help generate systemic transformations.

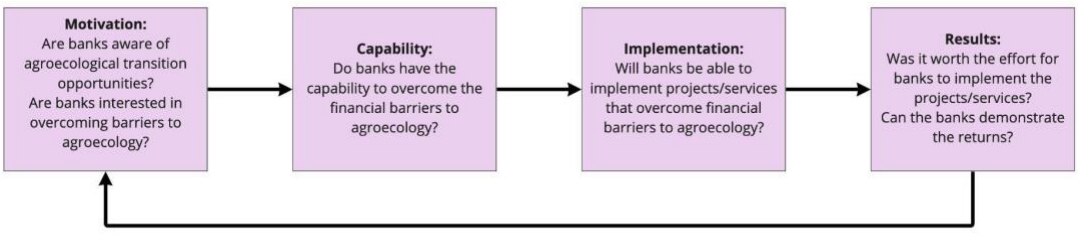


Figure 2: Motivation-capability-implementation-results (MCIR) framework adjusted from Chai and Yeo (2012) for the purpose of analysing overcoming systemic financial barriers to agroecological transitions.

# 3.0 Methodology

This chapter begins by explaining the research design, followed by an explanation of how data was collected for this research, and a justification as to why such approaches were chosen. How this data was analysed and how the key elements of the theoretical framework were operationalised forms the following section. The fourth part explains how and why cases were chosen and their suitability for this research. The methodology chapter is concluded with ethical considerations.

## 3.1 Research design

The primary aim of this paper is to further the understanding of how the three financial barriers to agroecological transitions can be overcome within the Dutch banking sector, by performing detailed analysis of individual bank strategies for overcoming the financial barriers, and by understanding the differences in approaches that have been taken in order to foster inter-organisational learning. A soft systems thinking approach was therefore used due to its suitability for assessing such a domain (as discussed in 2.3); specifically, the MCIR framework to assess the agri-finance nexus that has developed between farmers and banks. The agri-finance sub-system (see 2.2) therefore forms the focus of this research. In order to study the agri-finance nexus, a multiple case study design will be utilised (Yin, 2009). The case study method was chosen due to its ability to give insight into complex social phenomena: it enables a "rich and detailed" study of an issue or problem "where the boundaries between phenomenon and context are not clearly evident" (Stewart, 2012; Yin, 2009, p.18). The units of analysis for the multiple case study were banks within the Dutch financial sector (see 1.3 and 1.4) and an explanation as to which banks were chosen and why can be found in 3.4. The number of cases in this study is two. Highlighting variance between cases was important for the generalisability of the results; although the number of cases analysed was limited by time constraints of this research project. Optimally, the N number would have included more banks.

The first research question corresponds to the identification of key stakeholders (see 2.4) within the two financial institutions selected in 3.4. The approach utilised qualitative research methods to review literature to uncover which stakeholders were relevant and representative of the decision-making arena within the agri-finance nexus. Additionally, key information was obtained during stakeholder interviews which contributed towards better understanding of key stakeholders.

The aim of the second research question is to understand what projects and services are possible and available to overcome the three financial barriers, as elaborated by both stakeholder interviews and analysis of internal policy documents and other grey literature made available by the banks. Having identified key stakeholders responsible for decision-making in RQ1, the necessary information for requesting interviews and necessary literature for undertaking the analysis became available.

Furthermore, as deliberated in section 2.5, the MCIR framework forms a relevant approach for analysing responses to financial barriers to agroecological transitions from banks. As a result, the MCIR framework was implemented in this research to answer RQ3. The MCIR framework implementation was guided by questions derived from literature review which reflect the interests and objectives of the banks, and take into account key considerations from systems thinking literature oriented towards systemic transitions. This framework was used as an assessment method of the banks, in order to understand the motives, capabilities, implementation, and results.

RQ4 is concerned with comparative analysis of the two cases. It aims to highlight similarities and variance between both the banks' strategies, and differences in MCIRs. Cross-comparative analysis of the two cases offered opportunities of inter-organisational learning and critique of individual courses of action, and enabled more generalisable analysis of the governance approaches of the banks. The results of this analysis constitute what could be considered a guidebook for other banks looking to contribute to agroecological transitions and overcome the financial barriers.

Section 3.2 explains the methods used for data collection, and further elaborates how these data were used to answer the specific research questions. Section 3.3 explains how the research questions and the stages of the MCIR framework were operationalised and analysed. After this, section 3.4 outlines the process that was undertaken to select cases specific to this research, and justifies their selection, before section 3.5 discussing the research ethics of this work.

The following figure 3 outlines the methodological framework used in this research, the position of the research questions in relation to the approaches, and the sources of data used for answering each RQ. Due to the case study design and the aim of individual research questions, RQ1 through 3 was answered for the first case, then the second case, and the final

research question was answered simultaneously.

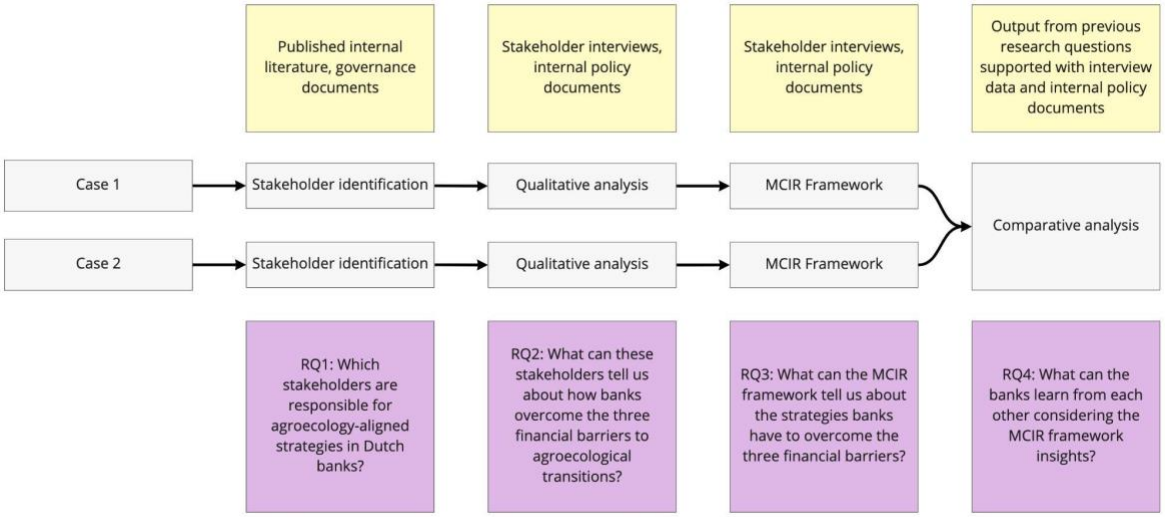


Figure 3: Methodological framework

## 3.2 Data collection

The data for analysis in this paper were collected through two main methods: (3.2.1) desk research and (3.2.2) stakeholder interviews. The importance of the interviews cannot be understated and the data that was collected feed into all the questions in this research. Desk research initially provided data for RQ1; whereby key stakeholders were identified for interviews. But further to this, many interview participants provided internal policy documents and draft documents on bank-farmer relations and policy that had not yet been published. These documents were pivotal to the analysis of RQ2 through 4. These documents were useful both in helping to verify the claims of interviewees and further analyse the various policies employed by the banks to help overcome the barriers. They were also fundamental in contributing towards understanding how the motivations, capabilities, implementation, and results contributed towards systemic transformations within the agri-finance nexus.

As has been established in 2.2, the perspectives of what a system is, how it should be interacted with, and what acceptable solutions to problems differ between individuals that constitute the system. For this reason, claims were varied, opinions were different, and the priorities and perspectives were different and often interrelated or conflicted. For this reason, multiple sources of data collection allowed for judgement as to which claims were accurate, and analysis as to why the difference occurred. The following two subsections further explain the two methods of data collection.

### 3.2.1 Desk research

Desk research contributed towards answering the four research questions as established in figure 3, although the data type found and analysed for RQ1 differed from RQ2 through 4. Through this desk research, two predominant sources were used for finding literature.

Firstly, desk research was performed in order to establish which stakeholders were relevant for interviews and analysis within this research. This was done through finding sources that contained relevant information, predominantly statute papers for the banks, key reports released detailing governance structures, internal bank composition, etc. These papers contributed towards an understanding of who key stakeholders were, who should be reached for interviews, and enabled graphical representations of what culminated into complex internal governance structures of banks and relevant key stakeholders. This literature was predominantly sourced through bank websites and publications, although some documents were supplied by stakeholders in later interviews, and retrospectively employed in this research. These data sources also helped establish the relationship between different stakeholders within the bank, what responsibilities were for decision-making, governance, and innovation, and how these stakeholders involved farmers/farmer knowledge within their decision-making processes.

The other form of literature gathered, useful for answering RQ2 through 3, was a combination of grey literature and academic sources on topics related to services and solutions for overcoming the financial barriers. These documents helped to establish what products and services existed, their relation to agroecology, how banks relate to furthering other sustainable practices within farming and agriculture, and the process of agricultural systems transformation. This literature helped to substantiate the empirical data collected through interviews. This information was collected through academic search engines such as Google Scholar and Scopus, utilising snowballing techniques to find seminal work, and how such work had been used in future research. Grey literature was found through bank websites, as well as reports from third party organisations such as the Sustainable Finance Lab, the STEPs centre, and the Biodiversity Working Group of the DNB.

Although playing a minor role, newspaper articles and other media accounts helped contribute towards answering the research questions. These newspaper articles were found using the Google News search engine, wherefor articles were searched using relevant key terms and publication dates were set to descending in order to ensure that the data used was relevant.

### 3.2.2 Stakeholder interviews

The process of conducting stakeholder interviews contributed to the data collection process for this research, especially RQ2-3, although it also revealed greater knowledge about the relevant stakeholders for RQ1. Eight interviews were undertaken, consisting of four representatives identified as relevant stakeholders from each bank. The interviews took the form of in-depth, semi-structured interviews. The stakeholders were selected both to gain a wider understanding of bank operations within this research domain, and to enable assessment of the complex interlinkages between different stakeholders within the agri-finance nexus. The different interviewees held different roles and positions within the banks, and some interviews were with subsidiary organisations to the main bank. The stakeholders included participants within lending teams, environmental research teams, climate transition managers, product managers, and agricultural teams. Each of the stakeholders were considered to be relevant as of part 2.4, and as such part of the innovation system and agri-finance nexus. Each interviewee was broadly from a different team and department within the banks, however the discussion points that guided the broad interviews remained broadly the same. As a result, in some instances it was possible for claims to be cross-referenced by the interviews of others. This increased confidence in the claims made. Similarly, for some interview transcripts (for those interviewees who were willing to cooperate more openly) a process of interviewee transcript review was employed using the Hagens et al. (2009) method. This included sending editable Google Docs of the interview transcripts back to interviewees in order for them to make edits where they deemed necessary. The interview transcripts were automatically generated using the transcription software Descript, and manually corrected for errors.

The interviews were guided by a broad interview guide, of which semi-structured interviews were designed in accordance with the work of Young et al. (2018). Each interview was divided into two halves. The first of which was related to the systemic financial barriers, where the barrier was introduced and explained. The second half of the research was related to the MCIR framework guided by the questions in Figure 2, where interviewees were asked about their motivations, capabilities, implementation, and results. This interview guide and questions can be found in Annex 1. The subject of these interviews is at times sensitive, and as a result the interviewees are to be kept anonymous (see 3.5), as a result a naming scheme will be used when citing. Participants A through D are interviewees from Rabobank, participants 1 through 4 are interviewees from Triodos.

## 3.3 Operationalisation and analysis

This section discusses the way that the data collected was analysed and elaborates how each of the research questions were operationalised and answered. The first three research questions will be answered individually for each bank in accordance to figure 3, with the fourth question being a comparative analysis of differences in approaches answered about both cases simultaneously.

The first research question is oriented towards uncovering relevant stakeholders theoretically underpinned by the foundational knowledge established in 2.4. In order to do this, a stakeholder identification method, developed by Achterkamp & Vos (2007) was adapted and used, taking the components relevant for the selection of stakeholders for this research. Using this analytical method, governance documents and other relevant reports released by the banks were analysed. The selection of stakeholders was guided by three questions: (1) *who's values and principles were being served?* (2) *who has the power to decide?* (3) *who has the sources of expertise?* Considering the interlinkages between bank governance structure and relevant stakeholders (established in de Graaf & Stoelhorst, 2009) it was additionally necessary to explain, to a limited degree, the governance structure of the target banks within this research. Undergoing this process will provide an answer to RQ1:

*RQ1: Which stakeholders are responsible for agroecology-aligned strategies in Dutch banks?*

Using the insights gathered from the first research question, stakeholders from the banks were reached out to for participation in this study. These stakeholders participated in semi-structured interviews as laid out in 3.2.2 using the interview guide found in Annex 1. The interview data gained in this step, published grey literature, and literature provided by interviewees, was analysed to establish the perspectives of the stakeholders towards overcoming the three financial barriers to agroecological transitions. These barriers being (1) insufficient economic (dis)incentives, (2) lacking transition funds, and (3) limited access to funding (clarified in 1.2). The barriers are not isolated, they are systemic barriers within the complex agri-finance nexus, and thus may have feedback effects among one another; especially when considering the interplay effects that various solutions may have. This is important to take into account when answering this research question. Additionally, they key theoretical tenets of what constitutes agroecology (see 1.1) will be considered when analysing stakeholder perspectives on how banks can overcome the barriers. Additionally, the perspectives of key stakeholders differ; this is a key feature of such systems, and of stakeholders (see 2.2, 2.4). Ensuring the accuracy of stakeholder claims required cross

referencing among stakeholder interview data, alongside published reports and data; including independent academic analysis. The culmination of this analysis will provide an answer to RQ2:

*RQ2: What can these stakeholders tell us about how banks overcome the three financial barriers to agroecological transitions?*

Thirdly, the second component of the stakeholder interview process (see 3.2.2/Annex 1) is focused on asking questions related to the motives, capabilities, implementation, and results (MCIR) of the bank considering strategies for overcoming the financial barriers to agroecological transitions. In line with theoretical understanding of this framework, the key variables will be operationalised:

### 3.3.1 Motivations

Motivations entail a bank's interest in pursuing solutions to overcome financial barriers to agroecological transitions, and the awareness that opportunities exist for both them and their clients from doing so. In operationalising this stage of the theoretical framework, two questions have been posed (see Figure 2):

1. Are banks aware of agroecological transition opportunities?
2. Are banks interested in overcoming barriers to agroecological transitions?

### 3.3.2 Capability

Following on from motivations, capabilities are concerned with how capable a bank is in pursuing opportunities, considering their hopeful awareness of them. Within this section, it is understood whether organisations possess or lack capabilities for implementing solutions to the financial barriers, and what/where those capabilities come from. Within the agri-finance nexus, there were instances of outsourcing capabilities arising from an organisational interesting in where and how capabilities can be accessed. One diagnostic question has been created to guide this analysis:

1. Do banks have the capability to overcome the financial barriers to agroecological transitions?

### 3.3.3 Implementation

Implementation is concerned with whether the banks will be or were able to implement their solutions to the financial barriers. This will require an understanding of the structural pathways, interlinkages between stakeholders, decision-making capabilities, expertise, and

necessary values and principles for implementing services and solutions. This stage of the theoretical framework is guided by the question:

1. Will banks be able to implement projects/services to overcome the financial barriers to agroecological transitions?

### 3.3.4 Results

Results refers to the outcomes of implementing solutions for overcoming the financial barriers. It will assess whether there are processes or structures in place for banks to assess the value of their policies, and how these evaluation structures can contribute to renewed or greater motivations as part of its feedback loop within the MCIR framework. It is guided by the questions:

1. Was it worth the effort for banks to implement the projects/services?
2. Can banks demonstrate the returns?

Ultimately, using the MCIR framework will be able to provide information as to the systemic transformation possibilities that banks can have considering this research arena on systemic barriers to agroecological transitions. The information collected through stakeholder interviews, internal policy, and strategy documents, published papers and reports from the banks, and other grey and academic literature will form the basis of this research segment, answering the third research question:

*RQ3: What can the MCIR framework tell us about the strategies banks have to overcome the three financial barriers?*

The fourth research question provides comparative analysis of the two banks strategies for overcoming the financial barriers. Differences and similarities are cross-analysed, and insights into why these differences occur were generated. The aim of this research question is to provide inter-organisational instances of learning and knowledge generation, in order to help shape the agri-finance nexus with explicit consideration of the financial barriers established. The results of the previous research questions will provide the basis for analysis, and provide an answer to the question:

*RQ4: What can the banks learn from each other considering the MCIR framework insights?*

## 3.4 Case selection

As discussed in 3.1, two cases will be selected within this study. Selecting cases for a small-N study is considered to be a "challenging endeavour" (Seawright & Gerring, 2008). This is in part as case selection is supposed ensure representability, yet must also achieve variation in order to highlight differences in features amongst a broader population. The selection methodology used to select cases in this study was guided by Seawright and Gerring (2008) and represents a diverse case selection profile, aimed towards exemplifying diverse values. The investigation is therefore exploratory; to understand whether differing values of a bank contribute differently to outcome when considering strategies to overcome the financial barriers. As elaborated in 1.4, this research will focus on the Dutch banking sector, this in itself limits the number of cases significantly. In addition to this, the banks selected ought to have a clear relation to/involvement with the agricultural industry. The prime divergent variable, however, that was useful for case selection, is the values upon which the banks operate. For this reason, and as a culmination of these factors, two cases stand out: the Rabobank group (henceforth, Rabobank) and Triodos Bank (henceforth, Triodos).

Rabobank was created by farmers within the Netherlands to serve this target group (van Empel, 2010). The name Rabobank comes as a portmanteau of Coöperatieve Centrale **Ra**iffeisen-Bank and Coöperatieve Centrale **Bo**erenleen**bank**, two banks which merged to form what is now known as Rabobank. The latter partner in the merger "Boerenleenbank" directly translates to "Farmers' Loan Bank". 85% of Dutch farmers bank with Rabobank, making them a prime unit of analysis for this research (van Eekeres, 2021). Rabobank is considered a "traditional" bank, following many of the similar principles of other major banks; it is part of the "big three" Dutch banks (Statista, 2022).

Triodos, on the other hand, is an ethical bank that intends to create system-wide change within the farming and agricultural industry towards organic and sustainable farming; it recognises the need for nature-based farming approaches and stimulating biodiversity (Triodos Bank, 2020). Farming and agriculture are only a small part of Triodos' overall investment portfolio, representing 1.8% of the bank's overall Dutch investments (Triodos Bank, 2021), however its commitment to aims which correlate with agroecology makes them a suitable case for studying the role banks play in overcoming financial barriers to agroecology. It is possible to consider Triodos as a disruptor company within the financial industry, and thus it is an interesting unit of analysis to understand the transformation process (Balch, 2018).

## 3.5 Research ethics

It was of the utmost importance to have high regards for ethical considerations within this research project. Explicit and full consent was requested of participants for their data to be part of the research. All involved participants were aware of how their data would be processed and used, and it was made explicitly clear that data would be used anonymously. Careful consideration has gone into the structuring of this report such that participants involved in data collection cannot be identified in the text, apart from in broad discussion in 4.1.1 and 4.2.1 about relevant stakeholder groups no further reference to such groups have been made, not all relevant stakeholder groups reached out to in 4.1.1 and 4.2.1 responded to interview requests, and the direct names of stakeholder groups have been generalised after 4.1.1 and 4.2.1, therefore it cannot be known explicitly who contributed what. Many of the documents shared were at the time of sharing undisclosed and unpublished, and the limits on use were well established prior to use in this document. Where the limits of cooperation allowed, interview transcripts were shared with interviewees, whereby participants could edit mistakes and remove or explicitly indicate data that could not be explicitly referred to within this research, or where they would prefer quotations not to be shared. Many of the interview participants did not want explicit quotes to be included, this has been respected.

# 4.0 Results

This chapter outlines the results of this research project. The structure of this chapter is as presented in chapter three on the methodology.

## 4.1 Case 1: Rabobank Group

The following three sections provide the results for RQ 1 through 3 for Rabobank.

### 4.1.1 Stakeholder identification

The stakeholders relevant for Rabobank were identified through two avenues. To understand these avenues, it must be explained that there are two distinct components within Rabobank. Firstly, there is a corporate governance structure within Rabobank. This governance structure is outlined in Rabobank's statutes, and details how the bank operates within a cooperative structure. This will be further explained within this chapter, in order to provide the knowledge necessary for understanding which stakeholders therein are relevant. The second component is the Rabobank administrative structure, which is divided into departments each related to a function, of which functions are in many areas interrelated. These departments (for example, Digital and Innovation) play a role in the agenda-setting, decision-making, or innovation implementation process within Rabobank. For each of these components, the key stakeholder groups are identified, their roles and relevancy explained, and this section concludes with the data for key stakeholders presented in a table, thus answering RQ1. In the sections after this paper, when Rabobank stakeholders, or stakeholders of Rabobank, are discussed, it will be these groups that are being referred to.

#### Corporate governance structure

Rabobank's corporate and management structure is outlined within its Articles of Association (Rabobank, 2021). The entirety of this management structure is not relevant for this results section; however, it is a useful guide for understanding how each body and layer of the Rabobank structure relates to each other, and in recognising the complexity of the governance structure as a whole. As a result, a figure has been made displaying the full corporate governance structure based off of the Articles of Association, and the Rabobank Annual Report 2020 (Rabobank, 2021; Rabobank Communications & Corporate Affairs, 2020). This figure can be found in Annex 2. Specifically, these papers describe how Rabobank's cooperative structure functions, how various governing bodies within the bank interact and hold each other to account, and how its members can participate within the decision-making process.

Rabobank has no shareholders, and its governance structure is complex (de Graaf & Stoelhorst, 2009). Rabobank's customers do not hold shares, rather they become members of the foundations or departments that run local banks. These members can then exert influence upon decision-making progresses and the strategic orientation of the bank:

> "The member representatives in governance bodies exert an important influence on the course of the local Rabobank as well as of the entire organization. As a core feature of cooperative governance, membership has always led to divergent internal dynamics and a different - strategic-orientation compared to financial institutions with different ownership structures." (Rabobank Communications & Corporate Affairs, 2020; p.78)

There is interplay between three central governing boards of Rabobank: The General Members' Council, the Management Board, and the Supervisory Board. The General Members' Council is comprised of the chairs of Local Supervisory Bodies, groups of appointed members each representing one of the 85 local member departments (Rabobank Communications & Corporate Affairs, 2020; p.78). The General Members' Council is the highest decision-making body within the Rabobank governance structure (p.79). The Management Board is comprised of a typical governance structure for a corporate organisation, such as the Chair, the Chief Executive Officer, etc. Within Rabobank, the Management Board includes an officer dedicated to Wholesale and Retail, Sustainability, and Food and Agriculture Knowledge. The Supervisory Board oversees the general developments and policy of the Management Board.

Within this corporate governance structure, there is also indicated subsidiaries, including Obvion, BPD and DLL. DLL (De Lage Landen) is a vendor finance organisation which provides financing within the Dutch food and agriculture sector (Claessens, 2019). It is fully owned by Rabobank. The organisation claims to be a sustainable actor within the agri-finance nexus, through minimisation of their and their customers negative impacts on the environment, and through financing solutions that take into consideration resource conservation and waste management (DLL, n.d.).

However, aside from DLL as a subsidiary related to financing the food and agricultural sector and members of the Rabobank Managing Board, relevant stakeholders were not found within the corporate governance structure relevant for this study. However, this research tangent lead towards important discoveries within the administrative structure.

## Administrative structure

The administrative structure of Rabobank refers to the way its workforce is partitioned. The partitions are commonly referred to as *corporate divisions* or departments, and such divisions refer to the way a bank is segmented in order to satisfactorily serve its customer base (Eriksson & Mattsson, 1996). These divisions or departments are ways for banks to separate various functions, in doing so, departments can specialise to certain tasks, and build expertise in a given area. Rabobank is separated into such departments, although these are not explicitly stated in any document. However, through both research of the vacancies section of Rabobank's website, and filtering for vacancies in the Netherlands, the various internal divisions were established. This research was latter backed up through interview data to ensure its validity. The departments elucidated below are by no means an exhaustive list of departments, but ones which can be considered stakeholder groups within the agri-finance nexus.

The Finance and Risk department within Rabobank provides services in the form of risk management solutions and products to various clients. Within its portfolio is included providing financing solutions for rural and agricultural clients. This department can clearly be considered a stakeholder because they possess the power to decide which agricultural clients receive funding. Similarly, modernisation within banking has led to instances of digitisation and robotisation, whereby decisions are made electronically by "robots" ("Finance and Risk", n.d.). The role of workers within this department is in part to present the data to senior management, and in part to analyse and work on the results provided by these forecasting models.

The Digital and Innovation department aims to make digitalisation and innovation "a high priority", doing so by digitising and modernising its own services, and creating an arena where innovation is fostered alongside clients ("Taking steps in digitalization and innovation", n.d.). This department, according to Rabobank, is a source of expertise for clients looking to foster innovation; especially within the food and agricultural sector whereby it aims to "take important steps in innovating and improving food production". This stakeholder group is interrelated with RaboResearch and other departments, as is similar with all these stakeholder groups, however specifically digitisation and innovation within farming and agriculture seeks to decrease the amount of inputs per unit crop yield and improve downstream efficiency in the agricultural sector (Kennes, 2017).

The Corporate Banking department within Rabobank is a key stakeholder group in the agri-finance nexus. This group includes wholesale banking, and Rabobank identifies innovation

and sustainability within the agricultural value chain as a key aspect of this group's role ("Corporate Banking", n.d.). This group also includes business banking, through which clients in the food and agricultural sector would bank. The stakeholder group has the power to decide what products and services are offered to whom and why, making them relevant for further analysis within this study.

RaboResearch Food and Agribusiness (F+A) is a global department of Rabobank that generates knowledge and insights on developments within food and agriculture. The department is split into continental regions, thus relevant to this research is their European contingency. They are a relevant stakeholder group as a source of expertise. RaboResearch F+A additionally have a team dedicated to food systems transitions, with the aim to develop clients towards climate- and nature-positive solutions within food and agribusiness (Participant C, personal communications, April 20, 2022).

Client Services and support is a broad categorisation that is not a term necessarily used by Rabobank, but nonetheless an important stakeholder group for this research. It refers to front-facing roles and liaison positions between the bank and the clients. As a group, individuals within roles in this stakeholder group are responsible for ensuring that the entire organisation is oriented towards food and agricultural clients' principles and values.

The Sustainability Department is responsible for the creation of sustainability strategy within Rabobank, holding dialogue with their own stakeholder groups related to environmental, social and governance concerns, and implementation of policy such as the Equator Principles (a risk management framework for "determining, assessing, and managing social and environmental risks in projects and project financing) (Rabobank CCA, 2021; p.37).

To present answer to RQ1 as part of the Rabobank case study, the following table outlines stakeholder groups which were contacted for interviews (see table 1). These stakeholder groups were identified through review of the governance documents and internal literature from Rabobank.

| Area of the bank | Stakeholder group |
|---|---|
| Corporate governance structure | Wholesale and retail, sustainability, and food and agriculture knowledge officer |
| | General Members' Council |
| | DLL |
| Administrative structure | Finance and Risk |
| | Digital and Innovation |
| | Corporate Banking |
| | RaboResearch Food and Agribusiness: Europe |
| | Client Services and Support |
| | Sustainability |

Table 1: The relevant stakeholder groups for the Rabobank Group within the agri-finance nexus.

### 4.1.2 Solutions to the financial barriers to agroecological transitions

In this section, the results of analysis into interview data and complimentary supporting literature will be outlined. In doing so, it will answer RQ2 within the Rabobank case study to better understand how stakeholders view solutions and bank strategies for overcoming the three financial barriers to agroecological transformations. The structure of this section will look at what stakeholders explained were current and possible solutions to the barrier of (1) insufficient economic (dis) incentives, (2) the barrier of lacking transitions funds, and (3) the barrier of limited access to funding. Both the barriers, and the solutions to them that were explained by the stakeholder groups, have interplay effects which in turn means overlap and interconnection between the barriers and the solutions. This complexity was welcomed and highlighted; interconnection should be recognised when overcoming these barriers (Chai & Yeo, 2012). The data for this section will be represented in a table, indicating which stakeholder that was interviewed referred to each solution independently of each other during data collection, it will highlight the overlap between the solutions that were established during the interviews.

## Insufficient economic (dis)incentives

Insufficient economic (dis)incentives, as established in 1.2, refers to inadequately pricing product externalities, whether positive or negative, into the cost/benefits of a given product or service. In the interviews, participants were introduced this barrier, and asked about what solutions were either currently available for farmers,

When discussing the barrier of insufficient economic (dis)incentives, all interviewed parties (A, B, C, and D) contributed on the topic of **rewards for clients** as a method for overcoming this barrier. Specifically, the policy entailed granting better interest rates on loans for dairy farmers who integrated biodiversity and nature-inclusive agricultural practices within their farming methods. This came in the format of **Sustainability Linked Loans** for new customers; loans which were coupled with the Sustainable Development Goals (SDGs), whereby agricultural practiced linked with targets set with cooperation of stakeholders in the bank, under the SDG framework. This reward system was governed in accordance with the Sustainability Linked Loans Principles developed by the Loan Market Association. Key Performance Indicators (KPIs) are set during term negotiations on loans, and when these indicators are reached, it triggers adjustments on the interest margins applied to loans (Rabobank Group, 2022).

> "I completely agree that that there's a lack of incentives, towards more sustainable practices. But, at the same time, I also recognized that this is changing right now... we are already rewarding clients with a better interest rate when they meet key targets" (Participant B, personal communications, April 14, 2022)

Participants A, B and D referred to stricter credit policies on new loans. Specifically, this included rejection of loans that do not meet necessary requirements related to sustainability, especially considering pollution of the natural ecosystem from artificial fertilisers. The "stringent conditions" were at the baseline related to requirements set by the Dutch government on new financing, however Participant D stated that it was a goal of the bank to make these tighten these loan requirements, albeit taking into account the difficulty that farmers faced in the current economic situation related to low profit margins. This statement in itself is a recognition in part for the need to disengage farmers from the intensive paradigm within current industrial farming, characterised by high yields and low profits. The exact specifics of these increases to loan requirements were not made available within this research.

> "We already have within our credit policies a more strict policy with regards to new loans that we provide to our clients, for example, in dairy, but also in greenhouse horticulture" (Participant D, personal communications, April 21, 2022)

Furthermore, participant A and B sought within their line of work cooperation with larger financial authorities, financial initiatives, and the Dutch government. There was a pessimistic view among both these participants that banks had little power to address the economic (dis)incentives barrier, that ultimately any incentives would have to come as increased prices for consumers; a lack of willingness to reduce profitability in order to encourage transitions towards agroecology or wider sustainability. However, it was said that the European Central Bank (ECB), and initiatives such as the science-based targets initiative (SBTi), can play a pivotal role cooperating with banks order to change the field of incentives. The ECB recognises that no country has sufficient incentive structures to meet environmental targets; many of which are in line with agroecological aims. One such set of targets is defined under SDG15, on promoting, restoring protecting the sustainable use of terrestrial ecosystems, reversing land degradation, and halting biodiversity loss (ECB, 2022).

Additionally, it was recognised that data driven processes within Rabobank for categorisation of clients can help indicate which industry innovations are causing the greatest systemic impact, and furthermore which clients require the most support to transition towards sustainability. The data driven processes make use of databases in which farmers are the data collectors, and is used internally within Rabobank to classify agricultural clients within the Netherlands into three groups: the frontrunners, the laggards, and in-between. It was not made available what classification methods were used for overall classification across indices, however in order to be classified a front runner in any given metric or index, agricultural clients must be within the top 5% of performers. Across all sectors, there are 37 sustainability characteristics used as criterion for classification (Rabobank, n.d.). One such criterion is the EKO quality mark, an indication that the producer is not only organic, but exceeds requirements within European regulations for organic agriculture and food; such as not using any synthetic chemical inputs as fertiliser or pesticides.

Participant A introduced the Biodiversity Monitor as a way of providing data to understand how to incentivise positive externalities. The Biodiversity Monitor is a joint venture between Rabobank, the Worldwide Fund for Nature Netherlands (WNF) alongside the dairy company Friesland Campina. It provides (dairy) farmers with the information needed to understand the benefits of biodiversity and the environment. The Biodiversity Monitor's aims are "to help restore biodiversity in agriculture" (van Laarhoven et al., 2018). It is driven by a set of

KPIs, including percentage of permanent grassland, whereby larger percentages of permanent grassland are weighted positively for soil quality, water regulation, and other factors, and thus considered an indirect indicator of biodiversity quality. Nitrogen soil surpluses are also measured as a key indicator of biodiversity, with a negative weighting, higher degrees of soil nitrate concentration are considered a threat to biodiversity and resilient ecosystems. The results of farmer assessment can lead to positive or negative consequences for optimal or bad behaviour; one such is increased market price valuations for milk produced on farms with highly rated indices for biodiversity within the monitor.

### Lacking transition funds

Green funds and savings accounts were recognised by participants B, C and D as solutions to the barrier lacking transition funds. In essence, these are funds, or savings accounts of which 70% of investments, that contribute towards what are categorised as "green investments". This classification is from the Dutch tax authorities, meeting the "green" classification of the RVO (Dutch Enterprise Agency) (Rabobank CCA, 2021). The green funds, operated under Rabo Groenbank B.V. increased volume of green loans to EUR 394 million in 2021, albeit that this sum represents <0.1% of Rabobank's total loans for the period 2021 (Rabobank Group, 2022). The funds make use of blended finance, finance through which the source is a wide array of actors, including but not limited to private investors, government funding, and banks. There is no sector-by-sector breakdown found in Rabobank's available literature, although from the stakeholder interviews it has been made clear that this fund does contribute to farms within the Netherlands that meet the "green" criterion.

The Rabobank Food and Agriculture Innovation fund was suggested by participant D as a solution to this barrier. It is a fund that offers between EUR 1.5-4 million as an investment per company in order to finance innovation within the food and agricultural sector alongside the supply chain. It is a novel fund, and internationally operated; the largest share of investments made thus far are for innovation-oriented companies within the food and agricultural sector outside of the Netherlands.

Another solution to overcoming the barrier of lacking transition funds recognised was consistency in policy setting and agenda. Participants A and C stated that farmers were frustrated in changes to advice, policy, and agenda, from both banks and government sources.

> "So for us, what we try to do is communicate with our clients... And some topics are varied, but farmers need clarity. That's what they want. They want to know. Do I go right? Or do I go left?

> And tell me what to do and don't change the rules every month or every two months. They need a long-term." (Participant A, personal communications, April 14, 2022)

Ensuring consistency in policy and agenda setting is said to prevent funds that otherwise could be implemented in investments towards agroecological aims instead being pushed towards projects based on short term policies and advice that farmers fear could be reversed or otherwise would be untenable for farmers to implement. Participant C emphasised how top-down governance lacking farmer consultation and farmer involvement had lead to policies being inadequately operationalised and key targets lacking clarification.

## Limited access to funding

There was a general failure across the interviews with Rabobank stakeholders to recognise that farmers have limited access to funding, or indeed, participants suggested that there was little funding available for measures that deviated from profitability:

> "It's one step at the time. Unless a lot of money is flowing to that area [agroecology and biodiversity]. And as long there's no money to cover this, it will take years to make that transition." (Participant A, personal communications, April 14, 2022)

Albeit various solutions have cross over effects, understanding data driven processes, for example, can identify farmers in need of funding for agroecological transitions. Green funds and investments from savings accounts can or F&A innovation funds funds, with the right emphasis from Rabobank be marketed towards new and existing companies such that they have increased knowledge of what financial products and services are offered.

The Rabo Carbon Bank, however, was one explicit solution made during the interview data collection process and subsequent analysis that did provide a solution to this barrier. The carbon bank develops "climate smart" initiatives in farming and agriculture, with the primary aim to support regenerative farming (the process of encouraging topsoil regeneration for carbon storage and input reduction, alongside increasing biodiversity and using no-till or reduced till farming methods). The aims of the Rabo Carbon Bank are very much so aligned with agroecological principles, especially considering the inclusion of cultivated and non-cultivated biodiversity. The aim is to support and fund farmers to grow additional crops which support soil regeneration. The Carbon Bank includes an outreach process to contact relevant clients in order to suggest regenerative farming as an option for both environmental and ecological aims, and for financial benefit of the farmers. Its express purpose it to help finance the agricultural transition to sustainability.

| Barrier | | | Solution | Participant | | | |
|---|---|---|---|---|---|---|---|
| **1** | **2** | **3** | | **A** | **B** | **C** | **D** |
| X | X | | Rewards for Clients: Sustainability linked loans | X | X | X | X |
| X | | | Stricter credit policies for new loans | X | X | | X |
| X | | | Cooperation with ECB and SBTi | X | | | |
| X | | X | Reinforcing data driven processes for categorisation | X | X | | |
| | X | X | Green funds and savings accounts | | X | X | X |
| | X | X | Rabobank F&A Innovation fund | | | | X |
| | X | | Consistent policy setting and agenda | X | | X | |
| X | | | Biodiversity Monitor | X | | | |
| | X | X | Rabo Carbon Bank | | | | X |
| | X | | Rabobank Impact Loan | X | | | |

Table 2: Solutions to the financial barriers to agroecological transitions from interview participants for the Rabobank group.

### 4.1.3 MCIR framework analysis

This section implements the MCIR framework in order to analyse Rabobank's motivation, capability, implementation, and results as indicated by the participants within this study. Their responses are cross referenced with published work in order to critically analyse these four stages within the systems thinking framework. This section forms the answer to RQ3 for Rabobank. The sub-sections are guided by a set of guiding questions (see figure 2).

#### Motivation

The guiding questions for this section on Motivation are:
(1) Is the bank aware of agroecological transition opportunities?
(2) Is the bank interested in overcoming barriers to agroecological transitions?

(1) Through the interviews with Rabobank, there was awareness of agroecological transition opportunities, however the priorities of the bank were heavily conflicted. Whilst biodiversity and sustainable farming appears to be a genuine focus among the participants, it was clear that the most common perspective was not awareness of the opportunities of agroecological transitions, but instead that the notion that integrating agroecological principles into their products and services was not a priority. This was not due to an intense profit motive, rather the issue of conflicting environmental motivations. The predominant focus of all participants was on alignment with the Paris Agreement, the reduction of carbon emissions within food and agriculture, and transitioning agriculture towards methods of greater carbon sequestration. This is supported by the fact that although each of the participants were given the interview questions found in the interview guide (Annex 1) the preparation, documents sent in advance, predominantly related to emissions reductions. This sentiment is best characterised by this quote from participant 1:

> "Biodiversity is all well and good. Many of our products, on regenerative farming, help biodiversity. But if we don't reduce carbon emissions, we won't meet our targets. It is our priority" (participant 1, personal communications, April 13, 2022)

The solutions found in Table 2, whilst seemingly aware of the opportunities of agroecological transitions, mostly echo this sentiment. The solutions for overcome the barriers in many circumstances have a different source of motivation; for example, the Rabo Carbon Bank, whilst furthering agroecological transitions, does so as a by-product of increasing rates of carbon sequestration in top-soil.

(2) The participants responses indicate that the bank has some interest in overcoming the barriers to agroecology. The creation of the Biodiversity Monitor, cooperation with the government and other sustainability initiatives that are aligned with the principles of agroecology, and the above considered awareness of the opportunities of agroecological principles show a base-line level of interest. This interest was however tempered with an attitude from participants which conflicted with the solutions to the issues that were proposed. Chiefly a concern that overcoming these financial barriers were outside of the governance scope of banks, or concurrently that Rabobank should not be responsible for sacrificing its competitive edge in order to overcome the barriers. There was a large recognition, that whilst the opportunities were there, that the regulatory and governance landscape ought to be changed by the government, be that through the European Union, or the Dutch government.

## Capability

The guiding question for this section on Capability is:
Does the bank have the capability to overcome the financial barriers to agroecology?

From analysis of interview data and supporting internal literature it is very much the case that Rabobank has the capability to pursue products and services aimed towards overcoming the financial barriers to agroecological transitions. Through their stakeholder composition in the agri-finance nexus, including relevant research facilities RaboResearch capable of generating and sharing knowledge, sustainability departments dedicated to measuring and understanding the impact of the bank's actions on the environment and society, and the various operational branches such as Corporate and Finance & Risk, there is little over than Motivation preventing Rabobank from pursuing capabilities. Certain capabilities within Rabobank have already been outsourced, with subsidiaries like DLL acting on behalf of Rabobank find agricultural equipment, technology, and software solutions for clients.

## Implementation

The guiding question for this section on Implementation is:
Will the bank be able to implement projects/services that overcome financial barriers to agroecological transformations?

From the existing projects and services which begin the process of overcoming the barrier, it is clear that solutions are implemented. However, what is lacking is the drive to grow and expand these solutions; many of the solutions are novel, and in departments outside of sustainability and research, the participants made it clear that there was a disconnect. Within more traditional banking sectors, there is a recalcitrance to adopt new practices, and there are barriers for the bank when considering how the stakeholders within Rabobank interact and operate. It is not clear from interview data, internal policy reports, or from published papers how interacted and connected the different stakeholder groups are with each other, at least within Rabobank's administrative structure. Rabobank's corporate governance structure is well connected, and well defined, however, there are few stakeholder groups within this structure that are relevant for overcoming systemic barriers outside of those listed in Table 1. As discussed in 4.1.2 on the solution of Green Funds, the scale of the so far implemented is minimal, the Green Fund loans represent <0.1% of Rabobank's total lending. Thus, whilst Rabobank is possessing the expertise and decision-making processes to implement solutions, they do not as yet overcome any financial barriers meaningfully.

### Results

The Results section is guided by the questions:
(1) Was it worth the effort for the bank to implement the projects/services?
(2) Can the bank demonstrate the returns?

(1) It is unclear whether to the Rabobank stakeholders it was worth the effort to implement these projects and services. Putting interview data aside, through this research process it was clear that the level of positivity Rabobank is generating around its sustainability solutions, green funds, biodiversity monitors and other such solutions, however the extent to which these solutions actually generate impact is often unclear, opaque. The sustainability reporting from Rabobank lacks transparency in these areas, and it was similarly data that stakeholder participants were either unwilling or unable to share for this research project. It is unclear, for example, whether there are assessment structures in place to monitor and analyse the results of the solutions.

(2) Considering the answer for (1), there appears little that Rabobank can do to demonstrate the returns of these solutions. Some solutions are, however, on a different scale. The green funds, F&A Innovation funds and Impact Investment funds will be able to be monitored as to their profitability, for example, however, the government has rated 70% of the funds' investments as "green", and thus the evaluation process for what is considered sustainable is outsourced. There is no indication whether the social or environmental impact of the funds is analysed; it is assumed that the impact will be beneficial due to the "green" government classification.

## 4.2 Case 2: Triodos Bank

The following section provides the results for RQ 1 through 3 for Triodos.

### 4.2.1 Stakeholder identification

This section provides an answer to RQ 1 by identifying key stakeholder groups in Triodos that contribute to problem solving within the agri-finance nexus. Similarly to 4.1.1 on the identification of stakeholder groups within Rabobank, Triodos has an internal corporate governance structure, and what it calls a group structure that guides its financial operations. However, unlike Rabobank, Triodos is a privately held firm rather than a cooperative, as a result its corporate governance structure is simpler, consisting of an executive board and a supervisory board. The individuals or groups which make up these boards have not been

deemed relevant stakeholders for this research, owing to the fact that the members and participants are predominantly involved with the legal operation of Triodos as a bank, and not with agenda setting or policy making related to the agri-finance nexus. It is similarly the case that Triodos is a much smaller bank, operating on a smaller scale, as such, there are fewer divisions (Participant 1, personal communications, April 12, 2022). The literature used to identify stakeholders for this section includes the Triodos Bank Articles of Association (Triodos Bank N.V., 2021), web-resources detailing internal corporate governance structures and group structures (Triodos, 2020), and Hofstra & Kloosterman's (2017) analysis of the Triodos business model and structure.

Triodos' group structure is composed of three tranches: (1) Retail & Business Banking and Private Banking, (2) Investment Management, and (3) the Triodos Regenerative Money Centre. The Retail and Business banking has multiple lending focuses, one of which is food and agriculture. The Retail and Business division lends money to organisations "working to bring about positive and lasting change (Triodos, 2020). The Investment Management stakeholder group seeks to create impact through investment funds or investment institutions operating under the Triodos name, specific funds are tailored towards sustainable food and agriculture. These two stakeholder groups operate in-house, and are subject to stricter lending requirements and financial targets (Participant 1, personal communications, April 12, 2022). The final stakeholder group identified, the Triodos Regenerative Money Centre, operates under a principle called "free money", whereby there are far fewer restrictions and targets on investment. The Regenerative Money Centre can gift money to initiatives with socially relevant ideas, even if such ideas are unlikely or uncertain to ever return a profit (see 4.2.2 Lacking transition funds + Limited access to funding).

Triodos does additionally have a Sustainable Food and Agriculture Team, which is part of the Investment Management division. This team is responsible for overseeing and generating Triodos' policy towards sustainable food transitions, and offering funding options for clients looking to transition towards sustainable and ecologically friendly production and operations (Triodos Bank, 2022).

These are the four stakeholder groups identified within Triodos, and from which employees were contacted for interview. To present an answer for RQ 1 as part of the Triodos Bank case study, the following table outlines stakeholder groups which were contacted for interview (see table 3).

| Area of the bank | Stakeholder group |
|---|---|
| Group structure | Retail and Business Banking |
| | Impact Investing |
| | Triodos Regenerative Money Centre |
| | Sustainable Food and Agriculture Team |

Table 3: The relevant stakeholder groups for Triodos Bank within the agri-finance nexus.

### 4.2.2 Solutions to the financial barriers to agroecological transitions

The following sections will introduce the relevant solutions presented within the interview data for Triodos.

#### Insufficient economic (dis)incentives

On solutions to the barrier of insufficient economic (dis)incentives, participant 3 indicated that there was little that banks could do to generate significant systemic change considering this barrier. Instead, they stated that Triodos is and has acted as an advocacy group, pressuring reform for the Common Agricultural Policy (CAP) within the EU. This is backed in Triodos' 2019 vision paper where it clarifies that the upcoming revisions to the EU's CAP should take into account enhancing transitions of agricultural land to organic and making conventional agriculture sustainable (Triodos Bank, 2019). This can be done through basing the subsidies within the CAP on organic and nature-based farming. These alterations would generate and enhance system-wide change within the agricultural sector towards principles aligned with agroecology.

There was also recognition that prioritising *impact* over profits or money would generate incentives for farmers looking to integrate sustainable methods or methods in line with agroecological transitions within their production, and disincentives for those that put profit seeking motives ahead of social or environmental benefit:

> "If we see that somebody wants to pursue regenerative agriculture or agroecological agriculture or other new sustainable ways of producing food, with the objective of just generating more money, because they can sell it then for a premium, then it's not going to work because we always put impact first." (Participant 1, personal communications, April 12, 2022)

Triodos Impact Investing internal literature similarly corroborates this, with their objective being to maximise positive impact within and across their sustainable transition themes (of which sustainable food and agriculture is one) (Triodos Investment Management, 2021). This has led to the thinking of impact of decision-making not only on the micro-scale, but "in the context of the larger systems" (Triodos Bank, 2019; p.9).

Triodos additionally issues conversion loans for new organic farms and traditional farmers who want to make the switch to organic farming at a competitive rate (Triodos Bank, 2019; p.46). These loans provide an incentive for farmers to pursue organic farming, where they might otherwise have not. Furthermore, Triodos will not issue loans to any farm which does not abide by its principles of organic farming; farms must demonstrate clear alignment to sustainable principles or practices.

### Lacking transition funds

Sustainability funds for agriculture is a broad term for the various funds that exist within Triodos aimed at increasing the amount of funding available to clients for sustainability transitions. Specifically relevant to the food and agricultural sector are the:

- Triodos Groenfonds
- Triodos Sustainable Trade Fund
- Triodos Organic Growth Fund
- Hivos-Triodos Fund
- Triodos Impact Equity and Bond Fund
- Triodos Food Transition Europe Fund

These funds are each tailored towards different clients and have different criteria and aims. The Triodos Groenfonds are a broad green fund of which 70% investments are certified green by the Dutch government. Within the portfolio, 87.9% of the funds are used within the Netherlands, and of the entire portfolio, 12.1% is invested in organic agriculture, with a further 0.7% invested in nature and landscape (Triodos Groenfonds, 2022). The fund, however, is small, the total hectares of farmland supported by the fund is 15,300. This is insignificant in comparison to the 2.2 million hectares of agricultural land in total within the Netherlands (Van der Molen et al., 1998).

Sinking initial transition costs is another solution to increasing available transition funds for farmers looking to transition to agroecology. Participant 1 elaborated that traditional farming techniques can be more expensive than regenerative and biodiverse farming

methods. In particular when considering top-soil quality. The process of growing monoculture crops and oversaturating soils with fertilisers and pesticides leads to farmers paying increased prices to maintain intensive agriculture.

> "You're making it more and more artificial, and then you need more and more resources as well to compensate for the lack of substances that the soil has. So, in the long-term, every time, the farm needs to buy more artificial supplies, additional things, more machinery, more things to maintain the same production levels... And then every time they need to borrow a little bit more and a little bit more, and the production levels are not increasing." (Participant 1, personal communications, April 12, 2022)

Transitioning to regenerative agriculture replaces the artificial inputs with cycles such as crop rotations in order to maintain soil quality. However, setting up crop cycles, purchasing the initial machinery can be expensive, as a result, participant 1 states how Triodos, in particular the Regenerative Money Centre, has products and services which integrates this understanding, including providing initial financing even though it may imply a riskier investment.

The Aardpeer initiative to transition towards nature-based agriculture is additionally a solution to the barrier of lacking transition funds raised by participants 2 and 4. It is a mix private-civil society initiative that makes offers bonds issued by Stichting Grondbeheer (Bosma et al., 2022). The money from these bonds is used to purchase land for nature-based farmers and sustainable food initiatives, in part helping overcome the high initial cost of obtaining land. As an initiative, it offers farmers fair and equitable lease conditions and rent, and enables smaller and riskier projects financing opportunities.

> "The money is used to purchase land that the farmers can then lease. So you take away this huge investment that the farmer needs to make, and this huge cost for them that it is the farm itself. You also avoid real estate pressures by doing that. So the price of the land is not impacting the operation" (Participant 4, personal communications, May 8, 2022)

### Limited access to funding

Product and service alignment entails the alignment of products and services to specific farmer businesses, interests, and scenarios. Participant 1 and 2 recognised from previous experience in other banks that often farmers are limited in accessing funding by the way that products and services are rigidly structured. That certain farmers operate on different crop

cycles, certain crops such as fruit trees take longer to reach maturity, and as a result it is important for banks to align the financial services that they offer to the needs of the farmers.

> "It's also possible that banks align their business to the client's business and not try to make the client align to the bank." (Participant 2, personal communications, May 2, 2022)

Sensible loan guarantees as a solution is a critique of the finance sector by participants 1, 3 and 4. When banks provide loans they always ask for a guarantee, and these guarantees will often be farmer assets. However, the assets for farmers are often directly related to farmers capability to generate revenue. The assets of a farmer is often machinery, lands etc. If a bank demands these assets as a guarantee, and in the case of debt repayment these assets are taken away, it only further diminishes the ability for farmers to pay back loans. This scenario was used as an example to illustrate how often there is a communication failure between banks and farmers, that there is a disconnect between language used. However, it comes across as an illustrative point for solutions to the barriers to agroecological transitions; that if a farmer has few assets, or a newcomer wishes to participate in sustainable or agroecological farming, that what guarantees are placed on loans ought to be carefully considered.

| **Barrier** | | | **Solution** | **Participant** | | | |
|---|---|---|---|---|---|---|---|
| **1** | **2** | **3** | | **1** | **2** | **3** | **4** |
| X | | | Pressuring legal reform: EU CAP | | | X | |
| X | X | X | Financial compensation for impact/Impact prioritisation | X | | | X |
| | X | X | Sustainability funds for agriculture:<br>- Triodos Groenfonds<br>- Triodos Sustainable Trade Fund<br>- Triodos Organic Growth Fund<br>- Hivos-Triodos Fund<br>- Triodos Impact Equity and Bond Funds | X | X | X | X |
| | | X | Product and service alignment | X | X | | |
| | X | X | Sensible loan guarantees | X | | X | X |
| | X | X | Sinking initial transition costs | X | | | |
| | | X | Involvement of third parties | X | | | |
| X | X | X | Conversion loans for new organic farms | X | X | X | X |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| X | X | X | Aardpeer: Transition to nature-based agriculture | | X | | X |

Table 4: Solutions to the financial barriers to agroecological transitions from interview participants for Triodos Bank.

### 4.2.3 MCIR framework analysis

The MCIR framework is herein implemented for Triodos Bank, providing an answer to RQ3.

#### Motivation

The guiding questions for this section on motivation are:
(1) Is the bank aware of agroecological transition opportunities?
(2) Is the bank interested in overcoming barriers to agroecological transitions?

(1) The short answer to this question is "yes". It is well established within both the interview data, internal policy documents, and published reports that Triodos is aware of the agroecological transition opportunities, for society and for the environment. Their value structure is broadly in line with agroecological transitions. Stakeholders from outside of the main Triodos structure operate under a different rulebook to them (as elaborated in 4.2.1), and there appears to be a different set of motivations within, for example, the Regenerative Money Centre and the Retail and Business Banking division. Within the Retail and Business Banking division, there remains financial targets, and when there are internal discussions about this, the people who work with financial targets find it "weird" (Participant A, personal communications, April 12, 2020). This suggests that there is difference in motivation structures, that perhaps certain divisions within the bank operate with differing motivations, and thus may treat opportunities differently.

Triodos has additionally made organic, sustainable and nature-based agriculture a key focus of its investment funds, this indicates that it is both aware of the opportunities of agroecology, but motivated to pursue key aims and ideals associated with it in practice.

(2) Again, the answer to this question is yes. There is a clear interest in widespread systemic change in the agricultural sector, towards agroecology, nature-based farming, increased biodiversity, away from artificial fertilisers and pesticides.

## Capability

The guiding question for this section on Capability is:
Does the bank have the capability to overcome the financial barriers to agroecology?

This is an interesting question for Triodos, considering that the motivation to effect systemic change is so strong. The answer, considering interview data and subsequent analysis is that Triodos has the technical and administrative capacity to implement solutions that would overcome the financial barriers, but it is nonetheless a niche operator within the Dutch agri-finance nexus. Triodos' agricultural portfolio represents only 1.8% of its total portfolio, and Triodos is a not a large bank within the Dutch finance system (Triodos' total assets are 1.91% of Rabobank's total assets) (CFI, 2021). For this reason, Triodos lacks the social capital within Dutch society to overcome the barriers at this current stage.

## Implementation

The guiding question for this section on Implementation is:
Will the bank be able to implement projects/services that overcome financial barriers to agroecological transformations?

Triodos is able to implement projects/services to overcome the financial barriers, however its size as a bank limits its ability to create effective system wide change. The decision-making capacity for implementing services for overcoming the financial barriers is strong, agroecological aims are embedded within Triodos' institutions. Triodos, for example, has set of minimum standards, including an exclusion list on what investments are not allowed. Included within this list is non-organic farming, factory farming, and the use of artificial chemical inputs within agriculture for grown non-food products.

## Results

The Results section is guided by the questions:
(1) Was it worth the effort for the bank to implement the projects/services?
(2) Can the bank demonstrate the returns?

(1) From the interview data available, it is clear that the key stakeholders perceive the effort to implement the projects/services as worthwhile. The work undertaken to implement solutions to overcome the financial barriers to agroecology align with Triodos' foundational values and principles as a values-based bank operating within the agricultural sector.

(2) Annually, Triodos releases a series of impact reports, detailing the effect that its different banking methods have had within society and on the environment. These impact reports evaluate the results of its banking methods in relation to the SDGs, per sector, and rather than KPIs, Triodos uses KIIs (key impact indicators) ("Impact report 2021", 2022). Such KIIs for the sustainable farming and agriculture sector include: inputs sourced sustainably or recycled, tonnes of hazardous materials avoided, organic meals served and number of created products supporting the food transition.

Furthermore, Triodos is in the process of developing "theories of change" for specific industries based off of the results of its experience thus far in the market (Participant 2, May 2, 2022). These industry specific theories of change are strategies to generate or achieve change. It highlights that Triodos has understood the value of its work, and has become motivated to further develop strategies for generating positive impact.

# 5.0 Comparison and discussion

This section begins with a comparison of the results from the two case studies on the Rabobank Group and Triodos Bank, highlighting similarities and differences, and introducing analysis as to why these similarities and differences exist and the impact that it has on the ability for the banks to achieve widespread systemic change. As a result of this comparison, learning opportunities will be presented. This analysis will constitute an answer to RQ4. After this, the overall study will be discussed, drawing upon the established theory and theoretical framework.

Firstly, one key difference that was plainly present was the motivations of each bank. Rabobank's stated priorities in interviews and in text were on industry-wide carbon emissions reductions, rather than on principles and values related to the tenets of agroecology. The motivations for pursuing agroecological transitions played second fiddle in comparison to its carbon emissions reduction motivations. Chai and Yeo (2012) established that competing motivations reduces the effectiveness of overcoming barriers and contributing to system wide change. The products and services created and proposed by Rabobank in many ways can solve the problem of financial barriers within the agri-finance nexus, considering agroecological transition. However, the positive contribution to agroecological transitions in many of solutions presented are a by-product of the carbon emissions reduction motivation which was present whilst interviewing participants. For example, within the Rabo Carbon Bank, the prime goal of the project is to increase the amount of carbon sequestered in the soil. The methods for doing this are regenerative farming, which is beneficial for biodiversity and reducing the needs for artificial inputs within farming, however the motivation for creating the bank was this goal of reducing carbon emissions.

For Triodos, on the other hand, it is clear that the principles and values of agroecology align with their core motivations. They are aware of the opportunities that overcoming the barriers offer, and thus interested in overcoming them. This has a positive impact further up the chain towards systemic transformation.

It is unclear or inconclusive why Rabobank prioritises carbon emissions reduction over support for biodiversity. One participant interviewed for Triodos had an opinion that the strict focus on the fulfilment of targets and the market pressure to align with the Paris Agreement influenced the decision-making of alternative banks, whereas Triodos needed to worry less about carbon emissions reduction as it has a stricter requirement on sustainability

and additionality when investing in agricultural clients (Participant 1, personal communications, April 12, 2022).

A further difference that was highlighted in this research was the difference in relationship between capacity and implementation related to the size of the bank. It is clear that Rabobank possesses capacity to enact system wide change in the agricultural sector, its significant market share enables it to interact and govern a larger number of clients. However, in part related to its lacking motivations for overcoming financial barriers to agroecology, it fairs poorly when it comes to implementation. Triodos, alternately, has aligned and motivated decision-making capacity for implementing solutions to overcoming the financial barriers, yet lacks the size and outreach of Rabobank. It has the motivation and will to implement solutions to generate system wide change, but is prevented from doing so as a niche bank. These findings correlate with systems thinking literature which explains that large, institutionalised actors are reticent to change (Padilla-Pérez et al., 2009).

Lastly, for differences, there are instances of policy innovation within each bank that can be learning opportunities for both the alternate bank, but similarly can provide inspiration for innovation within the market, or indeed inter-bank cooperation. Rabobank, being a larger institutionalised bank, has agricultural clients that are very much so unsustainable. It's job, to transition these clients, is far harder, as they are starting from an unfair position. As a result, the solutions that have been gathered speak to such differences. Sustainability-linked loans, for example, are loans where interest rates decrease as sustainability targets are met. These loans nudge customers who have taken out such loans towards sustainability by coupling it with positive incentives. Similarly, Rabobank having a far greater number of agricultural clients decreases the feasibility of customer aligned products and services. As a result, Rabobank has learnt that what is required to best govern large numbers of clients is consistent policy setting, where the rules of the game do not change. Triodos could learn from these two solutions; it currently does not invest in inorganic farming, or unsustainable animal farming, however it is important to realise that these sectors require alignment with sustainable aims as well. Triodos as a bank has over the past two decades seen consistent growth, and it is predicted to continue growing (Hofstra & Kloosterman, 2018). As the size of its agricultural portfolio increases, it may need to learn from its larger competitors how to govern a larger number of clients.

An important similarity to raise is that both firms recognised the role of government in overcoming the systemic barriers, especially related to overcoming the barrier of insufficient economic (dis)incentives. For Rabobank, there were concerns that incentivising good

behaviour and disincentivising bad behaviour would lead to lower levels of competitiveness (Participant A, personal communications, April 13, 2022). Triodos had different motivations for wanting government intervention, as it saw intervention from international organisations such as the EU as being an expedient route towards generating system wide change. It's suggestion that within the revised version of the Common Agricultural Policy there should be subsidy terms to include of incentives for good behaviour and disincentives for bad behaviour is a key example of this.

Furthermore, each of the banks employed similar solutions that can contribute towards overcoming the systemic barriers to agroecological transitions. Green funds were one such similarity, allowing public purchasing of bonds issued in order to fund agricultural clients that were system innovators, or that followed agroecological principles such as regenerative farming.

This research study was the first to use the framework of Chai and Yeo (2020) in a sector outside of the energy transitions field. It required testing and adjustment to the framework considering key literature on the agri-finance nexus. This has resulted in an expansion of the corpus of systems thinking literature and knowledge. Applying the framework was useful in understanding the interlinkages between the four stages, and the feedback affect that results have on motivations, and the snowballing effect this can generate. The results of this paper reflect this process, that strong motivation and alignment to principles and values positively contribute to being able to generate systemic change. The framework struggles, however, temporally, in that it is difficult to integrate and analyse solutions to barriers that are novel. An additional critique of the framework is that it fails to take into account competing norms and values within sustainability studies.

# 6.0 Limitations and future research

This chapter outlines the limitations within this research, and how these limitations effected the reliability and validity of this study. In learning from these limitations, areas that require further or deeper research are given.

The first limitation within this research was the number of interviews conducted. To increase the reliability of data, and depth of analysis, a greater number of interviews would have been preferable. The number of interviews were sufficient for this research, the participants came from varied areas of the banks, and at differing levels of seniority. However, a greater number of interviews would have increased the reliability of this work. It was beneficial that those who did participate in this research contributed useful literature and documents, and some were able to be contacted for further clarification and to read and correct the transcripts of the interviews. Within this research area, people were difficult to contact, and unlikely to respond.

It is additionally the case that there could be selection bias for the participants within this research. Those who accepted the request for an interview, were likely those most interested in the field of sustainable banking and food and agriculture. This was not considered during the methodology, and may have impacted the results of this research. Changing the design to eliminate this potential bias is something to consider in future research projects.

This area of study was novel, there are few academic sources on the agri-finance sector, specifically related to agroecology and finance. There was sufficient literature that culminated in this research, and provided supporting theory and academic sources. However it similarly means that there is currently no comparable research for validifying results.

Another limitation of this paper where reliability is concerned is the number of cases selected for study. The choice of cases was in order to highlight maximal variance, however Triodos is a niche-bank and Rabobank is a large cooperative with roots in the agricultural sector; these banks are not typical within the Dutch finance landscape. Further research with a greater and more varied number of cases would dramatically increase the knowledge in this field, and can provide some validity to the results.

Finally, it was clear that the financial barriers to agroecological transitions were broad. Within the scope of this research, three broad barriers clearly demarcated areas for research, and it was necessary in order to complete this research project within the time frame

available. It is suggested that future research could improve the corpus' understanding of the financial barriers.

# 7.0 Conclusion

To conclude this study, an answer will be given to the research aims and main research question: *How can banks overcome the theoretical financial barriers to agroecological transitions in practice, and what insights can be gained through analysis of these solutions through a systems thinking perspective?* To answer this research question, the financial barriers to agroecological transitions were first identified through literature review. These barriers were: insufficient economic (dis)incentives, lacking transition funds, and limited access to finance. In order to understand how banks could overcome these barriers, two banks were chosen as part of a diverse case selection process: Rabobank and Triodos. Key stakeholders within these banks were identified (see Table 1 and 3) and contacted to participate in interviews in order to understand how their stakeholder group and their bank as a whole can implement practical solutions to overcome these barriers (see Table 2 and 4). The responses from the stakeholders, and internal policy documents were subsequently analysed using the MCIR framework to understand how the banks contribute towards systemic change towards agroecology in the food and agricultural sector.

The findings of this research study show that banks can play a positive role overcoming the financial barriers to agroecological transitions. Within this research, 10 solutions were identified as existing or proposed for Rabobank, and 9 solutions for Triodos (see Tables 2 and 4). These practical solutions to the barriers for agroecological transitions indicate that barriers can be overcome due to solutions implemented by banks. However, systems thinking analysis using the MCIR framework offered insights as to why change has thus far been gradual. Large institutional banks, such as Rabobank, are reticent to change, their large agricultural customer base was acquired without significant thought to matters of sustainability, and as a result, they are starting from a disadvantaged position when it comes to system transformations. Triodos on the other hand exists within a small financial niche within Dutch banking, and although geared with the implementation expertise to enact radical system wide change, its impact on the Dutch agricultural sector has thus far been minimal. Both the banks can learn from each other, and these learning instances and insights can begin to permeate the financial landscape to begin the process of systemic transformations considering the need for an agroecological transition.

# Bibliography

Aare, A., Egmose, J., Lund, S., & Hauggaard-Nielsen, H. (2020). Opportunities and barriers in diversified farming and the use of agroecological principles in the Global North – The experiences of Danish biodynamic farmers. *Agroecology And Sustainable Food Systems*, 45(3), 390-416. https://doi.org/10.1080/21683565.2020.1822980

Abbott, K. (2012). Engaging the public and the private in global sustainability governance. *International Affairs*, 88(3), 543-564. https://doi.org/10.1111/j.1468-2346.2012.01088.x

Achterkamp, M., & Vos, J. (2007). Critically identifying stakeholders. *Systems Research And Behavioral Science*, 24(1), 3-14. https://doi.org/10.1002/sres.760

*AGRI3 Fund aims to mobilise additional public and private capital at scale, to contribute to sustainable agricultural value chains and avert deforestation.* Agri3. (2020). Retrieved 10 April 2022, from https://agri3.com/#TheAgri3Fund.

Ainger, J. (2022). *Just A Third of Largest Banks Have Set Robust 2030 Climate Goals.* Bloomberg. Retrieved 28 June 2022, from https://www.bloomberg.com/news/articles/2022-03-25/just-a-third-of-largest-banks-have-set-robust-2030-climate-goals.

Altieri, M. (1995) Agroecology: The scientific basis of alternative agriculture. West View Press, Boulder.

Altieri, M., & Nicholls, C. (2020). Agroecology and the reconstruction of a post-COVID-19 agriculture. *The Journal Of Peasant Studies*, 47(5), 881-898. https://doi.org/10.1080/03066150.2020.1782891

Anderson, V., & Johnson, L. (1997). *Systems thinking basics* (pp. 1-14). Cambridge, MA: Pegasus Communications.

Anibaldi, R., Rundle-Thiele, S., David, P., & Roemer, C. (2021). Theoretical Underpinnings in Research Investigating Barriers for Implementing Environmentally Sustainable Farming Practices: Insights from a Systematic Literature Review. *Land*, 10(4), 386. https://doi.org/10.3390/land10040386

Avrampou, A., Skouloudis, A., Iliopoulos, G., & Khan, N. (2019). Advancing the Sustainable Development Goals: Evidence from leading European banks. *Sustainable Development.* https://doi.org/10.1002/sd.1938

Balch, O. (2018). The disruptors: How Triodos' Bevis Watts is trying to make finance a force for good. *Reuters Events.* Retrieved 19 January 2022, from https://www.reutersevents.com/sustainability/disruptors-how-triodos-bevis-watts-trying-make-finance-force-good.

Bansal, P., & Des Jardine, M. R. (2014). Business sustainability: It is about time. Strategic organization, 12(1), 70-78.

Beierle, T. C., & Cayford, J. (2001). *Evaluating dispute resolution as an approach to public participation* (No. 1318-2016-103165).

Bosma, D., Hendriks, M., & Appel, M. (2022). Financing regenerative agriculture.

Blackburn, R. (2006). Finance and the fourth dimension. *New Left Review*, 39(39), 39-72.

Cabrera, D., Colosi, L., & Lobdell, C. (2008). Systems thinking. *Evaluation And Program Planning*, 31(3), 299-310. https://doi.org/10.1016/j.evalprogplan.2007.12.001

Carolina Rezende de Carvalho Ferrei, M., Amorim Sobreiro, V., Kimura, H., & Luiz de Moraes Barboza, F. (2016). A systematic review of literature about finance and sustainability. *Journal Of Sustainable Finance & Investment*, 6(2), 112-147. https://doi.org/10.1080/20430795.2016.1177438

Caron, P., Biénabe, E., & Hainzelin, E. (2014). Making transition towards ecological intensification of agriculture a reality: the gaps in and the role of scientific knowledge. *Current opinion in environmental sustainability*, 8, 44-52.

CFI. (2021). *Top Banks in the Netherlands. Corporate Finance Institute.* Retrieved 28 June 2022, from https://corporatefinanceinstitute.com/resources/careers/companies/top-banks-in-the-netherlands/.

Chai, K., & Yeo, C. (2012). Overcoming energy efficiency barriers through systems approach—A conceptual framework. *Energy Policy*, 46, 460-472. https://doi.org/10.1016/j.enpol.2012.04.012

Checkland, P. (1999). Systems thinking. *Rethinking management information systems*, 45-56.

Checkland, P. (2000). Soft systems methodology: a thirty year retrospective. *Systems research and behavioral science*, 17(S1), S11-S58.

Claessen, I. (2019). *Sustainability Impact Assessment in the Financial Sector: A Case Study of DLL's Food & Agriculture Portfolio.*

*Corporate Banking*. Retrieved 27 June 2022, from https://rabobank.jobs/en/expertise/corporate-banking/.

Cusins, P. (1994). Understanding Quality through Systems Thinking. *The TQM Magazine*, 6(5), 19-27. https://doi.org/10.1108/09544789410067853

Darnhofer, I., Gibbon, D., & Dedieu, B. (2012). *Farming systems research: an approach to inquiry.* In Farming systems research into the 21st century: The new dynamic (pp. 3-31). Springer, Dordrecht.

de Graaf, F., & Stoelhorst, J. (2009). The Role of Governance in Corporate Social Responsibility: Lessons from Dutch Finance. *Business & Society*, 52(2), 282-317. https://doi.org/10.1177/0007650309336451

DLL. *Corporate Responsibility, Sustainable Business Solutions.* DLL Group. Retrieved 27 June 2022, from https://www.dllgroup.com/gb/en-gb/about-us/corporate-responsibility.

Eiselin, M., Simons, H., & Verwer, C. (2020). Dutch non-state actor contributions to biodiversity: Preparing for the CBD Action Agenda for Nature and People. *National Committee of the Netherlands.* Retrieved from https://www.iucn.nl/app/uploads/2021/03/iucn_nl_2020_dutch_non-state_actor_contributions_to_the_aichi_targets_final.pdf

El Bilali, H. (2019). Innovation-Sustainability Nexus in Agriculture Transition: Case of Agroecology. *Open Agriculture*, 4(1), 1-16. https://doi.org/10.1515/opag-2019-0001

El Bilali, H., & Allahyari, M. (2018). Transition towards sustainability in agriculture and food systems: Role of information and communication technologies. *Information Processing In Agriculture*, 5(4), 456-464. https://doi.org/10.1016/j.inpa.2018.06.006

ECB. (2022). *FAQ on sustainability-linked bonds. European Central Bank.* Retrieved 28 June 2022, from https://www.ecb.europa.eu/paym/coll/standards/marketable/html/ecb.slb-qa.en.html.

Fagerberg, J. (2018). Mobilizing innovation for sustainability transitions: A comment on transformative innovation policy. *Research Policy*, 47(9), 1568-1576. https://doi.org/10.1016/j.respol.2018.08.012

Feola, G. (2020). Capitalism in sustainability transitions research: Time for a critical turn?. *Environmental Innovation And Societal Transitions*, 35, 241-250. https://doi.org/10.1016/j.eist.2019.02.005

*Finance and Risk*. Retrieved 27 June 2022, from https://rabobank.jobs/en/expertise/finance-risk/.

Francis, C., Lieblein, G., Gliessman, S., Breland, T. A., Creamer, N., Harwood, R., ... & Poincelot, R. (2003). Agroecology: The ecology of food systems. *Journal of sustainable agriculture*, 22(3), 99-118.

Francis, C., & Porter, P. (2011). Ecology in Sustainable Agriculture Practices and Systems. *Critical Reviews In Plant Sciences*, 30(1-2), 64-73. https://doi.org/10.1080/07352689.2011.554353

Freeman, R. E. (2010). *Strategic management: A stakeholder approach.* Cambridge university press.

Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research policy*, 36(3), 399-417.

Geels, F., Hekkert, M., & Jacobsson, S. (2008). The dynamics of sustainable innovation journeys. *Technology Analysis & Strategic Management*, 20(5), 521-536. https://doi.org/10.1080/09537320802292982

Giordano, R., Brugnach, M., & Pluchinotta, I. (2017). Ambiguity in problem framing as a barrier to collective actions: some hints from groundwater protection policy in the Apulia region. *Group Decision and Negotiation*, 26(5), 911-932.

Gliessman, S. (1990). Agroecology: researching the ecological basis for sustainable agriculture. *In Agroecology* (pp. 3-10). Springer, New York, NY.

Gliessman, S., Engles, E., & Krieger, R. (1998). Agroecology: ecological processes in sustainable agriculture. *CRC press*.

Gliessman, S. (2013). Agroecology: Growing the roots of resistance. *Agroecology and sustainable food systems*, 37(1), 19-31.

Gliessman, S. (2018). Defining Agroecology. *Agroecology And Sustainable Food Systems*, 42(6), 599-600. https://doi.org/10.1080/21683565.2018.1432329

Grin, J., Rotmans, J., & Schot, J. (2010). *Transitions to Sustainable Development.* https://doi.org/10.4324/9780203856598

Hagens, V., Dobrow, M., & Chafe, R. (2009). Interviewee Transcript Review: assessing the impact on qualitative research. *BMC Medical Research Methodology*, 9(1). https://doi.org/10.1186/1471-2288-9-47

Havemann, T., Negra, C., & Werneck, F. (2020). Blended finance for agriculture: exploring the constraints and possibilities of combining financial instruments for sustainable transitions. *Agriculture And Human Values*, 37(4), 1281-1292. https://doi.org/10.1007/s10460-020-10131-8

Hefferman, S. (2004). Modern banking. John Wiley & Sons.

Hendrikx, D. (2018). The Financial Farmer, financial education and extension to Dutch farmers, 1890-1940. *Studenttheses.* Retrieved 13 April 2022, from https://studenttheses.uu.nl/handle/20.500.12932/32667.

Hernández-Orozco, E., Lobos-Alva, I., Cardenas-Vélez, M., Purkey, D., Nilsson, M., & Martin, P. (2021). The application of soft systems thinking in SDG interaction studies: a

comparison between SDG interactions at national and subnational levels in Colombia. *Environment, Development And Sustainability*, 24(6), 8930-8964. https://doi.org/10.1007/s10668-021-01808-z

Hofstra, N., & Kloosterman, L. (2018). Banking on Values: Triodos Bank. *Palgrave Studies In Sustainable Business In Association With Future Earth*, 29-50. https://doi.org/10.1007/978-3-319-58804-9_2

Hyung, K., & Baral, P. (2019). Use of Innovative Public Policy Instruments to Establish and Enhance the Linkage between Green Technology and Finance. *Handbook Of Green Finance*, 1-24. https://doi.org/10.1007/978-981-10-8710-3_28-1

*Impact report 2021*. Triodos IM. (2022). Retrieved 28 June 2022, from https://www.triodos-im.com/impact-report/2021.

Ison, R. L., Maiteny, P. T., & Carr, S. (1997). Systems methodologies for sustainable natural resources research and development. *Agricultural systems*, 55(2), 257-272.

Kedward, K. and Ryan-Collins, J. (2022). *From financial risk to financial harm: exploring the agrifinance nexus and drivers of biodiversity loss.* UCL Institute for Innovation and Public Purpose, Working Paper Series (No. WP 2022/05). Available at: https://www.ucl.ac.uk/bartlett/publicpurpose/wp2022-05

Kennes, D. (2017). *The Promise of Digital Agriculture.* RaboResearch: Food and Agribusiness. Retrieved 27 June 2022, from https://research.rabobank.com/far/en/sectors/farm-inputs/the-promise-of-digital-agriculture.html.

Köhler, J., Geels, F., Kern, F., Markard, J., Onsongo, E., & Wieczorek, A. et al. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation And Societal Transitions*, 31, 1-32. https://doi.org/10.1016/j.eist.2019.01.004

Kuzma, E., Padilha, L., Sehnem, S., Julkovski, D., & Roman, D. (2020). The relationship between innovation and sustainability: A meta-analytic study. *Journal Of Cleaner Production*, 259, 120745. https://doi.org/10.1016/j.jclepro.2020.120745

Leach, M., Rockström, J., Raskin, P., Scoones, I., Stirling, A. C., Smith, A., Thompson, J., Millstone, E., Ely, A., Arond, E., Folke, C., & Olsson, P. (2012). *Transforming Innovation for Sustainability. Ecology and Society*, 17(2). http://www.jstor.org/stable/26269052

Leip, A., Billen, G., Garnier, J., Grizzetti, B., Lassaletta, L., Reis, S., ... & Westhoek, H. (2015). Impacts of European livestock production: nitrogen, sulphur, phosphorus and greenhouse gas emissions, land-use, water eutrophication and biodiversity. *Environmental Research Letters*, 10(11), 115004.

Lepetit, L., Nys, E., Rous, P., & Tarazi, A. (2008). Bank income structure and risk: An empirical analysis of European banks. *Journal Of Banking & Finance*, 32(8), 1452-1467. https://doi.org/10.1016/j.jbankfin.2007.12.002

Loconto, A. M. (2016). The role of knowledge in transitions to sustainable food systems: examples from institutional innovations.
McGuire, J., Morton, L. W., & Cast, A. D. (2013). Reconstructing the good farmer identity: shifts in farmer identities and farm management practices to improve water quality. *Agriculture and Human Values*, 30(1), 57-69.

Loorbach, D., & Rotmans, J. (2010). The practice of transition management: Examples and lessons from four distinct cases. Futures, 42(3), 237-246.

Makortoff, K. (2021). Europe's top 25 banks failing on green pledges, campaigners warn. *the Guardian*. Retrieved 22 June 2022, from https://www.theguardian.com/business/2021/sep/06/europes-top-25-banks-failing-on-green-pledges-campaigners-warn.

Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy*, 41(6), 955-967. https://doi.org/10.1016/j.respol.2012.02.013

Midgley, G., Munlo, I., & Brown, M. (1998). The theory and practice of boundary critique: developing housing services for older people. *Journal Of The Operational Research Society*, 49(5), 467-478. https://doi.org/10.1057/palgrave.jors.2600531

Mier y Terán Giménez Cacho, M., Giraldo, O., Aldasoro, M., Morales, H., Ferguson, B., & Rosset, P. et al. (2018). Bringing agroecology to scale: key drivers and emblematic cases.

*Agroecology And Sustainable Food Systems*, 42(6), 637-665. https://doi.org/10.1080/21683565.2018.1443313

Migliorelli, M. (2019). The Development of Green Finance in EU Agriculture: Main Obstacles and Possible Ways Forward. *Palgrave Studies In Impact Finance*, 175-206. https://doi.org/10.1007/978-3-030-22510-0_8

Mintzberg, H. (1987). The Strategy Concept I: Five Ps for Strategy. *California Management Review*, 30(1), 11-24. https://doi.org/10.2307/41165263

McGuire, J., Morton, L., & Cast, A. (2012). Reconstructing the good farmer identity: shifts in farmer identities and farm management practices to improve water quality. *Agriculture And Human Values*, 30(1), 57-69. https://doi.org/10.1007/s10460-012-9381-y

National Research Council. 2002. A Century of Ecosystem Science: Planning Long-Term Research in the Gulf of Alaska. Washington, DC: *The National Academies Press.* https://doi.org/10.17226/10469.

*Netherlands: largest banks 2021.* Statista. (2022). Retrieved 27 June 2022, from https://www.statista.com/statistics/762148/leading-banks-in-the-netherlands-by-total-assets/.

OECD. (2018). Oslo Manual 2018. *The Measurement Of Scientific, Technological And Innovation Activities*. https://doi.org/10.1787/9789264304604-en

Ollivier, G., Magda, D., Mazé, A., Plumecocq, G., & Lamine, C. (2018). Agroecological transitions: What can sustainability transition frameworks teach us? An ontological and empirical analysis. *Ecology and Society*, 23(2), 18-p.

Ouma, S. (2016). From financialization to operations of capital: Historicizing and disentangling the finance–farmland-nexus. *Geoforum*, 72, 82-93. https://doi.org/10.1016/j.geoforum.2016.02.003

Padilla-Pérez, R., Vang, J., & Chaminade, C. (2009). Regional Innovation Systems in Developing Countries: Integrating Micro and Meso-level Capabilities. *Handbook Of Innovation Systems And Developing Countries.* https://doi.org/10.4337/9781849803427.00013

Pluchinotta, I., Salvia, G., & Zimmermann, N. (2022). The importance of eliciting stakeholders' system boundary perceptions for problem structuring and decision-making. *European Journal Of Operational Research*, 302(1), 280-293. https://doi.org/10.1016/j.ejor.2021.12.029

Poppe, K. J. (2020). Time for departure: A reflection on the Dutch food system. *Wageningen Economic Research*.

Postel, S. (2000). Entering an era of water scarcity: The challenges ahead. *Ecological Applications*, 10(4), 941-948. https://doi.org/10.1890/1051-0761(2000)010[0941:eaeows]2.0.co;2

Rabobank. *Giving sustainable frontrunners a boost.* Retrieved 28 June 2022, from https://www.rabobank.com/en/about-rabobank/customer-focus/business/articles/giving-sustainable-frontrunners-a-boost.html.

Rabobank. (2021). *Articles of Association Coöperatieve Rabobank U.A.*. Rabobank. Retrieved from https://www.rabobank.com/en/images/articles-of-association-rabobankjuly-202167746991.pdf

Rabobank Communications & Corporate Affairs. (2020). *Annual Report 2020.* Utrecht: Rabobank Communications & Corporate Affairs. Retrieved from https://www.rabobank.com/en/images/annual-report-2020.pdf

Rabobank CCA. (2021). ESG Facts and Figures 2021. *Rabobank Communications & Corporate Affairs*. Retrieved from https://statics.rabobank.com/binaries-processed/ESG-Facts-Figures-2021_931251824.pdf

Ranjan, P., Church, S., Floress, K., & Prokopy, L. (2019). Synthesizing Conservation Motivations and Barriers: What Have We Learned from Qualitative Studies of Farmers' Behaviors in the United States?. *Society & Natural Resources*, 32(11), 1171-1199. https://doi.org/10.1080/08941920.2019.1648710

Rode, J., Pinzon, A., Stabile, M., Pirker, J., Bauch, S., & Iribarrem, A. et al. (2019). Why 'blended finance' could help transitions to sustainable landscapes: Lessons from the Unlocking Forest Finance project. *Ecosystem Services*, 37, 100917. https://doi.org/10.1016/j.ecoser.2019.100917

Runhaar, H. (2021). Four critical conditions for agroecological transitions in Europe. *International Journal Of Agricultural Sustainability*, 19(3-4), 227-233. https://doi.org/10.1080/14735903.2021.1906055

Schot, J., & Steinmueller, W. E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. Research policy, 47(9), 1554-1567.

Seawright, J., & Gerring, J. (2008). Case Selection Techniques in Case Study Research. *Political Research Quarterly*, 61(2), 294-308. https://doi.org/10.1177/1065912907313077

Senge, P. M. (2006). The fifth discipline: The art and practice of the learning organization. *Broadway Business.*

Seyfang, G., & Gilbert-Squires, A. (2019). Move your money? Sustainability Transitions in Regimes and Practices in the UK Retail Banking Sector. *Ecological Economics*, 156, 224-235. https://doi.org/10.1016/j.ecolecon.2018.09.014

Shi, J., Guo, X., & Hu, X. (2019). Engaging Stakeholders in Urban Traffic Restriction Policy Assessment Using System Dynamics: The Case Study of Xi'an City, China. *Sustainability*, 11(14), 3930. https://doi.org/10.3390/su11143930

Skaalsveen, K., Ingram, J., & Clarke, L. (2019). The effect of no-till farming on the soil functions of water purification and retention in north-western Europe: A literature review. *Soil And Tillage Research*, 189, 98-109. https://doi.org/10.1016/j.still.2019.01.004

STEPS Centre. (2010). *Innovation, sustainability, and development: A new manifesto.* Brighton: STEPS Centre. Retrieved from https://steps-centre.org/wp-content/uploads/steps-manifesto_small-file.pdf

Stephens, W., & Hess, T. (1999). Systems approaches to water management research. *Agricultural Water Management*, 40(1), 3-13. https://doi.org/10.1016/s0378-3774(98)00097-3

Stewart, J. (2012). Multiple-case Study Methods in Governance-related Research. *Public Management Review*, 14(1), 67-82. https://doi.org/10.1080/14719037.2011.589618

Stoate, C., Boatman, N., Borralho, R., Carvalho, C., Snoo, G., & Eden, P. (2001). Ecological impacts of arable intensification in Europe. *Journal Of Environmental Management*, 63(4), 337-365. https://doi.org/10.1006/jema.2001.0473

*Taking steps in digitalization and innovation*. Retrieved 27 June 2022, from https://www.rabobank.com/en/about-rabobank/innovation/digitalization-and-innovation/index.html.

Teixeira, H., van den Berg, L., Cardoso, I., Vermue, A., Bianchi, F., Peña-Claros, M., & Tittonell, P. (2018). Understanding Farm Diversity to Promote Agroecological Transitions. *Sustainability*, 10(12), 4337. https://doi.org/10.3390/su10124337

Triodos. (2020). Triodos Bank Group structure 2020 - Integrated Annual Report 2020. Annual-report-triodos.com. Retrieved 28 June 2022, from https://www.annual-report-triodos.com/2020/our-group/triodos-bank-group-structure-2020.

Triodos Bank. (2019). *Towards ecologically and socially resilient food and agriculture systems.* Retrieved from https://www.triodos.de/downloads/vision-paper-foodagriculture-triodos-bank?id=6adb6fbecab5

Triodos Bank. (2020). Triodos Bank: Finance should stimulate biodiversity. *Triodos.com.* Retrieved 19 January 2022, from https://www.triodos.com/articles/2020/triodos-bank-finance-should-stimulate-biodiversity.

Triodos Bank. (2021). Annual Report 2020. *Triodos Bank.* Retrieved from https://www.triodos.com/press-releases/2021/annual-results-2020

Triodos Bank N.V. (2021). *Articles of Association of Triodos Bank N.V.*. Zeist. Retrieved from https://www.triodos.com/governance

Triodos Bank. (2022). *Beyond risk and return The role of finance in preserving and fostering biodiversity.* Zeist: Triodos.

Triodos Groenfonds. (2022). *Factsheet May 2022.* Retrieved from https://www.triodos.nl/beleggen/groenfonds

Triodos Investment Management. (2021). Generating positive impact through euro-denominated bonds. Zeist.

Turnheim, B., Asquith, M., & Geels, F. (2020). Making sustainability transitions research policy-relevant: Challenges at the science-policy interface. *Environmental Innovation And Societal Transitions*, 34, 116-120. https://doi.org/10.1016/j.eist.2019.12.009

Ulrich, W. (2001). The quest for competence in systemic research and practice. *Systems Research And Behavioral Science*, 18(1), 3-28. https://doi.org/10.1002/sres.366

van Laarhoven, G., Nijboer, J., Oerlemans, N., Piechocki, R., & Pluimers, J. (2018). *A new tool for standardised quantification of biodiversity enhancing performance in the dairy sector.* Rabobank, Friesland Campina, WNF. Retrieved from https://www.rabobank.com/en/about-rabobank/in-society/sustainability/articles/2017/20170706-biodiversity-monitor.html

Van der Molen, D. T., Breeuwsma, A., & Boers, P. C. (1998). Agricultural nutrient losses to surface water in the Netherlands: impact, strategies, and perspectives. Journal of Environmental Quality, 27(1), 4-11.

van der Ploeg, J. (2020). The political economy of agroecology. *The Journal Of Peasant Studies*, 48(2), 274-297. https://doi.org/10.1080/03066150.2020.1725489

van Eekeres, L. (2021). Rabobank: 'Evenveel krediet boeren Nederland'. *Boerenbusiness.* Retrieved 19 January 2022, from https://www.boerenbusiness.nl/agribusiness/artikel/10890988/rabobank-evenveel-krediet-boeren-nederland.

van Tilburg, R., Bosma, D., & Simić, A. (2022). A nature-positive Dutch financial sector. Utrecht: *WWF*. Retrieved from https://sustainablefinancelab.nl/wp-content/uploads/sites/334/2022/03/A-nature-positive-Dutch-financial-sector.pdf

van Zanten, B., Verburg, P., Espinosa, M., Gomez-y-Paloma, S., Galimberti, G., & Kantelhardt, J. et al. (2013). European agricultural landscapes, common agricultural policy and ecosystem services: a review. *Agronomy For Sustainable Development*, 34(2), 309-325. https://doi.org/10.1007/s13593-013-0183-4

Verburg, R., Verberne, E., & Negro, S. (2022). Accelerating the transition towards sustainable agriculture: The case of organic dairy farming in the Netherlands. *Agricultural Systems*, 198, 103368. https://doi.org/10.1016/j.agsy.2022.103368

Vos, J. (2003). Corporate social responsibility and the identification of stakeholders. *Corporate Social Responsibility And Environmental Management*, 10(3), 141-152. https://doi.org/10.1002/csr.39

Wulandari, E., Meuwissen, M., Karmana, M., & Oude Lansink, A. (2017). Access to finance from different finance provider types: Farmer knowledge of the requirements. *PLOS ONE*, 12(9), e0179285. https://doi.org/10.1371/journal.pone.0179285

Xu, R., Tian, H., Pan, S., Prior, S., Feng, Y., & Batchelor, W. et al. (2018). Global ammonia emissions from synthetic nitrogen fertilizer applications in agricultural systems: Empirical and process-based estimates and uncertainty. *Global Change Biology*, 25(1), 314-326. https://doi.org/10.1111/gcb.14499

Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). Sage.

Young, J., Rose, D., Mumby, H., Benitez-Capistros, F., Derrick, C., & Finch, T. et al. (2018). A methodological guide to using and reporting on interviews in conservation science research. *Methods In Ecology And Evolution*, 9(1), 10-19. https://doi.org/10.1111/2041-210x.12828

Zimmermann. (2019). Same Same but Different: How and Why Banks Approach Sustainability. *Sustainability*, 11(8), 2267. https://doi.org/10.3390/su11082267

Ziolo, M., Filipiak, B., Bąk, I., Cheba, K., Tîrca, D., & Novo-Corti, I. (2019). Finance, Sustainability and Negative Externalities. An Overview of the European Context. *Sustainability*, 11(15), 4249. https://doi.org/10.3390/su11154249

# Annexes

## Annex 1: Interview guide

Interview rough length (45 minutes to 1 hour)
Interview questions:

1. **What is your role in the bank?**

2. **What relationships and interactions does your team/department have with other teams/departments within the bank?**

3. Farmers and agricultural clients face many challenges when undergoing sustainability transitions, and transitions towards agroecological farming; from the literature my research focuses on 3 financial barriers.
    A. Insufficient economic (dis)incentives
    B. Lacking transition funds
    C. Limited access to funding

4. On insufficient economic (dis)incentives; sustainable farming often comes at a price premium, beneficial externalities are inadequately compensated, negative externalities are not priced by market mechanisms. **What can be done (or is being done) by your bank to help close the price gap between sustainable and unsustainable agricultural practices?**

5. On lacking transition funds; farmers commonly have high levels of debt (research especially highlights the high-indebtedness of Dutch dairy farmers for example), which acts both as a barrier to change, but also creates path-dependencies locking farmers onto particular farming methods/trajectories. Shifting to grass-based feedstocks may require additional hay storage, or transitioning to lower intensity farming may render previous borrowing for increased barn capacity unnecessary. **How does/can your bank help farmers access funding for sustainability transitions?**

6. The limited access to funding barrier; availability of finance can contribute to efficiency and productivity improvements, as well as higher farmer wages. Different banks will have differing mechanisms for allocating funding (i.e. risk-assessment based lending strategies etc.).
    a. **How does your bank provide access to credit (i.e. what factors are taken into account when considering whether to lend or not)?**
    b. **What institutions/mechanisms exist to help raise awareness of funding pathways to existing clients?**

7. **In addition to these three barriers, what other challenges exist for farmers that want to transition towards sustainability? What can be done by banks to address these challenges?**

8. **What opportunities do you think exist for your bank in governing agricultural clients towards sustainability? (i.e. improving farmer/bank image, providing opportunity for knowledge creation etc.)**

9. **What further capacities are required to accelerate the transition? (i.e. technical, financial, monitoring etc.)**

10. **How are current bank practices being implemented, how could they be better implemented? (targets/KPIs, knowledge sharing networks, outreach programs etc.)**

11. **How are or could outcomes be analysed/quantified? Are there feedback/assessment structures for assessing and analysing progress, is the value of work communicated?**

Annex 2: Rabobank Group corporate and management structure figure