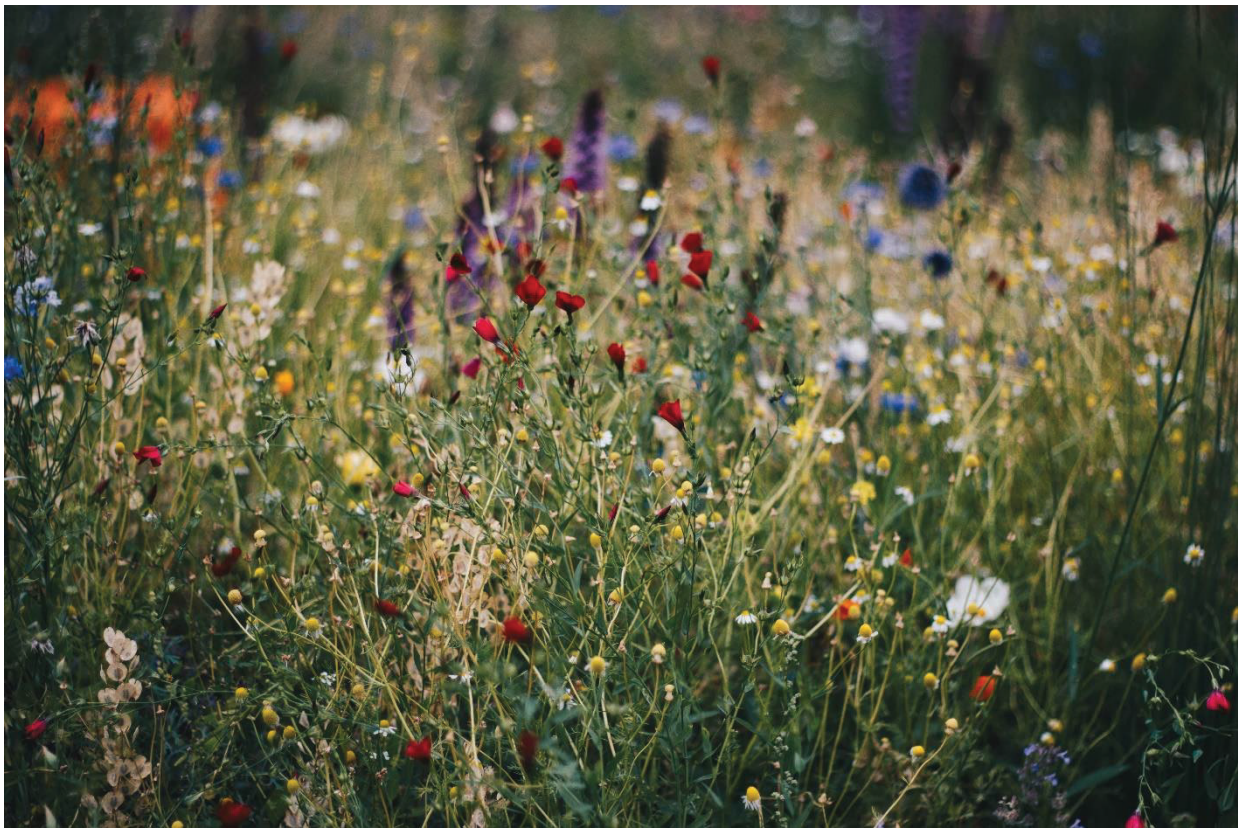
Identifying necessary success conditions for the participation of farmers in agricultural nature conservation in Dutch agri-environmental schemes



E.J. van der Pol

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Colophon

Author: E.J. van der Pol (s480171)
Supervisor: dr. H. Ploegmakers

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Abstract

The state of biodiversity in the Netherlands is under tremendous pressure, caused by different activities and events such as fragmentation, urbanization and deterioration of habitats. In agricultural areas, this deterioration and degradation of the landscape and biodiversity have been visible in large monocultures and the disappearance of species and landscape elements which were common in the Dutch agricultural landscape. Voluntarily agri-environmental schemes, where farmers receive financial compensation in exchange for executing measures focused on agricultural nature conservation, are one of the instruments which try to protect biodiversity in agricultural sites. In the Netherlands, agricultural cooperatives are responsible for coordinating and executing the Dutch *agrarisch natuur- en landschapsbeheer* by the participating farmers. In this research, necessary success conditions in agricultural collectives and cooperatives with an *above Dutch average* participation are identified to gain insight into the differences between the participation rate in 47 cases. Based on the collected data, farmers' *motivation*, *legitimation*, the *role of the collective* and a focus on meadow birds seem to influence the participation rate in Dutch ANLb positively.

Key words

Agricultural nature conservation, collectives, QCA, management packages, ANLb, success conditions, participation, cooperatives

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Summary

Agri-environmental schemes (AES) are instruments used to protect biodiversity in agricultural areas in Europe. In the Netherlands, a unique version of this system operates where agricultural collectives execute and coordinate nature and landscape management by providing farmers financial compensation in exchange for executing measures focused on biodiversity protection. In this voluntary system, farmers can apply for this financial compensation by participating in this kind of AES. The Dutch system, called *Agrarisch Natuur- en Landschapsbeheer* (ANLb), includes fourty agricultural collectives across the Netherlands. Within these collectives, smaller agricultural nature cooperatives exist which can operate as sub-areas in the collectives. To be eligible for compensation, farmers conclude a contract with the collective and execute the agreed measures focused on biodiversity protection, which are defined as *beheerpakketten.*

Around twenty per cent of the Dutch farmers participates in the schemes, but the voluntary character of the ANLb means that there can be great differences in the participation rate in this system among different areas. Therefore, participation is strongly dependent on the willingness of farmers to join the collective. In the research, different conditions influencing the willingness of farmers to participate are identified from the literature. Data from a combination of forty-seven collectives and cooperatives have been collected with an online survey distributed among the collectives and cooperatives. The collected surveys resulted in the creation of a dataset which makes it possible to give a state-of-the-art overview of the Dutch ANLb and compare the cases included in this research. This has been done on the basis of four indicators of success, which are *participation*, *compliance*, *effectiveness* and *continuity.* With the research method Qualitative Comparative Analysis, five success conditions for an *above-average* participation rate are identified by comparing the cooperatives and collectives with a participation rate of at least thirty per cent. Different combinations in the presence of these conditions can lead to this participation rate, and this shows the complexity of how different paths of conditions can lead to a higher degree of farmers participating in agricultural nature conservation. Insight into the important conditions can lead to a better understanding of the differences between cases and how the participation rate in some of the Dutch collectives and cooperatives might be increased.

Preface

Before introducing this Master's Thesis in Spatial Planning, I want to thank my supervisor, mister Huub Ploegmakers for the support, feedback and patience during the process of writing a thesis. The enthusiasm of my supervisor in doing research and regarding this research topic helped me enormously. Without this, I would not have been able to write this thesis and complete my Master's Degree in Spatial Planning at the Radboud University.

Further, I want to thank everyone I spoke with during explorative interviews and everyone I discussed parts of my research with. Lastly, thank you to all the respondents who took the time and helped me collect the data used in this research.

During my bachelor's and master's studies, I have always been interested in research themes which have to do with biodiversity, nature, environment and landscape in relation to spatial planning issues. Despite the fact that this research has turned out to be a difficult process, I am very glad with this research subject, the knowledge I have gained, and the interesting talks I had with people who know a lot about this subject.

Erik van der Pol

1. Introduction to the research

1.1 Reason for the research

The main reason for this research arises from the personal interest in the current bad state of biodiversity in the agricultural areas in the Netherlands and the need for solutions to stop the ongoing trend of biodiversity decline. The deterioration of the biodiversity state is not a new problem which occurred in the last years but largely the result of policies that focused too little on protecting nature in rural areas for decades. Instead of balancing nature and production, production and efficiency counted as the basis for the agricultural sector. Newbold et al. (2015) state that agricultural intensification is often a threat to biodiversity, looking at the large-scale monocultures and use of agrichemicals as examples. Also, urbanisation, the construction of infrastructure resulting in fragmentation, isolation and loss of habitat have a negative effect (Andrén, 1994; Otero et al., 2020). With around 70% of the Dutch land, the agricultural landscape forms by far the largest habitat for all kinds of species and plants (Erisman et al., 2016, p. 161). Especially the presence of meadow birds, for a long time one of the characteristics of the countryside, is one of the indicators of a biodiversity-rich agricultural area. Meadow birds are '*both for their value as ecological indicators and for the high number of species of conservation concern associated with agricultural ecosystems',* as stated by Calvi et al. (2018, p. 60). The Netherlands, and in particular its polders with large areas of grasslands, have always been the most important breeding ground for meadow birds, almost 90% of the Western and Central European population of black-tailed godwits used to breed in the Netherlands (Piersma, 1986).

For meadow birds, intensive grassland management with early and more frequent harvests is for example one of the reasons for nest destruction (Grüebler et al., 2012). The decline in the number of meadow birds in agricultural areas is clearly visible based on bird research by, for instance, Sovon Vogelonderzoek Nederland (2018). This problem has been recognized by the Dutch national government since 1970 already, and by that time, also measures were taken in order to stop the negative trend (Van Turnhout, Foppen & Zoetebier, 2019). Since the 1970s, farmers have had the possibility to apply for financial support when measures are taken to protect meadow birds by, for example, postponing the mowing date, so meadow bird chicks have a higher chance of surviving.

However, the *AES approach* did not lead to a significantly better situation for meadow birds and other species in the Netherlands. This previous system was known as the SNL-a. Different studies show that implementation of this system did not help to turn around the trend of decline in the number of meadow birds and that the measures lack effectiveness (Kleijn et al., 2001; Kleijn et al., 2006; Van

Egmond & De Koeijer, 2006; Breeuwer et al., 2009). Eventually, this led to the large-scale revision of the system in the EU, which resulted in the Netherlands in the more area-oriented, collective approach named *Agrarisch Natuur- en Landschapsbeheer* (*ANLb)* (Van Turnhout, Foppen & Zoetebier, 2019). Different from the old version of the *AES,* in which farmers individually applied for subsidies, this is currently the task of farmer cooperatives in the new *ANLb*. This new approach promoting a more nature-inclusive way of farming and restoration of the habitat for species might work better than the old system, but more research on which conditions improve the effectiveness and insight in how to increase the participation rate is necessary. Kleijn et al. (2018) state that despite the large commitment of farmers and public investments, the decline of biodiversity as a direct or indirect result of excessive use of fertilisers and pesticides has not stopped. In short, it can be said that for more or less forty or even fifty years, the problem of biodiversity loss has been recognized by the European and Dutch governments, but the AES approach so far has not led to significant positive ecological effects in agricultural areas. Kleijn et al. (2018) emphasise that the decline in, for example, the number of insects seems only to stop with an integrated approach in nature conservation areas and less intensive agricultural management in the area surrounding.

However, only the latest revision of the agri-environmental schemes is not assumed to directly lead to the improvement of the current state of biodiversity in rural areas. The use of fertiliser and pesticides has major negative effects on the number of insects and thus on the food chain of other species like farmland birds. Management packages aimed at the creation of flower strips and postponement of mowing dates alone probably would not significantly improve the state of biodiversity without a more extensive form of agriculture and less use of fertiliser and pesticides. However, the involvement of agricultural collectives might positively affect the participation rate in adopting and implementing measures focusing on biodiversity conservation. With a more area-oriented approach, the latest reform of the Dutch AES system offers the possibility and need to investigate further the success conditions and the question of which of these conditions have to be present for a minimum percentage of farmers executing measures focused on agricultural nature conservation. These (local) success conditions are further on in this research identified and operationalised but assumed to differ in strength among cases; the knowledge gap of which success conditions are present or lacking per area needs to be filled to improve the quality and effectiveness of the current *ANLb* system.

1.2 Research problem statement

Since 2016 farmer collectives have provided financial compensation for implementing measures focusing on biodiversity protection in the Netherlands, following the new scheme design of the common agricultural policy (CAP) in the EU. The agri-environmental schemes are a part of the CAP and should enable farmers to protect wildlife habitats on agricultural land (European Commission, 2019). The Dutch ANLb is in its turn an instrument of the *Plattelandsontwikkelings*-programma (POP3) (BIJ12, 2016a). In the current ANLb system, a central role is assigned to the agricultural collectives (ACs), which offer so-called *beheerpakketten* to farmers. These packages include certain rules the farmer must follow to receive financial compensation. For these packages apply: the more impact and the longer the length of the measure usually leads to higher financial compensation. In the Netherlands, collectives propose an area application (so-called *gebiedsaanvraag*) which the province will assess, and if necessary, points of improvement are proposed (BIJ12, 2016b). Farmers with plots located in the concerned area then can apply by the collective to execute measures in exchange for the financial compensation. Before this common agricultural policy reform, farmers had to apply individually for subsidies in exchange for adopting and implementing the measures aimed at biodiversity conservation. Next to the task of the collectives to redistribute government payments through private contracts with its members, the collectives have a coordinating role in achieving spatial connectivity and fulfilling regional priorities and targeted areas and species (Barghusen et al., 2021).

As the agricultural landscape forms the largest habitat for species in the Netherlands, biodiversity can benefit from a healthy landscape and the other way around. This kind of interplay where landscape elements like hedges, field margins and herb-rich strips benefit biodiversity, and the biodiversity in its turn with the provision of pollination by insects and, for instance, biological plague reduction (Erisman et al., 2016, p. 161). Therefore, the agricultural sector also serves as one of the solutions if a large-scale shift can be made to more nature-inclusive farming. The agri-environmental schemes form the instrument to help reach this. However, the functioning of the current design of AES in the Netherlands is a relatively new subject in research and therefore important to further investigate in order to make recommendations for improvements. The voluntary character of the AES means that participation depends on the willingness of farmers to join the agricultural collective and execute measures of the management packages. The underlying motivations for participation are subject to research (e.g., Lokhorst et al., 2011) and help to better understand the reasons for participation of farmers and landowners. Earlier research on the conditions and motivations which are essential for participation in AES is used in this research to find out which conditions seem crucial to reach a minimum percentage of farmers for sound execution and participation of measures in agricultural collectives and the area of the agricultural nature cooperatives in the Netherlands.

1.3 Research aim

Different researchers have already identified more than 25 factors influencing the success conditions for a shift towards more nature-inclusive farming (see Westerink et al., 2019). Therefore, it is not assumed to identify new factors, but research on the necessity of these different factors in comparative research can help to gain insights into the differences between success conditions among agricultural nature cooperatives and agricultural collectives in the Netherlands. This research aims to give an overview of, and insight into the degree of success of ACs and ANCs substantiated with measured indicators of success. Different conditions and characteristics of the collectives, the area and the farmers in the area should lead to the identification of the success conditions necessary for a well-performing collective or cooperative. However, this aim is not expected to lead to the delivery of one set of success conditions that will lead to guaranteed successful implementation and execution of measures in every area.

Knowler and Bradshaw (2007) emphasize the importance of particular conditions of individual locations in efforts to promote conservation agriculture. In each case, the most important factors can differ, and there is not one formula of specific success conditions valid in each area. In short, different studies show that participation in more nature-inclusive farming depends on socioeconomic and structural factors, the attitude of farmers, and the importance of these factors also differ between areas. Participation in a program focused on agri-environmental measures is dependent on the attitude of farmers, but the extent of this condition is not uniform in all areas following Defrancesco et al. (2008). The fact that the influence of certain conditions differs is consistent with the concept of multiple conjunctural causation, that more combinations of variables can lead to successful biodiversity protection and that per context, the combination of conditions varies (see Berg-Schlosser et al., 2009). This research follows the concept of multiple conjunctural causation and does not assume that there is just one combination of success factors, but it aims to contribute to identifying different combinations and insight into the important success conditions for farmer participation in the ANLb.

Besides this, the creation of a dataset with the involved cases and useful data for further research is aimed for. This data can be used to get an overview of the current state of the collectives and cooperatives and the execution of the ANLb. This data might be used for analysis with a different point of view or to compare with future research.

1.4 Research questions

To deal with the problem statement and in order to live up to the research aim, three sub-questions and one main question are formulated. The main question in this research is formulated as follows:

''Which conditions are necessary for the successful adoption and implementation of measures focussing on biodiversity protection in Dutch agricultural collectives and agri-environmental cooperatives?''

The following sub-questions are formulated in order to answer the main question:

- *How is success defined in the case of the adoption and implementation of measures focussing on biodiversity conservation and landscape restoration?*
- *To what extent does the degree of success differ between the collectives and cooperatives involved in this research?*
- *Which success conditions can be identified in the studied collectives and cooperatives, and to what extent does the success depend on these conditions?*

1.5 Relevance of the research

The current AES system in the Netherlands requires research on the ecological effects but also on the cooperation and motives of farmers to participate. The mentioned voluntary character and expected differences between ACs and ANCs imply that there are differences in the degree of participation and quality of the execution of measures among cases. This research contributes to the insight into differences in these indicators of success and tries to identify necessary conditions for successful implementation and execution of agricultural nature conservation. How this successfulness is exactly defined will be discussed further on in this research.

1.5.1 Scientific relevance

Scientific substantiation of the current knowledge on the current AES system can make legislation and policies more effective and efficient. The revision of the AES system in the Netherlands with the replacement of the SNL-a system because of a lack of effectiveness and too high costs is an excellent example of the usefulness of assessment of these kinds of policies and systems.
This research will contribute to the scientific knowledge available on the current implementation and execution of measures focused on biodiversity conservation in the area of Dutch agricultural collectives and agricultural nature cooperatives. The research does not include new data on the ecological effects of the AES revision in the Netherlands but does serve as a kind of inventory in

which the presence of expected success conditions is tested. The research gives a comprehensive view of a set of indicators of success in the agricultural collectives and cooperatives and an identification of essential conditions necessary for farmer participation in the Dutch ANLb.

Westerink et al. (2017) state that scientific research analysing collaborative governance arrangements on AES is lacking, while in the Netherlands, the subsidies focused on more nature-inclusive farming are provided through the ACs, which can be characterized as a governance arrangement. Next to the central role that the collectives have in the adoption and implementation of the management packages, the importance of spatial coordination and collaboration is acknowledged (e.g., Westerink, Melman & Schrijver, 2015), and these concepts are important pillars in the current AES system in the Netherlands. Interesting is the finding of Kleijn et al. (2004; 2006) and Ohl et al. (2008) that measures in the agri-environmental schemes are more effective in modern, intensive agricultural landscapes. This fact indicates that in a modern agricultural landscape like a large part of the Netherlands, well-executed AES can have significant positive effects on biodiversity. Therefore, insight into the execution of current ACs and ANCs is helpful. In addition, this research can help the collectives and cooperatives self to see which conditions are present and in which it excels, and which conditions might be lacking. This gives direct insight into which aspects need attention in order to improve the effectiveness and execution of the ANLb. In addition, the success conditions identified in this research can be compared with the suggested success conditions for participation from the literature.

1.5.2 Societal relevance

Next to the scientific relevance, this research can be considered societal relevant in different aspects. First, biodiversity protection is one of the main challenges in the 21st century as the number of species decreases rapidly, in particular in the Dutch agricultural areas. In the Netherlands, there are more than 50.000 agricultural businesses, and the agriculture and horticulture sectors take up two-thirds of the total land area (CBS, 2020; Compendium voor de Leefomgeving, 2020). In 2018, The whole agricultural sector offered 244.000 jobs, and the agricultural businesses had a net turnover of 29 billion euros in 2017 (CBS, 2020). Therefore, development and changes in the agricultural sector have impact on the Dutch landscape and on an important economic sector. The overall decline of the biodiversity state and landscape quality has been clearly visible in the last decades, and just as the measures that are part of the ANLb, which are executed by farmers, have their influence on the living environment.

The fact that measures are meant to be executed in agricultural sites does not mean that citizens not involved in agriculture do not play a part in the development of this sector. Farmer behaviour

expressed in adopting measures focussing on biodiversity conservation is, for a large part, a reflection of consumer behaviour and urgency in legislation to shift to a more nature-inclusive system of agriculture and dairy farming. In society, there are citizens, organisations and nature organisations and participants in agricultural collectives who feel the urgency to act in order to protect biodiversity in agricultural areas, but performing certain behaviour is still on the basis of voluntarily participating in an agricultural collective. Insight into the success conditions can lead to better understanding and interest in how individuals also can contribute to enabling farmers to shift to more nature-inclusive farming, expressed in the execution of agricultural nature conservation.

Mills et al. (2016) and Westerink et al. (2019) state that negative publicity on agriculture from society makes farmers think about their social responsibility and that farmers involved in social networks existing with non-farmers are more willing to participate in agricultural nature management. And more importantly, increasing market demand for more biodiversity-friendly products caused by a shared feeling of urgency from society helps to create a fair price for products, eventually leading to a stop in the ongoing agricultural intensification in the last decades. More research and identification of which conditions can stimulate participation in more nature-inclusive farming therefore helps to bring this problem to the attention of society.

2. Theoretical framework

In the scientific literature, several essential conditions can be identified for a minimum percentage of farmers adopting and implementing agricultural nature conservation measures. Initially, three main conditions are identified from the literature, which are: motivation, legitimation and possibilities. Motivation depends strongly on the intrinsic motivation of farmers, and demand and legitimation are more dependent on other actors involved. The perceived possibilities concern the question of the farmer if the execution of measures can be implemented in the business operations.
In the following sections, these conditions are substantiated with underlying theories and factors influencing the conditions. The choice of farmers to participate in the ANLb can be seen as a certain behaviour, which is expressed as *farmer behaviour* in this research.

2.1 Theoretical approaches to understand farmer behaviour

In this section, the theoretical background to understand how farmer behaviour is formed. Different theoretical approaches trying to explain human actions are used as a theoretical framework to understand where specific farmers' choices are based on, and these choices are thus defined as *farmer behaviour.* The Theory of Planned Behaviour (TPB) and Value-Belief-Norm Theory (VBN theory) are two theories from the sociology field which are used here to understand behaviour.

2.1.1 Theory of Planned Behaviour

Regardless of the current policies and discourses, farmers are the *agents* or actors who can perform certain actions to do something for biodiversity protection. To understand why farmers choose to take action to protect biodiversity or a healthy landscape, this research discusses behavioural theories which should lead to a better understanding on which grounds farmers make their decisions to act in a certain way. The Theory of Planned Behaviour from Ajzen (1991) is a reasoned action approach that has been used very frequently to explain human behaviour and can help to understand farmer behaviour towards more nature-inclusive farming practises. In the theory, the outcome *behaviour* is shaped indirectly by *perceived behavioural control* and directly by *intention*, which is the product of *attitude toward the behaviour, subjective norm* and again *perceived behavioural control.* The Theory of Planned Behaviour has been built on the Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975). Both of the models are displayed below in figures 1 and 2. In the TPB, which can be seen as the revised version of the TRA, *perceived control* is defined as the perception of persons on their ability to perform a given behaviour (Sok et al., 2021). The subjective norm is about the perception of what behaviour others would approve or disapprove of. The first independent variable in the model of the TPB is the *attitude toward the behaviour,* and this is mostly determined by a person's

characteristics. In the model of the TRA by Fishbein and Ajzen (2011), the authors show how the three independent variables are influenced by background factors, distinguished in factors on the individual, social and information level.

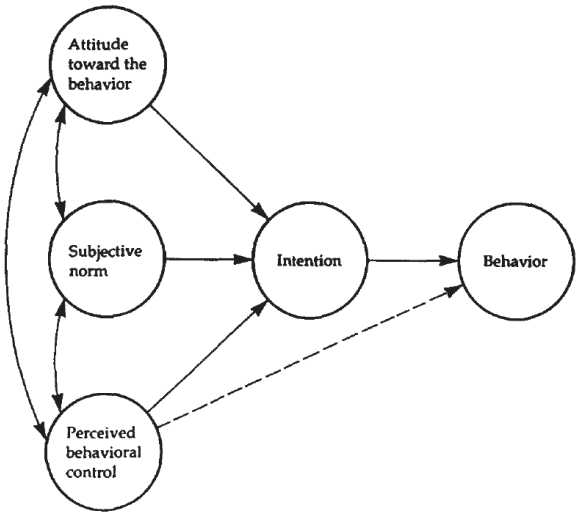

Figure 1. Theory of planned behaviour model (Ajzen, 1991)

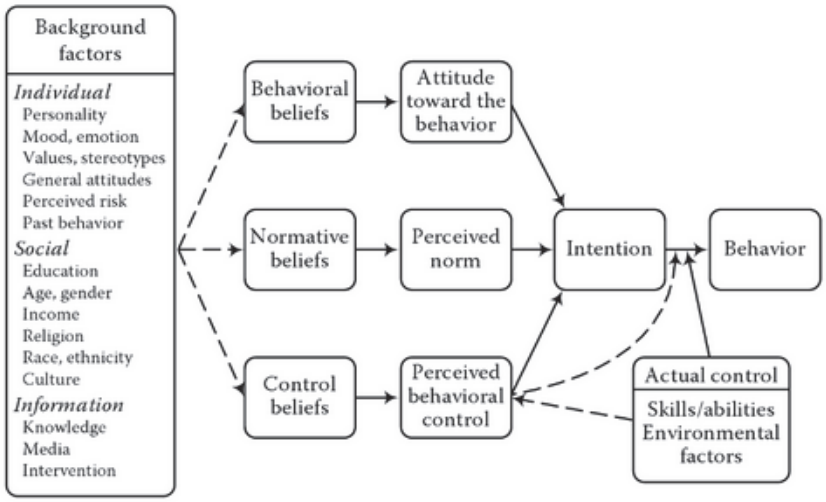

Figure 2. Theory of Reasoned Action model (Fishbein & Ajzen, 2011).

Different authors added behavioural constructs to the model of the Theory of Planned Behaviour, for instance: response-efficiency (Homburg & Stolberg, 2006) and self-identity (Burton, 2004; Lokhorst et al., 2011). Response-efficiency refers to the perceived efficacy and the fact that one is more willing to adopt certain behaviour if it is efficacious. Self-identity ‘’*reflects the farmer’s personal value system and worldview based on their own experiences and moral values and acts as an internal frame of reference, determining their perceptions of external factors and their own preferences’’* (Mills et al., 2017, p. 286).

Attitude towards the behaviour is the first variable leading to the intention to perform a certain behaviour. Here, a higher degree of positive attitude means a greater chance of a positive intention. The subjective norms in the Theory of Planned Behaviour of Ajzen (1991) show the influence that other actors have on a farmer's behaviour. This variable can be described as *''the degree to which one feels that significant others think one should perform the behaviour''* (De Snoo et al., 2013, p. 68). NGOs, for instance, can contribute to a positive change in farmer behaviour if these NGOs are considered *significant others* by farmers and they care about their opinions and ideas. For actors such as nature organisations, therefore, it seems necessary that the subjective norm can be embedded in the idea of what a good farmer should do, so nature conservation measures fit in the view of what farmers see as good farming. The perceived behavioural control of an individual can be operationalised as the potential skills, opportunities and barriers which are in the eyes of the farmer relevant to performing the behaviour (De Snoo et al., 2013). This is related to the belief that one's behaviour can lead to a successful contribution to the desired goals (Oreg & Katz-Gerro, 2006). Here, it must be said that only farmers having a positive attitude toward nature conservation or more nature-inclusive farming will not directly lead to a certain behaviour, in this case, the implementation and adoption of measures by participation in the ANLb. Ajzen (1977) and Fishbein & Ajzen (1975) argued that the overall pattern of responses to an object is influenced by a person's attitude, but only attitude does not predict any action. The large number of background factors that Fishbein and Ajzen (2011) identified as variables influencing behavioural beliefs leading to an attitude toward behaviour are largely determined and not flexible. The relation between background factors and behavioural beliefs leading to a certain attitude toward the behaviour indicates that farmer behaviour not only can differ between farmers themselves but also in regions where culture and religion differ in general or in the degree of influence it has on the individual attitude.

2.1.2 Value-Belief-Norm Theory

Next to the TPB of Ajzen, the Value-Belief-Norm Theory of Movement Support (VBN-theory) by Stern et al. (1999) provides a theoretical basis to study farmer behaviour, as well as the Norm Activation Theory (NAT) of Schwartz (1977), where this VBN-theory is built on. The theory of Schwartz assumes that behaviour can be predicted by personal or moral norms. The model of this theory can be presented as a chain where *awareness* leads to *responsibility*, leading to the *personal norm* and ultimately to *behaviour* (De Groot & Steg, 2009; Onwezen, Antonides & Bartels, 2013). The concept of *value* denotes an individual's preference, *''setting one thing before or above another thing''* (Oreg & Katz-Gerro, 2006, p. 466; Brown, 1984). The model of Stern et al. (1999) includes the *New Ecological Paradigm*, founded by Dunlap and Van Liere (1978). This paradigm believes in the importance of balancing economic growth, limit to growth and environmental protection. The VBN theory assumes the influence of the personal values that make that one sees the (negative)

consequences of actions resulting in a *pro-environmental personal norm* which can be expressed in activism, citizenship, policy support or private-sphere behaviours, as shown in figure 3 below when the theory is applied to environmentalism. In this research, the variable (*intrinsic*) *motivation* to take biodiversity protection measures is supported by this theory. Intrinsic motivation originating from personal characteristics and affinity with nature can play a major role for farmers to participate in agri-environmental schemes, next to the motivation of farmers as a result of, for instance, cost-benefit considerations.

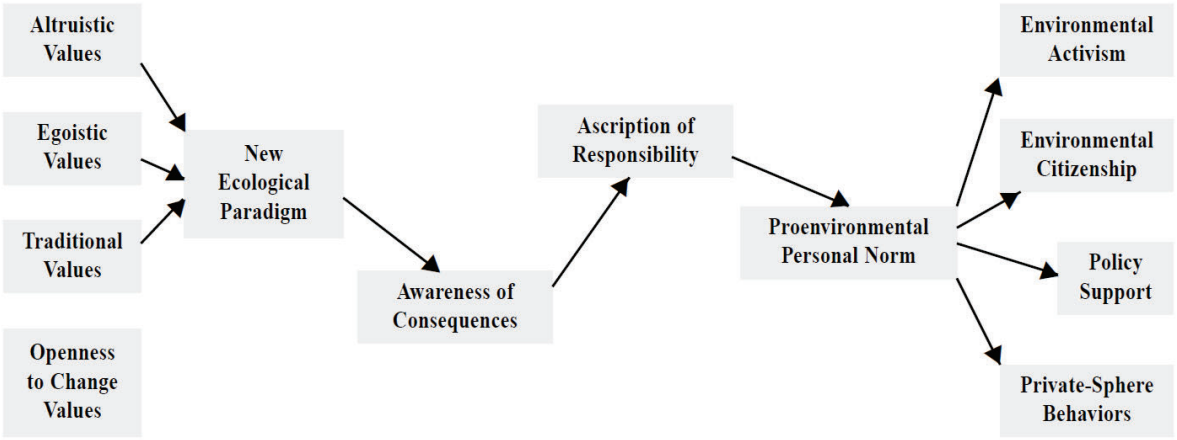

Figure 3. *Schematic model of the Value-Belief-Norm Theory applied to environmentalism* (Stern et al., 1999).

Johansson, Rahm & Gyllin (2013) adapted the VBN theory on landowners' participation in biodiversity conservation, resulting in the model where specific values, beliefs and personal norms lead to participation in biodiversity restoration projects. The beliefs *environmental concern*, *awareness of consequences for biodiversity*, and *perceived ability to reduce threats against biodiversity* should lead to a *sense of obligation to take action* and result in participation in a biodiversity restoration project. Harland, Staats and Wilke (1999) and Bamberg & Moser (2007) also address the presence of a *personal norm,* which means that one has the moral responsibility to act in a certain way, having an influential role in the behaviour. The causal chain shown in the Value-Belief-Norm theory in figure 4 differs from the Theory of Planned Behaviour of Ajzen (1991) but has similarities with the Theory of Reasoned Action of Fishbein and Ajzen (2011). *Values* are placed under *background factors* in this theory, leading to *beliefs,* followed by *attitude, norms* and ultimately, *behaviour*.

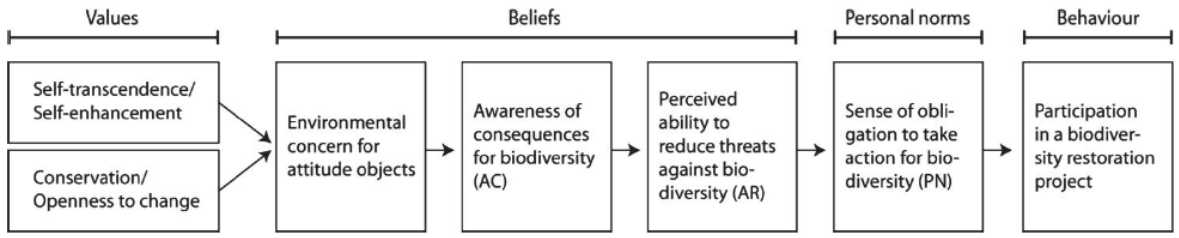

Figure 4. *Schematic model of the Value-Belief-Norm theory, adapted and applied to participation in biodiversity conservation projects* (Johansson, Rahm & Gyllin, 2013).

2.1.3 Lock-in and path dependency

Where the VBN theory and the Theory of Planned Behaviour both serve as the basis to explain which variables influence farmer behaviour resulting in AES participation in this research, lock-in and path dependence can be seen as one of the possible constraining factors for participation, even if farmers have the intention to perform more nature-inclusive farming practices. Path dependence can be seen as a mechanism behind fixed development in Dutch agriculture, following Vink and Boezeman, 2018. The concept of path dependence is defined by Sewell (1996, p. 262-263) as ‘’*what has happened at an earlier point in time will affect the possible outcomes of a sequence of events occurring at a later point in time’’.* In the agricultural sector -and in this research- the fixed development can be expressed as continuing with agricultural business focused on efficiency and cost reduction. Striving to maximise production and related investments can limit the perceived possibility of implementing biodiversity conservation measures. In essence, the start-up costs for alternatives are an obstacle that limits the possibilities for change (Vink & Boezeman, 2018).

Mills et al. (2017) mention next to compatibility with the farming system and external drivers, the economic status of the farms as one of the factors influencing the ability to produce more nature-inclusive farming products. Earlier decisions, in combination with investments in the past, can form a major obstacle to switching to a more nature-inclusive farming style, even if a farmer has a positive attitude towards nature-inclusive farming. Long-term financing is not completely guaranteed in subsidy schemes, and the long-term perspective has not been sufficient to make new investments necessary for more nature-inclusive farming (Jongeneel et al., 2008). The authors state that farmers can doubt whether contracts will be renewed or that practices which are voluntary at the time will become compulsory in the future.

Path dependency can make it more difficult to adopt new measures in the business operations as this is not in line with the earlier decisions and what used to be the norm. The intensification and striving for higher and more efficient production that has been going on for decades can be characterized as a

mechanism that drove farms into a direction where agricultural nature conservation did not fit in. The market for farm products where the demand is dependent on the desired products of the consumer is not proven able to stop the trend of intensification. Higher-priced, more nature-inclusive products will only be produced if it is attractive for the farmers to deliver.
In the end, farmers can still make their own choices, but certain choices have become less and less inevitable because of previous choices (Vink & Boezeman, 2018). This path dependence in itself is not necessarily bad, as it leads to specialisation, but if society or the market demands a shift, path dependency limits possibilities for farmers. Vink and Boezeman (2018) distinguish four kinds of path dependence present in agriculture: *material*, *cognitive*, *financial* and *regulatory path dependence*. Material path dependence refers to the investments in, for instance, the organisation of the farm, machinery and farm sheds. The investments are based on certain expected revenues, and therefore shifting to more extensive farming would mean that a farmer is left with costs made for a more cost-efficient business model. Financial path dependence is related to this as it means that a bank will not be willing to grant new credit for investments in more extensive farming if earlier loans were granted for investments focused on a business model focused on cost price reduction. Cognitive path dependence includes all the experience and knowledge the farmer has gained through the years with a specific business style. The production of other crops or making a shift to other cattle may require different knowledge. The last kind, regulatory path dependence, refers to the fact that developing new regulations on the basis of the current policy is less difficult than starting from scratch and developing a completely new set of regulations (Vink & Boezeman, 2018, p. 18).

Path dependence takes place in the entire sector, and the issue in that sense is not dependent on a local context, but the degree of local demand that might create slight risk reduction to shift to a more nature-inclusive farming style might differ between areas. The presence of conditions that might invite farmers and other involved actors (e.g., banks) to choose another path can lower the barriers to switching paths. Vink and Boezeman (2018) and Smits et al. (2020) mention three measures that can be taken:

1. Enhanced self-management and supply chain management, realizing changes by the industry itself, with facilitating policy of the (local) government;
2. Centralizing public values and exchange. Initiating and facilitating of the public debate and the financing of desired norms with tax money. Central here is the way in which agricultural development paths can be adjusted;
3. Regionalization of what can be done regionally. This is in line with regional agreements on nature-inclusive farming, ACs, ANCs and regional products and multifunctionality.

2.1.4 Social capital and social norms

The presence and tillage of farmland have a large impact on the physical appearance of the landscape, just as different farming styles lead to other physically shaped landscapes, for instance, monocultures in more intensive farming areas and plots with more landscape elements in more nature-inclusive farming areas. The literature denotes that landscapes are socially constructed and, in certain ways, governed by humans (Görg, 2007; Lagendijk, Arts & Van Houtum, 2009), and in this process, social and cultural capital has an important role. Social capital is defined by Woolcock and Narayan (2000, p. 226) as ‘’*the norms and networks that enable people to act collectively*’’, and seems of great importance in researching farmer behaviour as farmers in local ACs and ANCs are part of a collective. Different authors used the theory of social and cultural capital of Bourdieu in research on farmer decisions (e.g., Burton and Paragahawewa, 2011). In his theory of capital, Bourdieu (2018) makes a distinction between three fundamental kinds of capital: *economic*, *social* and *cultural* capital, which can be converted between these forms via *symbolic* capital. In understanding farmers’ decisions towards nature conservation, the social status of farmers in (local) farmer communities based on their cultural and social capital is key, according to Burton, Kuczera and Schwarz (2008); Burton and Paragahawewa (2011) and Sutherland and Burton (2011). Besides the distinction of capital in three different forms made by Bourdieu (2018), cultural capital can be expressed in three states: institutionalised (e.g., educational qualifications), embodied (e.g., skills) or objectified (De Krom, 2017). Cultural norms in farmer communities can show, for instance, the importance of a ‘tidy landscape’, meaning that farmland fields are free from weeds, which makes the owner a good farmer (e.g., De Krom, 2017; Mills et al., 2016). Here, cultural capital is objectified as a ‘tidy landscape’. These kinds of social norms in a (local) farmer community can be a barrier for farmers to be *legitimized* in initiatives that aim for more diversity and landscape elements, which is the opposite of a tidy landscape, aiming for a more monocultural landscape.

2.2 Conditions influencing participation

The previously described theoretical approaches scientifically substantiate the three main success conditions for farmer participation in AES, identified from the literature: *motivation*, *possibilities* and *legitimation.* Motivation is strongly based on the TPB and VBN, *possibilities* partly on the concept of *perceived behavioural control* in the TPB, and the theory of path dependence. The condition *legitimation* is the condition which leans on the theory of social and cultural capital of Bourdieu (2018). These first three conditions are related to the farmers and therefore specified as operating on the *farmer level*. Next to these first three conditions, the condition *capacity* (of the collective) is concerned with the collectives and cooperatives and involves the features and operation of these organizations. This is expressed as the role of the collective, which operates on the *governance level.*

This condition is labelled *capacity* as it concerns the capacity of the collective in terms of the available knowledge, time and resources for the active approaching of farmers and to support farmers with executing measures and/or overcoming barriers for participation.
Next to the farmers themselves and the collectives, other actors such as nature organizations and volunteers might have an influence on the farmer's choice to participate in ANLb, as well as characteristics of the area, which partly determine which management packages and target species the measures are focused on. This data is measured within the *area* and *type* conditions, which are included in the *landscape* level.

2.2.1 Farmer-level conditions influencing participation

Motivation

Based on the behavioural theories in chapter 2.1, *attitude toward the behaviour, subjective norm, perceived behavioural control, personal moral obligations* (Ajzen, 1991; Fishbein & Ajzen, 1975; 2011), *self-identity* (Lokhorst et al., 2011; Burton, 2004), *response efficacy* (Homburg & Stolberg, 2006), *personal norms* (Schwartz, 1977; Johansson et al., 2013) and *group norms* (De Snoo et al., 2013) can be summarized as the important variables that influence the willingness to engage in more environmental behaviour, which can be explained as the condition of *motivation.* Various authors researched farmer behaviour based on the Theory of Planned Behaviour of Ajzen (1991) and the Theory of Reasoned Action of Fishbein and Ajzen (1975; 2011), and the concept of motivation based on the image of the *good farmer* and *good landscape* will be discussed.
Personal views and ideas of what a *good farmer* should do and what a *good landscape* implies play an important role in the motivation of a farmer. In the mainstream idea of a good farmer, high production is very important, according to Burton (2004). Farmers work in an intensive system where high production and efficiency are desired, and sacrificing land with high fertility for nature conservation is experienced as an issue for a large number of farmers (Wauters, D'Haene and Lauwers, 2017). Subjective norms are capable of influencing the view of what the concept of a good farmer includes. If other actors keep promoting nature-inclusive farming, the image of a 'good farmer' might shift from being the owner of highly productive land to more nature-inclusive farming, making the motivation of farmers toward more nature-inclusive behaviour positively changes.

Next to the motivation originating from personal and subjective norms, more practical issues influence the motivation of a farmer to participate in more nature-inclusive farming.
Jongeneel et al. (2008) and Westerink et al. (2018) emphasize farmers' desire for freedom and autonomy. Performing a certain behaviour on own initiative may be preferred over the mandatory implementation required when participating in AES when restrictions on what is allowed are imposed (Lokhorst et al., 2011; Siebert, Toogood & Knierim, 2006). The additional bureaucracy involved in

participating in AES is another barrier for farmers to participate, according to Schroeder, Chaplin and Isselstein (2015). And so, more barriers can reduce the motivation of farmers. For this reason, the boundary between the formulated conditions *motivation* and *possibilities* can sometimes be a grey area, as the absence of perceived possibilities can limit the motivation one has. This illustrates the interconnectedness between the three conditions with each other, as they can indirectly influence the motivation of farmers.

The concept of *intrinsic motivation* addresses the affinity with nature and motivation to adopt and implement measures purely because of the aim to protect biodiversity and landscape elements. Many authors name affinity with nature and the wish to contribute to nature conservation as one of the most important factors influencing the willingness to participate in agri-environmental schemes (Wilson & Hart, 2000; Siebert et al., 2006). Making a distinction between motivation originating from a strong affinity with nature and motivation caused by, for instance, financial incentives can contribute to understanding if the agricultural collectives can increase the motivation to participate or whether it is still in particular dependent on the beliefs and values of the farmer.
The importance of personal interest in nature and participating in AES is also mentioned by Mills et al. (2016). However, addressing that only a positive *attitude,* as described by Ajzen and Fishbein (1980), does not directly lead to performing a certain behaviour. Runhaar et al. (2017) state that farmers can lose motivation if the measures require too much effort, even when major effects on biodiversity can be reached with the measures. Also interesting is the relationship between participation in ACs and interest in nature biodiversity protection, as one of these variables might mutually influence each other. As Wilson and Hart (2000) state: participating in an agri-environmental cooperative might be dependent on the degree to which one wants to contribute in agricultural nature conservation, but the other way around, participating can help to improve the affinity with nature. In the TPB model, the interrelation between *attitude towards the behaviour* and *subjective norm* influencing the *intention* form a theoretical basis of this process. The findings of Wilson and Hart (2000) indicate that intrinsic motivation is neither a necessary starting condition for participation in AES nor that other reasons make farmers move to participation, and intrinsic motivation might occur and develop over time.

Possibilities

In the scientific literature, one other condition coming from landowners or farmers themselves and one provided by other actors can be identified: *ability* and *demand.* In this research, the condition *possibilities* have been formulated as the combination of market demand and the ability of farmers to implement and adopt measures. The concept of ability is not literally related to the fact that the landowner is able to perform or take specific measures, but more the estimation of the farmer regarding the possibilities and the control of the behaviour (Farmar-Bowers & Lane 2009; Methorst, 2016; Wauters et al., 2017; Westerink et al., 2019). Linked to the Theory of Planned Behaviour, this can be seen as the variable of *perceived behavioural control*. Further, ability, and therefore the possibility to adopt and implement, can emerge or is stimulated by a certain degree of demand in products or behaviour. Because of this relation between the two, the choice was made to merge both of the conditions in the condition *possibilities.*

Demand is the one main condition that is -or should be provided by other actors than farmers themselves. Runhaar et al. (2017) define it as the ‘’*extent to which farmers are requested or even obliged to participate in a nature conservation governance arrangement’’* (p. 268). Market failure is in principle the main reason for subsidy schemes promoting more nature-inclusive farming, as the demand for more sustainable products from the market is insufficient to generate a major shift to the production of these products by itself. The same applies to measures in the AES, which are not paid for by other actors than (national) governments, as there is no market for it at all. The current market demanding farmers to deliver ecosystem services fails (Jongeneel et al., 2008), but according to Runhaar et al. (2017), supply-chain governance where dairies set requirements on biological standards of the products, for instance, has the potential to create more demand for more nature-inclusive products. More demand for more sustainable products is in itself also an incentive to change behaviour (Mitrokostas & Apostolakis, 2013). Therefore, demand expressed as market demand for more biological products or expressed as discourses and societal critique can be placed in or described as the *subjective norm* in the Theory of Planned Behaviour of Ajzen (1991).
Next to absolute or measurable demand expressed in the production of more nature-inclusive products, demand can also be expressed in the public opinion or negative attention, which can change the view of farmers on their societal responsibility they have (Mills et al., 2016, Westerink et al., 2018; 2019). The Norm Activation Theory of Schwartz (1977) might be used as the basis to describe this process of creating awareness that the current functioning of the agricultural sector causes major negative effects on biodiversity. The presence of awareness of need, consequences and responsibility can activate personal norms leading to behavioural change if the farmers want to be morally responsible and maintain positive self-concepts.

Risk and uncertainty are two factors that form on the one hand that farmers do not want to sign long-term contracts for agricultural nature conservation because of the uncertainty farmers experience with the revenues and labour market according to Sutherland (2010). On the other hand, assurance of income from participation in AES can lead to a secured income, resulting in stability. The contracts in the ANLb system started at the beginning of 2016 and continued until the end of 2021. This gave farmers the possibility of a multi-year source of income.
In the *possibilities* condition, location-dependent factors that might differ per area can come to the front. In combination with high land costs, a shortage of farmland can form an obstacle to implement conservation measures on valuable land like higher water levels or flowers on field edges (Wauters et al., 2017; Westerink et al., 2018; Westerink et al., 2019). Especially in the Netherlands, high land prices form a problem in more sectors. For farmers, soil fertility seems to play an important role here, as Ingram et al. (2013) state that farmers are more likely to use farmland for nature conservation purposes if the land includes unproductive landscape elements and these restrictions provided by the landscape can act as a chance for farmers to implement measures focused on nature conservation.

Next to high prices of land (for cultivation), there is another experienced obstacle for farmers to implement measures in the AES. Path dependency in agriculture is such a major perceived barrier as it led to the fact that many farm businesses nowadays are (to a certain degree) trapped in the market system where the highest efficiency and productivity are pursued. Investments in the past were based on conventional dairy or agriculture, with profit maximization as a starting point. Obtained loans from the bank are based on this and a kind of investment which is not designed for a less intensive farming style. This means that strong path dependency limits the possibilities to shift to more nature-inclusive farming as the farmland is supposed to be used as efficiently as possible. At the same time, path dependence is still a mechanism that drives farmers in a certain direction in decision-making, but not an obligation. Next to this, lock-in and path dependency might seem like a relevant problem in the case of shifting to more organic agriculture as it might be financially unfeasible, more than in the case of -only- participating in AES, which can have less drastic consequences for the business operations. Therefore, it can be that in a more rigorous and fundamental change in the agricultural sector, path dependency and lock-in are a larger barrier than in the execution of measures which are part of the Dutch AES.

Legitimation

The third condition at the farmer level is *legitimation,* which can be explained in two ways as it means, on the one hand, the legitimation that farmers are legally allowed to participate in AES, and on the other hand, the experienced legitimation occurring from the influence of colleagues and other actors that might 'condemn' participation. The success condition could therefore even be split into *legal* and *social* legitimation. The legal legislation is quite clear, as some farmers are located in areas where no AES takes place. Therefore, the farmers are not eligible for a subsidy fee in exchange for the execution of measures (Westerink et al., 2019).

Where legislation, on the one hand, can promote more nature-inclusive behaviour of farmers if it would really force farmers to do so, current legislation can also unintentionally lead to the opposite. The requirements in the schemes lack flexibility, and farmers fear further tightening of the requirements (Westerink et al., 2018; Van Herzele et al., 2013).

The *social legitimation* as one of the conditions for the adoption and implementation of nature conservation measures by farmers, as well as the societal discourses by which farmers are demanded to do more in order to protect biodiversity, can be characterized as the subjective norm in the Theory of Planned Behaviour by Ajzen (1991). Here, the concept of the good farmer comes up again. The image of what a good farmer should do is influenced by society, NGOs and directly by colleagues. As stated earlier, the idea of the *good farmer* created by other farmers is a guide for farmers to determine their own behaviour (Burton, 2004). Except for the fact that some farmers are not geographically located in core areas and therefore not eligible for the agricultural nature conservation schemes, the legitimacy for nature conservation is mostly based on discourses within the farmer community and the idea of what measures are 'allowed' to or not to take.

Except that the image of a good farmer might differ between more tidy landscapes with high production or fewer monocultures and the adoption of measures focussing on farm bird protection, disapproval of colleagues following the predominant discourses on proper landscape management is becoming more and more an important sanction in landscape governance (Eshuis & Van Woerkum, 2003). This social norm that farmers have to take good care of the landscape, especially if a farmer receives a subsidy to do so, makes free-riders who do not do this are seen as untrustworthy by colleagues (Eshuis & Van Woerkum, 2003). Thus, except for the fact that farmers can feel supported or rather legitimized to participate in biodiversity conservation, this can even shift to a kind of peer pressure to stick to the requirements. Social or subjective norms form an important role in the behaviour of farmers, and this variable is based on different discourses and social/cultural capital. In areas where landscape management is focused on balancing production with nature conservation, farmers and landowners might adopt and implement measures focusing on biodiversity conservation earlier. The presence of NGOs, an active municipality or an agri-environmental cooperative might

unconsciously influence the willingness of farmers to take measures in order to protect biodiversity. In areas where biodiversity protection is increasingly woven into agriculture due to mentioned institutions, researchers or an actively involved collective or cooperative promoting more nature-inclusive farming, farmers probably have a more positive attitude to this approach and a higher feeling of urgency.

2.2.2 Governance-level conditions influencing participation

Next to the conditions that influence the choice of farmers to participate in AES and, therefore indirectly, the participation rate in the area of the collectives and cooperatives, the collectives themselves can have an important role in involving farmers in agricultural nature conservation. The collective or ANC can influence the choice of farmers to participate in AES but also play an important role in involving farmers, knowledge sharing, assistance with the measures and the coordination of agricultural nature conservation. Therefore, the role of the collective is included as a fourth condition, which will be further on operationalized as the condition *capacity*. To describe the role of the collectives and cooperatives, a number of approaches towards collaborative agri-environmental governance are discussed in this paragraph.

The agricultural collectives and cooperatives in this research can be characterized as governance arrangements promoting agricultural biodiversity protection, acting as a kind of intermediary between the government as the provider of subsidies and the farmer receiving this financial compensation. Governance is a form of governing either in the public or private sector. Bryson, Crosby and Stone (2006, p. 49) describe governance as ‘’*a set of coordinating and monitoring activities’’* which ‘’*must occur in order for collaborations to survive’’.* Ostrom (1990) states that jointly determined norms and rules designed to regulate individual and group behaviour can be seen as a dimension of governance. Emerson, Nabatchi and Balogh (2012, p. 2) define *collaborative* governance as ‘’*processes and structures of public policy decision making and management that engage people … to carry out a public purpose that could not otherwise be accomplished’’.* In reaction to the growing concern about the degradation of the environment and biodiversity, environmental governance can be the answer, according to Driessen et al. (2012). The authors state that governance emerged as a concept that shows societal problems are not only to be solved by the public sector. In governance, more attention is given to interactions between actors in the market, state and civil society sphere. The Collaborative Governance Regime (CGR) of Emerson, Nabatchi and Balogh (2012) contains the drivers of *leadership, consequential incentives, interdependence* and *uncertainty*, which are essential for the impetus for successful collaboration, and therefore differ from contextual factors that have their influence but are not necessary. Leadership refers to *‘’the presence of an identified leader who is in a position to initiate and help secure resources and support for a GCR’’* (Emerson, Nabatchi & Balogh,

2012, p. 9). Problems, the need for resources (internal drivers), and, for instance, threats and opportunities (external drivers) form the second driver: consequential incentives. Interdependence refers to the lack of ability to accomplish things individually, resulting in the need for collaboration. In the farmer-based collectives, this is also clear: farmers are (or can be) the performers of measures, but to do this on a large scale, they only (can) do this if subsidies are offered by the government via the collectives.
The last driver in the CGR is uncertainty, and if this cannot be resolved internally, it drives groups to collaboration in order to reduce and share risks (Emerson, Nabatchi & Balogh, 2012).
The drivers lead to the collaboration dynamics: *shared motivation*, *principled engagement* and *capacity for joint action*, leading to actions and adaptation. This Collaborative Governance Regime is located in a certain *system context,* as it is presented by Emerson, Nabatchi & Balogh (2012).

The concept of a governance collaboration needs further specification as the structure and cooperation between actors can differ. Driessen et al. (2012) distinguish five modes of governance arrangements which are: centralized governance, decentralized governance, public-private governance, interactive governance and self-governance. The cooperation between the agricultural nature cooperatives, farmer collectives and farmers based on voluntary participation is a form of public-private governance. The provincial government (state) creates a market by providing subsidies which are divided by the ACs. The farmers and landowners are represented in the civil society sphere and can apply for the subsidy through participation in the collective. Next to public-private governance, implementation and adoption of measures focussing on biodiversity protection might be characterized as a form of self-governance, which is a bottom-up approach driven by autonomy and leadership (Driessen et al., 2012). The authors state that the central government always has some kind of regulation, but actors have much autonomy and possibilities to initiate new approaches.

Although the studied ACs and ANCs in this research are characterized as a form of public-private governance, other governance modes can contribute to the implementation and adoption of measures focussing on biodiversity protection too. Supply chain governance, for instance, means that in this context, companies involved in agri-food chains can demand more sustainable farming, including nature conservation and restoration. Dairy processors, for instance, can reward farmers who take measures for more nature-inclusive farming with a higher milk price (Runhaar et al., 2017). Supply chain governance represents a new form of steering nature conservation in agricultural landscapes (Runhaar et al., 2017). Participation in such a self-governance arrangement seems highly dependent on structural funding of nature conservation measures. Specifically for supply chain governance, sufficient market-based instruments such as bonus-malus can increase the motivation for farmers to participate (Runhaar et al., 2017). That other kinds of schemes or initiatives than AES which grants subsidies, can help in order to do something for biodiversity protection is obvious, but it can also

increase the willingness to participate in AES, as it normalizes the combination of nature conservation and agriculture. However, participation in all kinds of governance arrangements is not taken for granted. Eshuis and Van Woerkum (2003) state the importance of trust in governance processes and the fact that stakeholders are reluctant to participate if they do not have trust in a good outcome of the process. This indicates the important role assigned to the agricultural collective, to provide the involved actors with a feeling of the importance of participating in agri-environmental conservation and the positive effects on biodiversity. Barghusen et al. (2021) stress that next to the importance for collectives to motivate farmers to participate, the way in which farmers should be approached and motivated is a question for the collective to solve. The authors state, for instance, that the emphasis on the economic benefits might work if implementation leads to income loss for farmers, and this asks for a specific approach. The question if and how potential participants are approached and engaged in agricultural nature conservation can be a key success condition provided by the collective.

Role of the collective

To play a role in involving farmers in the Dutch AES system, the collective should have enough capacity to approach farmers, and the people involved should possess the right capabilities. The *Five Capabilities Framework* of Baser et al. (2008) consists of five capabilities which focus on interrelationships between individuals or groups in the system in which they operate. This framework is based on the capability approach of Amartya Sen. Capabilities in the framework of Baser et al. (2008) are defined by the authors as the collective abilities of a system to carry out a specific process. To do this, competent people are necessary for the functioning of the system, but their skills, knowledge and attitude determine if this process can be successful. The five capabilities are: 1) commitment and engagement, 2) carrying out functions and tasks, 3) relating and attracting resources and support, 4) adapting and self-renew, and the last, 5) balancing coherence and diversity (Baser et al., 2008). The five capabilities are partly reflected in the scheme below of Van Oosten, Runhaar and Arts (2021), with the two kinds of challenges in landscape governance, defined as substantive and procedural challenges. Substantive challenges include conflicts in producer demands, livelihood and biodiversity and achieving balanced outcomes between these conflicting needs (Arts et al., 2017; Van Oosten, Runhaar & Arts, 2021). Landscape professionals indicate that the ability to deal with ‘’*resource pressure and competing claims on natural resources through land use planning and more robust restoration plans’’* (p. 7) is the most important to overcome substantive challenges (Van Oosten, Runhaar & Arts, 2021). Procedural challenges relate to the legitimacy of the process: most landscape restoration initiatives remain informal and are therefore not very effective. This assumes that embedding the initiatives in formal governance arrangements is important for the effectiveness of the initiatives (Van Oosten, Runhaar & Arts, 2021). Creating an institutional space where the involved actors can meet, resolve conflicts and share visions is an important ability to overcome procedural

challenges, according to different landscape professionals (Van Oosten, Runhaar & Arts, 2021). The current ANLb system in the Netherlands can be considered a formal governance arrangement where the agricultural collective and the participants form an institutional space. The collaborative character is not only based on the relation between farmers and the collectives but also on collaboration between the collective and, for instance, water authorities, companies and nature conservation parties (Terwan et al., 2016). Barghusen et al. (2021, p. 540) state that the knowledge and contacts with farmers make the collectives interesting partners for other actors focused on the agricultural sector. This ensures that the collective AES approach in the Dutch system supports collaborative (agri-environmental) governance in the long term.

Figure 5. Scheme with landscape governance challenges and capabilities (Van Oosten, Runhaar & Arts*, 2021).*

Leadership, one of the drivers in the Collaborative Governance Regime of Emerson, Nabatchi and Balogh (2012), can be one of the success conditions in collectives in cooperatives as the presence of a coordinator or other important person approaches participants and convey the importance of measures in the AES to farmers. For the agricultural collectives, promoting agricultural nature management is the main objective, while farmers focus primarily on the business operations and production. Therefore, it can be expected that the collectives have to take the lead in order to involve participants. As Baser et al. (2008) state: the presence of competent persons is necessary, and their skills, knowledge, and attitude make the functioning successful or not. Commitment, engagement, carrying out functions and tasks, and attracting support seem in the case of AES as the most important capabilities. Next to these capabilities, the network-, entrepreneurial- and policy-making capability are mentioned by Dik, Runhaar and Termeer (2021) as characteristics which determine the professionalisation of farmer collectives. If in a collective the right strategy, including aspiration, goals and execution strategy, combined with a learning organization and providing ecology training for both the employees and participants is present, this should lead to the ability to achieve positive effects for biodiversity (Runhaar, 2021; Triste et al., 2020; Schomers et al., 2021, in Dik, Runhaar &

Termeer, 2021). Research on the question of how professionalisation in agricultural collectives can lead to positive effects for biodiversity caused by the implementation of AES measures emphasizes the important role of this condition.

2.2.3 Landscape-level conditions influencing participation

Next to the farmers, collectives and cooperatives, other actors are involved in collaborative landscape governance. Collaborative governance and the different governance modes specified by Driessen et al. (2012) are not specifically designed for a specific work field and thus occur in different domains. However, in scientific literature, the concept of *landscape governance* emerged to describe the process of landscape restoration. The process of protecting biodiversity through intervening in the agricultural landscapes can be placed in the concept of landscape governance. For landscape actors, there is no concrete guidance on how and when to identify and engage stakeholders in landscape restoration (Mansourian, 2016). Holmes (2012) and Van der Sluis (2017) state that landscape governance aims at balancing production, consumption and protection. Buizer, Arts and Westerink (2016, p. 449) define landscape governance as ‘’*the interplay of (a) the natural conditions in which actors take initiatives, (b) the discourses that taken together may enable or restrain certain forms of managing the landscape, and (c) the institutional practices that may make some discourse stronger and other weaker’’.* Stakeholders in an area collectively shaping their productive life in order to sustain future needs and demand can also be regarded as landscape governance (Van Oosten, 2013). As well as with the conditions essential for the adoption and implementation of nature conservation measures in landscape governance, legitimacy is an important condition and is divided into *output legitimacy* (effectiveness of resulting policies), *input legitimacy* (actor participation) and *throughput legitimacy* (efficacy, accountability, openness and inclusiveness of the process between input and output) as described by Scharpf (1997) and Mees, Driessen and Runhaar (2013).

Area and type

Other stakeholders next to the farmers and ACs/ANCs, which can have an influence on the participation and execution of agri-environmental schemes, are located at the landscape level in this research. Actually, the collectives are the most important actor on the landscape level as the collectives provide the coordination of conservation measures and engage farmers in AES (Dik, Runhaar & Termeer, 2021), but as previously described, this actor is included as an individual condition. The other actors involved in this landscape-level are the province, municipality and the presence of volunteers and (nature) organizations. These actors and their possible roles are further explained in the operationalisation and analysis. Next to the role the governance actors play, fixed characteristics of the collectives can have an influence on the indicators of success in the agricultural collective and in the area of the ANC. Size of the area, geographic location and the presence of target species included in the ANLb can be seen as characteristics of the involved cases in this research, and these characteristics are included in this research as the last condition *type*, focussing on the characteristics type of landscape.

In figure 6 below, the discussed conditions and the corresponding levels which are presumed to determine the degree of farmers participating in the ANLb are displayed. This model gives a schematic overview of the levels and conditions distinguished in this research. The six conditions which are expected to influence the participation rate in the Dutch ANLb are shown in the corresponding level where they operate.

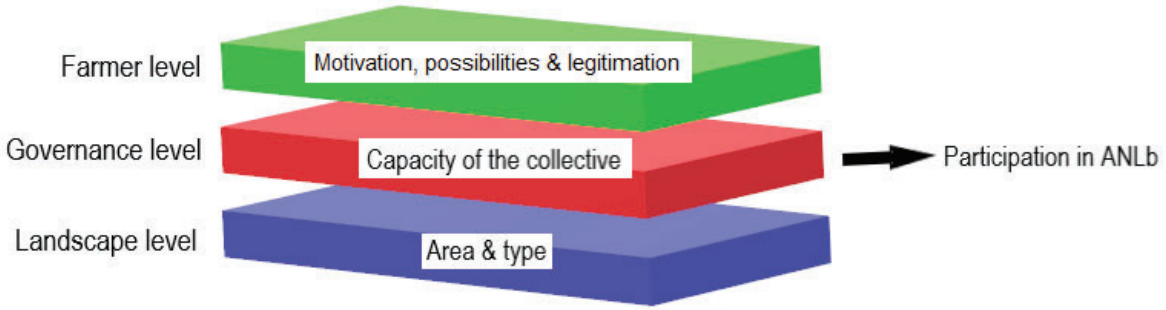

Figure 6. Schematic overview of the levels and included conditions leading to participation in ANLb.

3. Operationalisation

This research includes a number of abstract concepts which need to be defined in order to understand how they should be interpreted in this research and how they are measured as variables in the empirical part. In this chapter, first, the four indicators of success which can be used as the outcome in the analyse are operationalized, as well as the conditions included in the farmer, governance and landscape-level influencing participation in the Dutch ANLb.

3.1 Measuring Outcome

In the previous chapters, the theoretical basis of the potential success conditions to reach a minimum percentage of farmers adopting and implementing measures focussing on biodiversity conservation are discussed. In this chapter, this participation rate will be introduced as the outcome of the presence of the success conditions which are identified in the theoretical framework. The degree of success (or outcome) in agricultural nature conservation could be measured on the basis of *results* or *actions* taken. Successful results, for instance, can be measured as the increase in species and absolute numbers of animals and plants compared to the situation before implementing and adopting measures focussing on biodiversity protection. The Dutch ANLb system aims at the preservation of target species on the basis of a habitat approach (BIJ12, 2016a). Therefore, research to what extent this aim has been reached could be a useful assessment based on data on the number of target species. However, collecting this kind of data is beyond the scope and aim of this research, as well as the fact that this kind of research does fit more in the research field of ecology. Besides this, the collection of data takes several years to give reliable results of the biodiversity state. Therefore, the data on which the cases in this research are eventually assessed is the percentage of farmers in the concerned area of the collective or cooperative which is affiliated with the collective, and thus takes measures focused on biodiversity protection. This participation rate gives an indication of the scale on which agricultural nature conservation is executed in the involved cases in this research. With that, it can be stated that the participation rate is one of the indicators of success in research to the Dutch ANLb. Next to the percentage of farmers participating in the ANLb, there are three other indicators of success defined in this research, which will be included in the empirical part of this research. In the following part of this chapter, the four indicators of success are introduced and operationalized.

Although the participation rate is the outcome variable in the analysis used in this research, it is not the only indicator to fixate on. The focus on core areas and more heavy measures for agricultural nature conservation also mean that there are also areas where farmers are not eligible to participate in the ANLb and receive financial compensation for executing measures (BIJ12, 2015). In these areas, none or too few species occur, and therefore the area is not specified as a promising area in the area

application of the province. Executing measures here are not expected to achieve significant positive effects for biodiversity, and therefore the financial funds can be better invested in promising areas. However, this means that the maximum percentage of farmers who participate in the ANLb can differ between the cases. If a large share of farmers do have plots in the ANLb areas, which means they cannot participate, then the maximum possible percentage of farmers participating in the ANLb is relatively low. Therefore, interpretation of the participation rate might be difficult in some cases.

3.1.1 Participation rate

The percentage of farmers in the concerned area participating in the ANLb is the first defined indicator of success in this research. As briefly stated before, this participation rate indicates on what scale measures focused on biodiversity protection are implemented. A minimal percentage of participants executing measures seems important to reach positive effects for target species in the ANLb, as few positive effects are expected if just a small number of farmers participate. Few farmers means a small area under agricultural nature conservation, which might indicate fragmentation of habitats. In the Netherlands, around 11000 farmers participate in ANLb schemes (BoerenNatuur, 2021) on a total of 53000 agricultural businesses (CBS, 2020). In percentages, this is around 20%, which is therefore also expected to be the most observed percentage in the cases involved in this research. For the identification of success conditions to reach a minimum percentage of participants, the bar is set at 30%, as this is slightly higher than the average and therefore includes the *above-average* cases. This set minimum is discussed further on in the research in the empirical analysis.

3.1.2 Effectiveness

The so-called *beheerpakketten* (management packages) that can be chosen in the Dutch AES can differ in requirements of the execution within one package. Especially measures focused on meadow bird protection include different requirements: the farmer can choose which measures with corresponding financial compensation is concluded. One example is the postponement of the mowing date on grassland. The later the mowing date is set, the higher the compensation for the farmer. Postponement of the mowing date gives meadow bird chicks more time to leave the nest and thereby increases the chance of survival. Effectiveness is included as an indicator of success because the different requirements of the measures can have a positive effect on nature conservation as stricter requirements should lead to better results for biodiversity. When the requirements of the management packages are not strict, the measures are less likely to have a large impact; above-average participation alone is not expected to be effective enough in order to stop biodiversity degradation. In this research, the effectiveness of the management packages is measured on a Likert scale from 1 to 5, where also the option '*does not apply'* is available, as not in all areas a level of effectiveness in the management packages is available.

3.1.3 Compliance

Compliance is an indicator of success measuring to what degree the concluded management packages and corresponding requirements are executed properly. The requirements must be met by the farmer to be eligible for financial compensation. If the corresponding requirements are not well executed, the agreed financial compensation to receive can be cut by the agricultural collective. The compliance of the farmers can be based on the inspection results that are often executed on the basis of random sampling by the collectives. This inspection which is executed every year must ensure that the members adhere to the terms and conditions of the management packages and that the measures are properly executed. The compliance scores in this research are rated on a scale from 1 to 10 by the respondents, where 1 means *no compliance* and 10 represents *full compliance*.

3.1.4 Continuity

Continuity in the execution of measures should ensure long-term positive effects for biodiversity. The management contracts in the current AES system started in 2016 and should last six years until the end of 2021. If a large part of the farmers did not extend the contracts with the collective, the possible positive results in the past years would not get any follow-up. In order to measure the degree of continuity, coordinators are asked to estimate the expected number of farmers that want to extend their contracts with the collective and continue taking measures in exchange for financial compensation. Important to note here is that the continuity applies to the current participants that execute AES. This implies that by, for instance, an expected continuity of 80-90%, the total number of participants in the next period does not automatically will be less, as new participants might start with AES in the concerned area. The total number of hectares on which agricultural nature conservation takes place might also even increase as current or new participants expand their business expressed in hectares.

3.2 Measuring conditions

In the following section, the ways in which the conditions are tried to capture are discussed. In the table below, the questions used to measure the conditions are displayed. The survey included more questions than displayed here, but these are not all included in this research and the analysis itself. Some questions are combined into one condition, and therefore, the Cronbach's alpha scores are presented in the section below.

Questions (or statement)	**Short description**	**Condition Type**	**Scale / answer categories**
Which percentage of farmers is already taking voluntary measures?	This question measures which share of the farmers already take voluntary measures apart from participation in the ANLb.	Motivation	*-Does not apply* *-0-10%* *-10-20%* *- ...* *-90-100%*
Which percentage of farmers is already taking the following voluntary measures? *- postponement of mowing date* *- presence of herb-rich strips* *-presence of herb-rich grassland* *-check bird nests* *-presence of wetlands*	This question measures which share of the farmers already take specific voluntarily measures apart from participation in the ANLb.	Motivation	*-Does not apply* *-0-10%* *-10-20%* *- ...* *-90-100%*
Which percentage of farmers experience the high ground prices as a barrier to participate in ANLb?	This question measures if the ground price is seen as a barrier for participation in the ANLb. Executing measures on pieces of land can be uninviting if the ground prices are too high.	Possibilities	*-Does not apply* *-Up to 25%* *-25 to 49%* *-50%* *-51-75%* *-75 to 100%*
Which percentage of the farmers experience former investments as a barrier to participate in ANLb?	This question measures if former investments are seen as a barrier for participation in the ANLb. This question is meant to see the influence of path dependence.	Possibilities	*-Does not apply* *-0 to 25%* *-25 to 49%* *-50%* *-51-75%* *-75 to 100%*
Which percentage of income loss is a more intensive farmer willing to accept on a part of their land?	This question gives an indication of the acceptable percentage income loss more intensive farmers are willing to take for taking nature conservation measures.	Possibilities	*-Not a single percentage* *-0 to 25%* *-25 to 49%* *-50%* *-51-75%* *-75 to 100%*
Which percentage of income loss is a more extensive farmer willing to accept on a part of their land?	This question gives an indication of the acceptable percentage income loss more extensive farmers are willing to take for taking nature conservation measures.	Possibilities	*-Not a single percentage* *-0 to 25%* *-25 to 49%* *-50%* *-51-75%* *-75 to 100%*

Which percentage of farmers see themselves as landscape manager?	This question is meant to find out if farmers feel responsible for the landscape and biodiversity state, next to the function of food producer.	Legitimation	*-Does not apply* *-0-10%* *-10-20%* *- ...* *-90-100%*
Do farmers cooperate between themselves in this area to contribute to nature- and landscape management?	This question is meant to find out if farmers work together in agricultural nature conservation and in which way.	Legitimation	-No, does not apply -No, only via the collective or cooperative -Yes, by knowledge sharing -Yes, by participating in courses and excursions -Yes, by helping each other in executing measures -Yes, namely: …
Which percentage of farmers think the expertise of the collective is useful?	This question is meant to find out if the collective and its knowledge is appreciated by the farmers.	Capacity	*-Does not apply* *-0 to 25%* *-25 to 49%* *-50%* *-51-75%* *-75 to 100%*
''The agricultural collective has sufficient knowledge and expertise to support farmers and contribute to biodiversity protection.''	This statement is meant to find out if the knowledge in the collective/cooperative is sufficient.	Capacity	-Strongly agree -Agree -Neutral -Disagree -Strongly disagree
Has the collective enough capacity to actively approach farmers to participate?	This question is meant to find out if it is possible to approach farmers for participating actively.	Capacity	-Yes, active approaching -No -Does not apply -Other: …
Which barriers that prevent farmers from participation can the collective (or ANC) take away?	This question is meant to find out if the collective can play a role in persuading farmers to participate.	Capacity	-Paperwork -Uncertainty executing measures -Lack in belief positive results -Perceived time and effort in executing measures -Other: …
''The municipalities and agricultural cooperatives cooperate sufficiently to protect biodiversity.''	This question is meant to find out if the cooperation might need to be improved to achieve better results in the ANLb.	Area	-Strongly agree -Agree -Neutral -Disagree -Strongly disagree
''The province and collectives cooperate sufficiently to protect biodiversity.''	This question is meant to find out if the cooperation might need to be improved to achieve better results in the ANLb.	Area	-Strongly agree -Agree -Neutral -Disagree -Strongly disagree
Which other actors are present in the area on a regular basis?	This question is meant to find out if there are actors present in the area and if this presence might have an	Area	-Specie management volunteers -Landscape management volunteers

	influence on the participation rate.		-Environmental/nature organizations - Other: …
Which percentage of the management packages is focused on meadow birds?	This question is meant to find out if collectives and cooperatives with a focus on meadow bird protection have higher farmer participation in the ANLb.	Type	*-Does not apply* *-0-10%* *-10-20%* *- …* *-90-100%*

Figure 7. Questions used in the survey, with corresponding answer categories.

3.2.1 Measuring motivation

The concept *motivation* in this research refers to the willingness of farmers to take measures for agricultural nature conservation in the Dutch ANLb. Especially the intrinsic motivation is meant here and tried to capture in this research. Motivation in itself is a complex concept as the desire to perform a certain behaviour can be limited by other constraining factors. Because of this, despite the wish and benevolence, something may not be carried out. For instance, a lack of the other conditions specified on the *farmer level, possibilities* and *legitimation* can decrease the overall motivation to participate in the ANLb. Because of this interplay between these conditions, which determine farmer behaviour, they form together the farmer level.

In the dataset, the presence of *motivation* is tried to measure by means of different questions. In particular, the percentage of farmers taking voluntary measures for biodiversity protection is expected to give a good indication of the number of intrinsically motivated farmers. In that case, farmers are already willing to take measures for agricultural nature conservation without receiving financial compensation. Also, the reason for participation in the ANLb is asked, which can say something about the motivation of the farmer to participate. This motivation to participate can be based on financial, ecological or practical grounds.
In the analysis, two conditions measuring motivation are included. The condition MOT1 indicates which percentage of farmers in the area of the concerned case already take voluntary measures focused on agricultural nature conservation. In the survey, it has been emphasized that the measures have such an impact that they have consequences for the revenues and income. The MOT2 condition includes five measures which can be taken for agricultural nature conservation. The five single variables measure the percentage of farmers taking specific measures: postponement of the mowing date, creation of herb-rich strips, herb-rich grassland, checking for bird nests before mowing and the presence of wetlands. Together, these variables combined have a Cronbach's alpha score of 0,84, which indicates that the variables can be combined, as the score can be interpreted as *good* to *very good.* In fact, by combining the five described measures in one condition, MOT1 has been measured again by taking the average percentage taken measures of the different kinds of measures together.

3.2.2 Measuring possibilities

With the *possibilities* condition, the perceived feasibility of implementing participation in the ANLb in the business operations is tried to capture in this research. Farmers can experience high ground prices or former investments focused on maximizing production as constraining factors to participate in the agri-environmental schemes. As described in chapter 2.1.3, lock-in and path dependence plays a major role here. Two conditions are used in the analysis of this research. The first condition, POS1, combines the first two *possibilities* questions included in table #. The Cronbach's alpha score of the two variables combined is 0,83, and therefore it is possible to generate a reliable condition POS1. The logic behind merging these two variables is the fact that both variables measure an experienced barrier by farmers to participate in Dutch AES. High prices for agricultural land can mean that giving up potential agricultural yields lead to less income as the compensation received through AES might be less than the selling price of the harvest. The second included variable refers to the perceived risks of fewer yields, conflicting with former investments focused on higher and more efficient production. This kind of striving for higher production can conflict with implementing measures focused on biodiversity protection and restoration.

The second merged possibilities condition POS2 combines the expected acceptable income loss farmers are willing to take on a part of their land. This part of the land then can be used for the implementation of measures focused on agricultural nature conservation, which makes it likely that this will result in lower yields. The two variables together have a Cronbach's alpha of 0,92. The single variables measure which percentage of income loss a more extensive and a more intensive farmer would accept to take. Together the variables can indicate how much the average farmer is willing to hand in a part of the revenues in order to do something for agricultural nature conservation.

3.2.3 Measuring legitimation

If farmers feel legitimized to participate in agricultural nature, conservation is measured with the condition of *legitimation.* More than the other two farmer-level conditions, this concept is quite abstract as this concerns a feeling that the farmers are allowed to execute measures for biodiversity by their colleagues. Especially the idea of what a *good farmer* is, plays a role here, and if agricultural nature conservation fits this image in the view of the farmers in this area. In order to try to measure the presence of this condition, the degree to which farmers see themselves as landscape manager (LEG1) and if farmers work together in agricultural nature conservation (LEG2) has been researched. If farmers work together and help colleagues with the knowledge or with executing measures, this might indicate the normalization of agricultural nature conservation and thus the feeling of legitimation.

3.2.4 Measuring capacity

The role of the agricultural collective is expressed in the *capacity* condition. The collectives can have different capabilities which can influence the participation of farmers in the ANLb. One is the available capacity, which can be expressed in the time and financial resources to approach farmers to participate in agricultural nature conservation actively. The presence of sufficient knowledge and expertise and the estimated appreciation by the farmers is also a part of this condition. The question if the agricultural collectives can take away any perceived barriers like paperwork and uncertainty is also included in this capacity condition. The four questions measuring the *capacity* of the collective all form a single condition, of which the first concerns the percentage of farmers appreciating the expertise and knowledge of the collective. The condition CAP2 measures if the respondent thinks there is sufficient knowledge and expertise. The third condition is meant to find out if the collective has sufficient capacity to approach farmers to participate in the ANLb actively. The different answer categories for the last condition have been distinguished in the dataset, and the CAP4 condition is present if the collective can take away feelings of uncertainty that farmers can prevent from participation.

3.2.5 Measuring area

The *area* condition measures if there are actors like volunteers and nature organizations present in the area and if the collectives and cooperatives work together well with the province and the municipalities. The presence of actors focused on biodiversity conservation promotion or monitoring might influence the decision of farmers to participate in the ANLb. These actors can be nature organizations, environmental organizations and landscape or specie management volunteers. Next to colleagues, the agricultural collective and possibly other persons involved, these actors operating on the landscape level might have consciously or unconsciously a positive effect on the participation of farmers in the Dutch AES. In the survey, this possible influence will be measured by asking for which estimated percentage of the farmers participating in the ANLb the presence of the described actors has partly led to eventual participation. This question, however, is not included in the analysis, only which actors are present. Asking for the estimated percentage of farmers influenced by these actors to participate has been estimated as too inaccurate eventually. The first of the two *area* conditions is concerned with the relation between the agricultural collective and the cooperatives with respectively the province and the local municipalities. As in fact the provinces provide financial compensation to the farmers through the agricultural collectives, the collectives cooperate most with the provinces. The smaller-scale cooperatives especially deal with municipalities. The two variables combined give an indication of the overall cooperation between the cases and both the government levels. The Cronbach's alpha of these combined conditions is not very high, with a score of 0,66. As described, with the ARE2 condition, the presence of volunteers focused on species or landscape elements and

nature organizations has been indicated. Specie management volunteers are, for example, concerned with species counting and monitoring, and landscape management volunteers with the maintenance of landscape elements. The low Cronbach's alpha score of 0,42, however, indicates that these actors occur together to a lesser extent.

3.2.6 Measuring type

The last distinguished kind of condition in this research, the condition *type,* has been introduced to measure the relevant characteristics of the landscape. The *type* of landscape involves the questions on which percentage soil type and species the management packages in the area of the cooperative or collective are focused. The predominant kind of soil type in the area largely determines which target species which species occur in the area and which management packages will be concluded and executed the most. In the analysis executed in this research, only the focus on meadow birds has been included. The condition TYP1 measures which percentage of the management packages in the collective or cooperative has its focus on meadow birds. Meadow bird protection is an important form of agricultural nature conservation, and therefore it is interesting to see if the participation is higher in areas with habitats suited for meadow birds.

4. Research design

This chapter serves to discuss the research design, choices made regarding the research philosophy, methods used and the chosen strategy and method for the data collection. In order to reach the aim of this research, identifying success conditions, it is necessary to have the possibility to identify and compare the presence of these conditions in a reasonable number of cases. Next to the literature study prior to data collection and analysis, the method used in this research is qualitative comparative analysis (QCA) which will be discussed and justified in the following sections, next to the discussion on the central research philosophy, ontology and epistemology that form the basis of this research.

4.1 Research philosophy

This research is both comparative as well as explanatory as it aims to explain which conditions are necessary for agricultural nature conservation in the Dutch ANLb. In order to do this, Qualitative Comparative Analysis (QCA) will be used. QCA is both a technique and an approach introduced by Ragin (1987). The author built the QCA technique on the epistemological basis of Mill (1843). Mill makes a distinction between the so-called *method of agreement* and the *method of difference* in order to explain causes and effects on the basis of circumstances in the studied phenomena. In the method of agreement, a shared circumstance between studied cases is the cause or effect if, in both cases, the same phenomena occur. The method of difference works the other way around: if a phenomenon occurs in one case but not in the other, not the corresponding can be the cause for this phenomenon, but one of the other circumstances (not present in the other) should explain this phenomenon.
This method forms the basis for QCA as it attempts to identify sufficient and necessary conditions and all combinations in between (Lucas & Szatrowski, 2014).

In the field of social research, it is difficult to produce verifiable scientific statements, which makes it impossible to prove an objective truth as the outcome of this research. The five well-known research philosophies, positivism, post-positivism, realism, interpretivism and pragmatism, are shortly discussed in order to explain the philosophy that forms the basis for this research. Positivism and post-positivism assume a ‘real’ reality, whereas post-positivism approaches this reality more critically as it assumes that reality only can be understood imperfectly (Guba and Lincoln, 1994). Post-positivists assume that research findings are probably true, in contrast to positivists, who assume findings are true.

In this research, it is assumed that the findings represent to a certain extent the ‘real’ situation of success conditions, but not the idea that the conclusion can be presented as a fully verifiable truth.

Positivism and post-positivism also partly fall off as the philosophical basis of this research as not all the data in this research is objective: many answers in the survey include estimates of the respondents, just as the fact that the answers and conditions will be personally valued in the analysis.
However, the method of falsification of a priori hypotheses, which is used by post-positivists, is also one of the assumptions upon which QCA is built on. The falsifiability criterion was introduced by Karl Popper and can be seen as a reaction to induction, where verification and the formulation of theories is the main principle. The suppositions formulated by the researcher need evidence that the researcher tries to find in order to verify the expectation (Van Thiel, 2014). With this kind of research, there is a chance that the researcher will focus on the cases that are in line with the hypotheses in order to confirm the expected. Next to this, Van Thiel (2014) states that induction, in fact, requires studying all situations to make it possible to draw conclusions. However, this is quite impossible in most research. With the idea of falsification, Popper rejects the method of induction and suggests searching for evidence to refute the null hypothesis. In this way, not all possible situations have to be investigated in order to draw conclusions with complete certainty, but just one opposite finding rejects the null hypothesis. In the QCA used in this research, rejection of the null hypothesis suggests that a specific set of conditions does not always lead to the desired outcome, which indicates that the presence or absence of conditions leading to an expected outcome is not an objective fact.

4.2 Research methods

In this paragraph, the research methods used for the collection of data and the analysis of the collected data are discussed. Also, the steps which have been taken and choices made in the research are described and justified.

4.2.1 Method for data collection

As this research is a combination of quantitative and qualitative research, it is most quantitative in essence. Prior to the data collection used in the analysis, desk research has been the main research method to develop the theoretical framework and an overview of the current situation and research problems in agri-environmental schemes. Policy documents, reports and action plans have been analysed to formulate the right research questions and develop the survey used for the data collection. Next to the desk research, a small number of exploratory interviews are held to create an appropriate survey that focuses on the collection of usable data to answer the questions in this research.

The online program *Qualtrics XM* has been used to create and distribute the survey. The online survey was distributed via email to the respondents. The forty agricultural collectives and corresponding contact details were available, and via email, all the collectives have been approached. The emails sent included a description of the research and an invitation link to the survey. After a couple of

weeks, the non-responding cases were sent a reminder in order to increase the response rate. IN order to approach the agricultural nature cooperatives, the same method has been used. Most of the contact details were available via the web page of the overarching agricultural collective or provided by the coordinators or contact person of the concerned collective, as many as findable cooperatives have been approached via email, just like the agricultural collectives. In total, nearly fifty useful surveys are collected with this method and are included in the analysis. As in most research, the response rate is not 100%, as some approached collectives and cooperatives simply did not respond to the reminder or because questions in the survey were not able to be answered, or there was no time available to do so. Contacting these cases via phone could possibly have increased the response rate. However, two reasons are suggested to legitimise the choice to only approach respondents via email. The first reason is the fact that it is best for the reliability of the research to question all the respondents in the same way, which prevents answers from being interpreted differently by the researchers as the respondent has the possibility to elaborate on their answer. An as high as possible degree of objectivity is expected to disappear in personal conversations in comparison to more anonymous and quantitative data collected through the online survey.
The second reason is the lack of necessity for a larger number of cases. In principle, a larger N gives more reliable and generalizable results. However, in this research, the focus lies on the relations between conditions and the participation rate in the cases and less on finding as many as possible cases with a high (or lower) participation rate of farmers in the ANLb. Therefore, a large number of studied cases is a good thing, but almost fifty cases are sufficient.

The vast majority of the answers in the dataset are filled in by the respondents approached to participate in this research. However, some questions were added at the time that the survey was already distributed among a number of participants. Therefore, questions like in which municipalities the concerned ANC operates or the number of participating farmers in the collective could not be answered by a number of the respondents who filled in the survey before this addition in advance. It was also assumed that some questions might have been difficult to answer or that the respondent might not fill in some of the questions. The municipalities located within the area of the ANC or collective, therefore, are in some cases manually added in advance of the first analysis.

4.2.2 Method for analysis

For the analysis, all the data collected with the survey is imported to *Stata 17*, which is a software program for the statistical analysis of quantitative data. In this program, answer categories are assigned to the values collected in the surveys. All the questions asked in the survey form variables in the dataset, which can have different answer categories, expressed in percentages, open answers or a simple *yes* or *no.* With the program *Stata 17*, cross tables are created for the first analysis and overall

insight into the data and similarities and differences in the cases involved in the research. After this descriptive analysis, the final conditions which will be used in the QCA are defined, of which some by combining different variables. This combining of variables has been done with variables which have the same scale of measurement and on the basis of the Cronbach's alpha scores. These scores are also calculated in the program *Stata 17.* The choice for Qualitative Comparative Analysis is partly based on its strength in linking theory to the analysis: the explanatory model with the causal paths leading to the desired outcome, which is the product of QCA, is "*based on a constant dialogue between theory and evidence*" (Marx & Dusa, 2011, p. 104; Rihoux, 2003). On the basis of theory and scientific knowledge, a set of conditions is expected by the researcher and this set is tested in the analysis and adjusted until a best-fitting model has been found. One other reason to use QCA is the fact that qualitative comparative research is well suited as both technique and research method as it shows the relation of a set of conditions and their outcome, instead of the correlation between a single condition and its outcome. In this way, necessary conditions can be identified as well as sufficient conditions.

For QCA as an approach, two goals are strived for: in-depth insight into cases and their complexity, and at the same time, it aims to produce some level of generalization (Ragin 1987; Rihoux & Lobe, 2009). QCA assumes causality, with room for complexity. This is explained by the concept of multiple conjunctural causation (Ragin, 1987; Rihoux & Lobe, 2009). This concept is based on the following three principles: 1) a combination of conditions produces a certain outcome (independent variables lead to the dependent variable), 2) several combinations can lead to the same outcome, and 3) conditions can be context-dependent, they may have a different impact on the outcome (Rihoux & Lobe, 2009). Within QCA, a distinction can be made between crisp set QCA and fuzzy set QCA. In a crisp set, binary values are used to indicate if a variable is present or not (0 or 1). With a fuzzy set, every value on the 0 to 1 interval is possible (Grofman & Schneider, 2009). In the example below, the data is dichotomous: the variable is present or absent, and there is no degree of presence like in a fuzzy set, where a positive attitude can be very strong (e.g., 0.9) or low (e.g., 0.2). The concept of multiple conjunctural causation distinguishes QCA from more regular statistical techniques as it does not aim for one single causal model but multiple causal models to describe the involved cases (Ragin, 1987). In this research, crisp set QCA will be used. The choice for this kind of QCA is based on the collected data. The data used is gathered through surveys and exists of estimated percentages, numbers and answers by the respondents. These answers are expected to give a good representation of the cases and the presence of conditions. However, all the different variables in the data have not been measurable to such a degree that a reliable value between 0 and 1 for fuzzy would always be achievable. The second reason to prefer crisp set QCA over fuzzy set QCA is the fact that the degree in the presence of conditions is not very relevant in this research. For the identification of present conditions in involved cases in this research, it is only the question if the condition is present or

absent, and not to which degree. At which value a condition is labelled as present is discussed in chapter *6.2 Variables and thresholds.*

Next to the description of differences and similarities between involved cases, QCA makes generalization of the research results possible to a certain extent. As briefly mentioned before, some level of generalization is aimed at with the QCA approach. 'Modest generalizations' must be the outcome of a well-executed QCA and therefore go beyond the description of the involved cases (Ragin, 1987). The number of cases involved in this research in comparison to the total number of agricultural collectives and agricultural nature cooperatives seems sufficient to draw tentative conclusions on the success conditions for agricultural nature conservation by farmers across the Netherlands. The collected data and conclusions drawn from nearly fifty cases provide a good state-of-the-art overview. As this research includes quite a large share of the total number of collectives and cooperatives in the Netherlands, a certain degree of generalization is expected to be reached.

4.2.3 QCA method in practice

With a Qualitative Comparative Analysis approach, the cooperatives and collectives involved in this research can be systematically compared as cases (Berg-Schlosser et al., 2009). The concepts of *necessity* and *sufficiency* form the basis of this research method to identify the important conditions. These concepts will be introduced below, based on an example used by Berg-Schlosser et al. (2009). In chapter 6, these concepts will be discussed further.
In this research, it is assumed that the formulated conditions *motivation, possibilities, legitimation,* the role of the collectives expressed as *capacity, area* and *type* determine if farmers participate in the Dutch agri-environmental schemes. Four of these conditions are used in the following example.

A: Motivation
B: Possibilities
C: Legitimation
D: Capacity

The combination of A+B might have the same outcome Y as A+C or A+D, which makes both combinations sufficient to reach the participation of farmers. Three combinations leading to participation mean that there is not just one combination of conditions necessary for participation. However, in this example, the presence of condition A seems a necessary condition for outcome Y because all combinations here include the presence of condition A. Thus, the presence of A is necessary, but A in itself is not sufficient: only in combination with either B, C or D outcome Y will be reached in this example. *Necessary* is defined by Lucas and Szatrowski (2014, p. 7) as *''a cause that is always present in the case of the outcome. However, sometimes the cause will be present but*

the outcome will not be observed''. And *sufficient* is defined as ''*a cause that always produces the outcome. Sometimes the outcome will be present but the cause will be absent''* (Lucas and Szatrowski, 2014, p. 7). Next to these concepts, *INUS* is a third form of causation which is important in QCA and defined as ''*a cause X that is an insufficient but necessary part of condition Z, where Z is a sufficient cause of Y''* (Lucas & Szatrowski, 2014, p. 7). A specific participation rate in agricultural nature conservation can be seen as the outcome of a given path, consisting of a combination of conditions (Berg-Schlosser et al., 2009). However, the example showed that there might be more combinations of conditions leading to the same outcome, which makes one of these combinations *sufficient,* but not always *necessary.* The fact that different paths lead to the same outcome is described by the definition of *equifinality* (Berg-Schlosser et al., 2009).

4.3 Validity and reliability

Reliability

The degree of accuracy and consistency with which the variables in the research are measured form the basis for sound research with reliable research results. High consistency and accuracy reduce the probability that the research results are coincidental and therefore not representative. Accuracy refers mainly to the instruments used for the measurement of the variables (Van Thiel, 2014).
It is important that the right methods are used in order to capture the desired data and the different values that the variables can assume (Van Thiel, 2014). Operationalization is important here as it should be clear why the collected answers measure a certain variable. In this research, the variables forming the conditions could have been measured with different questions, as especially the conditions *motivation, possibilities, legitimation* and *capacity* can be defined and expressed in several ways. The operationalisation and corresponding questions of the conditions help to gain the desired data and how this data should be interpreted. All the data of the cases have been collected by the same research instrument, so in principle, the accuracy is guaranteed.

Next to accuracy, consistency is the second important pillar for the reliability of the research. The idea of repeatability captures what accurate research is: under the same conditions, the measurement used will lead to the same research results. As with the consistency, repeatability indicates that the data is 'true' and that the findings are less likely to be coincidental.

Internal validity

For the internal validity, it is important that the variables have to be captured precisely and correctly in order to measure the exact things the researcher wants to measure. Therefore, the variables measured have to be specified as precisely as possible, so the questions in the survey are clear and

well interpreted by the respondents. The survey set out in this research has been adjusted and reformulated several times in order to make the questions best understandable for the respondents. Further, many of the conditions in the analysis are combinations of single variables merged into one condition. This method benefits the validity of the research as the variables combined give a mean score which gives a more reliable value, as it is the average of variables. By combining more variables into one condition, outliers or incorrect answered values are kind of filtered out by the other 'correct' answers.

External validity

As already mentioned, sound Qualitative Comparative Analysis should next to the description function be able to provide the opportunity for modest or limited generalisations (Ragin, 1987; Berg-Schlosser et al., 2009). This generalisation then might be applied to similar cases with quite a number of the same characteristics that have been used in this research (Berg-Schlosser et al., 2009). However, the external validity of this research is a point of discussion. The number of cases in this research cannot be compared to real quantitative research with hundreds or thousands of observations representative of a population, for instance. Generalisation is, therefore, in particular important and achievable for statistical research and less achievable for research with smaller datasets or qualitative research. Next to this, the conclusions are interesting to generalise to a larger group, which is a bit harder in the case of Dutch cooperatives and collectives focussing on agricultural nature conservation. The Dutch system is quite unique and differs from the systems in other countries. Therefore, the nearly fifty cases might give an overview of the situation and success conditions in the Netherlands, and in the best case, also useful in contributing to the knowledge on the subject but not directly generalizable to other countries.

5. Description of the dataset

As mentioned in the introduction, the revision of the former AES system (SNL-a) led to the implementation of the new ANLb system. The previous system did not accomplish sufficient ecological effects, and the execution costs were too high compared with the gained results (Boonstra & Nieuwenhuizen, 2019). In the new system, the focus went to more quality instead of quantity and on core areas for agricultural nature conservation. Melman et al. (2016) stated that the current system could be more effective if management outside more promising areas would be reduced, and the management in these high potential ecological areas would be increased. Focus on clusters and a better connection of these promising core areas through green infrastructure help to reach better effectivity. More heavy management like postponement of the mowing date instead of easier management like *legselbeheer* (protection of nests) can lead to better results for meadow bird protection. In the dataset, this has been measured partly by the degree of effectiveness of the management packages.
When the new ANLb was implemented in 2016, the focus on more quality instead of quantity was immediately visible in the total area under agricultural management. The total amount of hectares declined compared to the old SNL-a, as expected. The share of *legselbeheer* contracts in this system was large, and as these contracts expired, these hectares were no longer under agricultural nature management (Boonstra & Nieuwenhuizen, 2019). However, since this revision in 2016, the total amount of hectares under management as well as the number of participants increased in the years following. In the following section, the different agricultural nature types and corresponding management packages are further discussed.

5.1 Management packages and focus

The management packages in the ANLb are all focused on specific agricultural nature types. In 2020 the share of hectares under management per nature type was as follows: the soil type *open grassland* was responsible for approximately 91290 ha, and *open arable land* for 6.048 acres. *Droge dooradering* (8400 ha), *natte dooradering* (3472 ha) and *water* (4898 ha) form the other three targeted agricultural nature types in the Dutch AES (Dunnink et al., 2021). In the following part of this paragraph, these nature types are briefly described.

Agricultural landscapes with predominantly (wet and herb-rich) grasslands, eventually with line-shaped waters like ditches and canals, are defined as the type of *open grassland*. The specification '*open'* does not mean that some vertical landscape elements are not present, for instance, reed. Some of the target species in this kind of agricultural nature type benefit from the presence of vertical landscape elements like mice, while species like the black-tailed godwit prefer the most open areas

(BIJ12, 2012). In an ideal situation, there are nature reserves present next to the agricultural plots in this type of landscape. If there is no nature reserve present, management focused on the survival of chicks is executed on the agricultural plots. Certain parts of the land then serve as breeding grounds for meadow birds, with measures like nest control (BIJ12, 2012).

Open akkerland, which has been translated to open arable land, refers to the agricultural nature type with predominantly presence of arable land with common crops such as potatoes, onions, sugar beets and cereals. Vertical vegetation, verges or ditches form the borders between the different plots. In the core areas, there has to be sufficient presence of fallow fields, extensive agricultural land, strips and edges for populations of target species to survive independent of the measures focused on agricultural nature conservation (BIJ12, 2012). Target species in the nature type of open arable land are, among others: hen harriers, lapwing, skylark and the yellow wagtail.

Droge dooradering is probably best translated as green infrastructure and consists of line-shaped landscape elements like alder rows, hedgerows, shrubbery and flower strips, but also dikes and coppice bushes (BIJ12, 2012). Common target species in this agricultural nature type are partridges, the long-eared owl, crested newt and several bats and birds.

Natte dooradering or so-called green-blue infrastructure consists of a network of wet landscape elements like ditches, streams, creeks, small swamps, reed beds and wetlands. In some areas, pools and small waters are also included in this type of agricultural nature. Certain areas are ideally surrounded by wet grasslands with high groundwater levels with herb-rich crops (BIJ12, 2012). These kinds of areas are natural habitats of target species like the common snipe, redshank and black tern. Toads, frogs, salamanders and dragonflies are also species which occur in this habitat type and benefit from measures focused on these kinds of areas.
Management areas of the Dutch waterboards are referred to by the category water. These areas are also located in the rural areas. Here, the so-called *blauwe diensten* can be implemented by the province, municipality or waterboard. *Blauwe diensten* or *groenblauwe diensten* are just like the measures in the ANLb focused on nature, landscape, recreation or thus water. Therefore, they contribute to the same objectives set in the ANLb: improvement of biodiversity, landscape and nature (BIJ12, 2012).

5.2 Differences in indicators of success

After the removal of incomplete responses, 47 usable cases form the dataset used in this research. In five cases, the respondent was not able to give an indication of the percentage of participants in AES in the concerned area of the ANC or Collective. These five cases are the ANCs *De Ploegdriever, ANV Veluwe IJsselzoom, ANV 't Broek* and *VANL Tieler- en Culemborgerwaarden* and a sub area within the agricultural *Collectief Súdwestkust*. The variable *Uitkomst* represents the participation rate of farmers in the Dutch AES in the area of the ANC or the AC. In three cases, the agricultural nature cooperatives VANL Tieler- en Culemborgerwaarden[1], De Ploegdriever[2] and the sub-area in Collectief Súdwestkust[3], the percentage of participants have been calculated using the mentioned number of members provided by the coordinators of the cooperatives. By dividing this number by the number of agricultural businesses in the involved municipalities, the participation rate could be defined. The two other cases in which the percentage of participants was missing are not included in the first analysis as the participation rate could not be determined with sufficient certainty.

With the final dataset and cases, a first analysis of the differences in the success conditions can be executed. The main indicator of success in this research is the participation rate, which is used to make a distinction between *above-average participation cases* and cases with a participation rate around or under the average in the Netherlands in the Qualitative Comparative Analysis in the following chapter. As expected, most of the cases have a participation rate around the average. Of the 47 cases, 25 differ between 10 and 40%. Notable is the small number of extremely low percentage cases: in just three cases, the percentage of participants is clearly below the average in the Netherlands. This number includes two cooperatives and one collective here.

[1] The VANL-TCW counts 160 members in the municipality West-Betuwe, where 470 agricultural businesses are located (CBS Statline, 2021). This would suggest that 34% of all the businesses participate in the ANLb, and this might even be a bit more, as the number of agricultural businesses also includes a few greenhouse horticulture businesses, which are not eligible for the measures taken in the management packages.
[2] In the Ploegdriever, there are 40 participants in the AES system, on a maximum of 118 agricultural businesses, with which this case also falls within a 30 to 40% participant range.
[3] The entire collective has more than two hundred participants and volunteers, and all the other three involved cases mention a participation rate higher than the average in the Netherlands, with estimated participation rates of 40-50%, 50-60% and 80-90%. According to CBS Statline (2021), a maximum of 777 agricultural businesses are operating in the area. However, the eleven mosaics together cover not the whole area, but more about half of the total area within the municipal boundaries. Based on the number of participants mentioned by the respondent it is therefore stated in this research to assign a participation rate of at least 30%.

Participation rate	Freq.	Percent
0-10%	3	6,38
10-20%	8	17,02
20-30%	9	19,15
30-40%	8	17,02
40-50%	1	2,13
50-60%	4	8,51
60-70%	2	4,26
70-80%	2	4,26
80-90%	4	8,51
90-100%	3	6,38
Unknown	3	6,38
Total	47	100

Figure 8. Percentage of farmers in the case area which participate in AES.

As can be seen in figure 8, the number of cases in the participation ranges from 50-60% to 90-100%, differs between two and four. Nine cases, which is almost 20% of all cases included, have a participation rate of at least 70%. These cases involve smaller agricultural collectives and nature cooperatives, but also two of the three collectives in the province Noord Holland, *Collectief Noord-Holland Zuid* and *Water, Land en Dijken.* Where it could be expected that only in small cases a high participation rate could be expected, this is not necessarily true. In smaller areas, the benefits and legitimation for participating in agricultural nature conservation could have been spread quicker among the farmers in the area.

The continuity rate, which is measured as the estimated percentage of farmers to extend their AES contract, has less variety except for a quite small number of notable cases. The very large majority of collectives and cooperatives have an expected continuity rate of at least 80%, as can be seen in figure 8. As stated earlier, this does not directly mean that the number of participants decreases after the current contracts expire, as new participants might apply, or currently participating farmers choose to execute other management packages. The most chosen answer category, 90-100%, includes, of course, also the suggestion that all the current participants will remain in the upcoming contract period. Therefore, the continuity rate has a very large impact on the future participation rate in the cases, which is the outcome variable in the QCA in this research.

Continuity	Freq.	Percent
30-40%	2	4,26
50-60%	1	2,13
60-70%	2	4,26
70-80%	3	6,38
80-90%	15	31,91
90-100%	24	51,06
Total	47	100

Figure 9. Estimated percentage of participants to extend AES-contract.

The effectiveness and compliance rate of the management packages are extra important since the revision of the AES system in 2016 was caused by the lack of effectiveness in the old system. It has to be stated that the effectiveness, measured in the different degrees available for specific measures, does not apply to all kinds of management packages. Specific management packages have different degrees of effectiveness, where a higher degree of severity of the measures also includes higher financial compensation and expected effectiveness. For instance, for the management package containing postponement of the mowing data, the later the mowing date is set, the higher the financial compensation and expected survival rate of breeding meadow birds is. In figure 10 below, an overview of this effectiveness is given. Notable is the fact that most of the respondents deal with management packages which include certain degrees and that the majority of cases have an effectiveness score of three or four, which indicates that the measures are quite heavy and thus should lead to positive effects for biodiversity and the landscape.

Effectiveness	Freq.	Per cent
n/a	12	26,67
1	1	2,22
2	5	11,11
3	11	24,44
4	15	33,33
5	1	2,22
Total	45	100

Figure 10. The average effectiveness level of the executed measures.

The compliance in the collectives and cooperatives has also been highly rated by the respondents. Perfect compliance occurs in two cases, according to the data collected in the survey, and the vast majority have a compliance score of nine. Just one case scores low on compliance, with a score of five. This case has a participation rate between 10% and 20% and is therefore also not labelled as a case with above-average participation in the ANLb. Overall, just as with the *effectiveness* and the expected *continuity* of the packages, the scores on the compliance of the executed measures indicate that the execution of the ANLb performs well, albeit based solely on the answers and the three indicators.

Compliance	**Freq.**	**Percent**
5	1	2,08
7	7	14,58
8	10	20,83
9	28	58,33
10	2	4,17
Total	48	100

Figure 11. Estimated compliance of the management package requirements.

One important remark to make to the previous brief descriptive analysis is the fact that also cases with a lower participation rate are included. In order to conclude more about the *above-average cases*, these three indicators of success for these cases are displayed in figure 12 below. The frequency column for *effectiveness* includes only 23 instead of 25 cases, as in two cases, this score is missing. The two cases with a low estimated continuity (30-40%) do not occur in the cases with a participation rate of at least 30%, and neither does the only mentioned case with low compliance.
Compared with the cases which do not reach the set 30% minimum, the higher scores are more often present in the cases with above-average participation.
Therefore, these indicators of success occur in a larger percentage of the cases than when these other collectives and cooperatives are also included.
However, it should also be mentioned that also in the *above-average cases,* relatively low scores on the indicators of success occur. For both included cases with the lowest compliance score, the effectiveness is either unknown or not applicable, the participation is 30-40% or 50-60%, and the corresponding continuity rate is 50-60% or 70-80%. The least scoring *above-average cases* compared to the highest scoring case differ therefore quite a bit. The only case here with a perfect score on compliance, also has the highest occurring score on effectiveness and the continuity rate, combined with an estimated participation rate between 70 and 80%. This shows that also in cases with an above-

average participation rate, the indicators of success can differ strongly, but overall, these cases score well.

Continuity	Freq.	Percent	**Effectiveness**	Freq.	Percent	**Compliance**	Freq.	Percent
50-60%	1	4,00	**n/a**	2	8,70	**7**	2	8,00
60-70%	1	4,00	**2**	3	13,04	**8**	5	16,00
70-80%	2	8,00	**3**	6	26,09	**9**	18	72,00
80-90%	7	28,00	**4**	12	52,17	**10**	1	4,00
90-100%	14	56,00	**Total**	23	100	**Total**	25	100
Total	25	100						

Figure 12. Continuity, effectiveness and compliance scores of the above-average participation cases.

Based on the answers provided by the respondents, the execution of the measures scores more than sufficient. In combination with quite heavy measures as a result of high effectiveness levels, the current AES system is expected to deliver good ecological results. The level of continuity suggests that farmers keep executing measures in the near future, which contributes to a sustainable and stable system. However, this concise assessment is based on data supplied by those involved themselves, and the ecological effects of the measures which form the most important output of agri-environmental schemes have not been included in the scope of this analysis.

6. Analysis

In this part of the research, the collected data has been analysed in order to gather the necessary data which is required to answer the central research question. After the explanation of four key concepts in QCA research, the analysis is carried out step-by-step, following the logic of Rihoux and De Meur (2009). The identification of relevant conditions is the first important step in qualitative comparative analysis. The following part of the analysis is based on a sequence of steps that form the guideline for a sound QCA. First, the thresholds for the conditions are determined, followed by the selection of conditions which will be used in the final analysis. Then, on the basis of these conditions, it is determined which are necessary to reach the desired ANLb participation degree of 30% set in this research.

6.1 Key concepts

In the crisp set QCA analysis, which is used in this research, four concepts are critical to understand. The concepts of sufficiency and necessity are already briefly mentioned in chapter *4. Research design* in the discussion on the chosen method of analysis, and will be described here prior to the analysis. The concepts of consistency and coverage need some extra description as well.

Sufficiency and necessity

In crisp set QCA, a condition is necessary for outcome 1 if this condition is always present when the outcome is 1. Without the condition, the outcome cannot occur. If a condition is sufficient, the condition is always present when the outcome is 1, but also without the certain condition, outcome 1 can occur (Rihoux & Ragin, 2008). The following example can clarify this further: the degree of sufficiency measures which variables can be present but are not per se a necessary condition to reach outcome 1. If set A*B leads to outcome Y, but A*b leads to the same outcome, then both sets are sufficient, but only the presence of A is necessary for the outcome. For condition B, it is not necessary to be present (B) or not present (b). In practice, a condition is usually not completely sufficient or necessary, which would mean that the sufficiency or necessity score would be 1. In order to measure the degree of sufficiency or necessity, the scores can be calculated. This will be done using an example.

To illustrate the calculation of the necessity and sufficiency score, an example is used with a total of fifty cases, of which twenty cases have outcome 1. The condition A is in total thirty cases present, of which in fifteen outcome 1 cases.

The necessity score of condition A is here calculated by dividing the presence of A in outcome 1 cases (15) by the total number of outcome 1 cases (20). This calculation (15/20 = 0,75) indicates that in 75% per cent of the outcome 1 cases, the condition is present.
The sufficiency score of condition A is calculated by dividing the outcome 1 cases where the condition is present (15) by the total number of cases where the condition is present (30). This calculation (15/30 = 0,5) indicates that when the condition is present, the outcome is 1 in 50% of the cases. In these examples, the scores for individual conditions are calculated, and these scores can help to select the relevant conditions to include in the QCA.

Consistency and coverage

Consistency refers to the degree to which a set of conditions lead to outcome 1 (or 0) in QCA. When the consistency is 1, the specific combination always has outcome 1. When the consistency is equal to 0, the opposite is true, and none of the cases with the specific set of conditions has the outcome 1. However, perfect consistency is quite rare and therefore, most of the time requires small *N*s or macro-level data (Ragin, 2006). Ragin (2006) advocates that the consistency score should score as high as possible. For consistency scores below 0.75, it is hard to assume relations between the subset X and outcome Y. In this research, no full consistency means that there are *contradictory cases,* which means that a specific set of conditions leads to cases with outcome 0 and 1.

The coverage is the indicator to which degree the outcome is covered by a specific set of conditions. This number indicates how much of the outcome is covered by the final solution sets (Longest & Vaisey, 2008). The final step in the QCA in this research provides insight into which minimal combinations of conditions always lead to the desired outcome. How more cases with the outcome 1 exists of the given sets of conditions, the larger the coverage of the set is. High coverage scores indicate that the concerned set of conditions nearly always should be present to achieve outcome 1.

6.2 Variables and thresholds

Defining thresholds is crucial in crisp set QCA as the set values determine if the specific condition is either present or absent in the involved cases. In the sets of conditions which will be identified in the analysis, capital letters indicate the presence of a condition. As this research makes use of crisp set QCA and not fuzzy set QCA, conditions are only present if the score at least equals the threshold score set for the condition.

The first set threshold is the threshold of the outcome, which is expressed in the percentage of farmers participating in the ANLb. Hence, the participation rate is the dependent variable in this QCA analysis. Without a set threshold for this variable, it is not possible to answer the central research question in this analysis. Therefore, it is crucial to determine the minimal value to define a case as an *outcome 1 case* in this research. Approximately 20% of the farmers in the Netherlands participate in the ANLb (BoerenNatuur, 2021; Runhaar, Polman, Dijkshoorn-Dekker, 2018). More specifically, a total of 11.159 farmers executed measures within this system. The participation rate in the ANLb has been increasing in recent years, and this is also visible in the total net area under management: from 64.293 ha in 2016 to 77.351 ha in 2018 (Boonstra & Nieuwenhuizen, 2019). The gross total was 105.000 ha in 2018 and approximately 110.000 ha in 2021 (Boonstra & Nieuwenhuizen, 2019; BoerenNatuur, 2021). The increase in both participants and total area under ANLb management suggests further growth in the number of participants in the upcoming years. In order to identify success conditions to achieve a relatively high participation rate, cooperatives and collectives with already an *above-average* participation rate form the group of cases to study. Therefore, the threshold for the outcome is set at 30-40% to identify cases where the participation rate is slightly above the average. Higher thresholds could have been chosen, but the fact that there are fewer cases with such a relatively high participation could mean that only the present conditions in the more extraordinary successful examples of cooperatives and collectives are identified. This can mean that one of the aims of the research is lost sight of, namely, to gain insight into which conditions collectives and cooperatives with an (just below) average participation rate in ANLb have to improve to make the step to a higher level of participation. Cases with a minimum participation of 40% or even 50% might be seen as outliers which are not directly comparable to the cases with a participation rate of around 20%.

6.2.1 Thresholds of the conditions

In crisp set QCA, the determination of thresholds and justification of these chosen thresholds is crucial for transparent QCA research (Rihoux & De Meur, 2009). Thresholds are the values which determine if a condition is present or absent, and therefore, if the value of the underlying variable is 0 or 1. The same applies to the outcome variable, which is 1 when the outcome is present, and 0 if the outcome is not present. The chosen threshold can be based on the mean, median or technical criteria, but justification on substantive or theoretical grounds is preferred (Rihoux & De Meur, 2009). In this paragraph, all the thresholds for the conditions existing of combined variables are discussed. Figure 13 provides a quick overview of the conditions and the corresponding thresholds.

Variable name (in dataset)	**Condition name**	**Combined or single**	**Alpha score**	**Threshold:**
mot_vrijwillig_maatregelen	MOT1	Single	-	≥ 50-60%
mot_uitstellen_maaidatum *mot_kruidenrijkestroken* *mot_kruidenrijkgrasland* *mot_vogelnesten* *mot_plasdras*	MOT2	Combined	0,84	≥ 50-60%
pos_grondprijs_barriere *pos_risico_investeringen*	POS1	Combined	0,83	≤ 7
pos_inkomstenverlies_intensief *pos_inkomstenverlies_extensief*	POS2	Combined	0,92	≥ 2.5
leg_boer_beheerderlandschap	LEG1	Single	-	≥ 50-60%
leg_kennisuitwisseling	LEG2	Single	-	= 'Ja' (=1)
cap_meerwaarde_expertise	CAP1	Single	-	≥ 51-75%
cap_voldoende_kennis	CAP2	Single	-	= 'Mee eens' (2) or 'Volledig mee eens' (1)
lea_capaciteit_organisatie	CAP3	Single	-	= 'Ja, actief benaderen.'
lea_onzekerheiduitvoering	CAP4	Single	-	= 'Ja'
are_sw_gemeenten_ANV *are_sw_provincie_collectief*	ARE1	Combined	0,66	= 'Volledig mee eens (1) or 'Mee eens' (2)
leg_landschapsvrijwilligers *leg_soortenbeheervrijwilligers* *leg_milieunatuurorganisaties*	ARE2	Combined	0,42	≥ 2 or 3
typ_weidevogels	TYP1	Single	-	≥ 50-60%

Figure 13. Overview of the selected conditions and chosen thresholds.

Thresholds motivation

It is difficult to determine the thresholds for the motivation conditions, as the measures are partly dependent on land use (meadows or arable land) and the presence of target species. Some of the voluntarily measures asked for in the survey are expected to occur more in areas with mainly meadow land, for instance, postponement of the mowing date and presence of *plasdras.* This, and the fact that farmers who participate in the ANLb are expected to take fewer measures voluntarily (as the participant receives compensation for participation), make that an area with a high degree of voluntarily taken measures performs better in AES than in cases with a lower degree voluntarily taken measures.

For the MOT1 and MOT2 conditions, the threshold is set on 50% of the farmers taking voluntary measures. Even if 50% is not an illogical threshold as it is a clear distinction between minority and majority, a recent study on more nature-inclusive business operations among farmers indicated that 58% of the respondents implemented measures to do so (Bouma, Koetse & Brandsma, 2020). Runhaar, Polman and Dijkshoorn-Dekker (2018) researched self-initiated conservation activities among Dutch farmers. In the research, eight different kinds of self-initiated conservation activities are specified, which can be executed and implemented by arable and dairy farmers[4]. Approximately 80% of the farmers execute at least one to four measures voluntarily, and 20% of the farmers state to combine five or more measures (Runhaar, Polman, Dijkshoorn-Dekker, 2018). The lowest single performed measures are the presence of waterholes and unutilized pieces of land by 13% of the dairy farmers, and the highest single performed activity is helping birds by 77% of the dairy farmers.
In this research, the percentage of farmers executing the measure *plasdras* lies between 0-20% in almost 90% of the cases, which corresponds with the results in the quoted research. The expected percentage of farmers with voluntarily herb-rich grasslands lies a bit lower in this research, and the other activities are somewhat difficult to compare due to the different methods used to measure the number of farmers taking voluntary measures.

Thresholds possibilities

For the first possibilities condition POS1, the threshold is set on the value 7. This score in the dataset represents 50-60% of the farmers. Both the variables in this condition have the same answer categories, which makes that no difficulties are experienced with merging both variables. The only problem with this condition, however, is the fact that in contrast to the other conditions, the value 1 would suggest that farmers perceive former investments and high ground prices as a barrier to participating in AES. In the survey, the respondents are asked to the estimated percentage of farmers who deal with this idea. As a success condition however, it is expected that if farmers do not experience these barriers, they are more likely to participate. Therefore, the values 0 and 1 are here the other way around. Observations with a score higher than 7 in the dataset are valued at 0, and below the threshold, the cases are valued at 0 because the absence of experienced barriers is seen as a success condition here.

The condition POS2 condition refers to the accepted income loss and combines the variables *pos_inkomstenverlies_intensief* and *pos_inkomstenverlies_extensief*. These variables have the same answer categories, and therefore merging does not cause any problems. The value 1 as an answer here

[4] The specified activities are: 1) meadow bird protection, 2) helping birds on and around the farm 3) herb-rich grasslands, 4) extensive grazing, 5) presence of unutilized pieces of land, 6) nature friendly banks alongside ditches, 7) presence of waterhole, 8) search for species before mowing (e.g. roe deer) and 9) other activities (Runhaar, Polman, Dijkshoorn-Dekker, 2018, p. 7).

represents ‘not a single percentage’, and 6 indicates 75-100%. Crisp set QCA has here a disadvantage in comparison to fuzzy analysis as defining the values 0 and 1 for absence and presence of the condition is hard to define here. The value 1 here means that both the more extensive and intensive farmers do not accept income loss, and with the value of 1.5, one of the two (expected to be the more extensive) would accept 0-25% loss. As 0-25% can already be defined as a significant part, this could imply that the condition ‘farmers accept income loss’ in order to take measures focused on agricultural nature conservation is present. However, at this point, the threshold is set at 2.5. This implies that at least one of the two types has to accept 50% income loss and the other variable up to 25%, or one should accept 51-75% income loss. It is argued here that in this case, it is clear that there is a significant degree of willingness present to really hand in yields in order for biodiversity protection.

Thresholds legitimation

The two legitimation conditions both have a clear threshold. For the first condition, LEG1, concerned with the question of which percentage of the farmers in the area sees themselves as landscape manager, the set threshold is 50%, as this minimum value clearly distinguishes the majority from the minority of farmers in the area. With this, an indication if the farmers in the area are mainly focused on production or also partially as an actor responsible for landscape elements and biodiversity. The second condition LEG2, measures if farmers mutually share knowledge on agricultural nature conservation. This condition is present in the cases if this question is answered with *yes* by the respondent.

Thresholds capacity

The first capacity condition also has its threshold set to distinguish the majority of the farmers in the area. The condition is labelled as present if at least 51-75% of the farmers in the area are expected to appreciate the expertise of the agricultural collective and whether they see added value in this expertise. The second condition measures if the respondent agrees with the statement that there is sufficient knowledge present in the agricultural collective. If the respondent *agrees* or strongly *agrees* with this statement, the condition is present in the cases. For the third and fourth capacity condition also applies that the conditions are present if the question has been answered with *yes.* The third condition concerns the question if the collective has enough capacity to approach farmers to participate in agricultural nature conservation actively, and whether this happens.
The fourth *capacity* condition questions if the collective can play a role in taking away uncertainty in the execution of measures focused on agricultural nature conservation. For farmers, this can be a perceived barrier to participating in the ANLb. In this, the collective can convince farmers of the

feasibility of the implementation of measures for biodiversity or landscape restoration in the business operations.

Thresholds area

The two conditions concerning the area characteristics which can influence farmer participation in the ANLb both have a different set threshold. The condition ARE1 is present if the respondent *agrees* or *strongly agrees* with the statement that the cooperation between the agricultural collective or the cooperative with respectively the province and local municipalities is sufficient. The ARE2 condition is present if at least two of the three specified landscape actors can be found in the area. These actors are volunteers focused on landscape elements, species and nature organizations. The presence of two or three of these actors indicates that farmers in the area can be influenced directly or indirectly to perform measures focused on agricultural nature conservation through participation in the ANLb.

Thresholds type

The condition TYP1 has its threshold set at 50%, which again means that this condition is present if the majority of the management packages in the concerned area are focused on meadow birds. The presence of this condition indicates that the measures are executed on grassland. The presence or absence of this condition tells if the presence of this specific landscape type and species can be seen as a success condition in the participation of farmers in the Dutch ANLb, based on the data collected in this research.

6.3 Analysis of the conditions

In this section, the conditions for the final analysis are selected. First, the necessity and sufficiency scores of the conditions are displayed and discussed, which help to identify the right conditions which seem to have an influence on the participation rate in ANLb, based on the information collected in the dataset.

6.3.1 Selection of conditions

The created dataset contains a large number of variables which can be used as conditions in the qualitative comparative analysis. In order to make a clear distinction between useful and less influential variables for the desired outcome in the analysis, the sufficiency and necessity of the variables for the outcome *participation rate* are tabulated, as can be seen in Figure 14 below. The higher the score of the condition, the more sufficient or necessary the specific condition is for the outcome, which is a participation rate of at least 30%.

Condition	Necessity	Sufficiency
MOT1	0,280	0,700
MOT2	0,320	0,889
POS1	0,520	0,393
POS2	0,440	0,647
LEG1	0,640	0,696
LEG2	0,520	0,565
CAP1	0,800	0,741
CAP2	0,920	0,575
CAP3	0,800	0,714
CAP4	0,800	0,526
ARE1	0,200	0,625
ARE2	0,417	0,455
TYP1	0,760	0,792

Figure 14. Sufficiency and necessity scores

Based on the scores presented in the two figures above, the first conditions are chosen for the QCA, which makes it important to interpret the numbers accurately. Directly notable is the condition CAP2, which has a high necessity score of 0,920, which indicates that this condition is present in almost all of the outcome 1 cases. However, the sufficiency score is quite a lot lower (0,575), suggesting that in nearly half of the cases, the presence of this condition does not result in the desired outcome. The MOT2 condition has the highest sufficiency score of the selected conditions (0,889) but one of the lowest necessity scores (0,320). This is due to the fact that the condition is just present in eight of the 25 *outcome 1 cases*, but of the total nine times the condition is present, this leads to outcome 1 in eight cases.

The four conditions which measure the importance of the collective and/or the cooperative have all high to very high necessity scores, varying from 0,800 (CAP1, CAP3 and CAP4) to 0,920 (CAP2). These high scores indicate that in the 25 outcome 1 cases, at least 20 include at least one of the *capacity* conditions. the presence of the CAP conditions in at least 80% of the cases leads to a positive outcome. The sufficiency scores for these variables are a little bit lower, varying between 0,526 (CAP4) to 0,741 (CAP1). The lower scores of CAP4 and CAP2 (0,526 and 0,575) arise from the fact that they occur in a large number of cases: respectively, 35 and 37 cases have this condition. This given means that the conditions also occur in quite a large number of outcome 0 cases.
The high necessity scores for the *capacity* conditions stand out extra as the other conditions in the farmer and landscape-level score much lower in general. The conditions for *motivation* score respectively 0,280 and 0,320 and for *possibilities* 0,520 and 0,440. *Legitimation* (0,640 and 0,520) and *type* (0,760) have average scores, but the three *area* conditions are poor (0,200 up to 0,417). Where the conditions MOT1 and MOT2 compensate this with good sufficiency scores, this does not apply to the ARE conditions. Partly based on the sufficiency and necessity scores, a first set of conditions will be included in the QCA, which will be displayed in a truth table in the next paragraph.

6.3.2 Configurations

After the necessity and sufficiency scores of the individual conditions are discussed, the configurations and their outcome are discussed in this paragraph. The configurations of conditions in this dataset are identified and analysed with the command *fuzzy* in *Stata 17*. The command *fuzzy,* which is used to do the analysis, has been developed by Longest and Vaisey (2008), and with this command, both fuzzy QCA and crisp QCA can be executed. Despite the fact that this command can be used to perform a fuzzy QCA with all possible values possible between 0 and 1 for the conditions, only the Boolean data has been used instead. The result of using this data is the fact that a crisp set QCA will be executed.

After the selection of potential and preferred conditions to include in the QCA, these conditions and their presence or absence in the involved cases van can be displayed in a truth table. In a truth table, three different types of configurations occur. Next to the *1 configurations* (outcome 1) and *0 configurations* (outcome 0), there are *contradictory configurations,* referred to with the capital *C.*[5]
For a sound qualitative comparative analysis, the contradictory configurations have to be resolved. As stated by Rihoux and De Meur (2009), the presence of contradictory outcomes is normal in QCA and can help to understand the individual cases better and gather more information about the specific cases. However, it is necessary to solve as many contradictory cases as possible, as the remainders

[5] Two other configurations are so-called *don't care configurations* (outcome indeterminate) and *logical remainders* which are the not observed configurations (Rihoux & De Meur, 2009).

have to be excluded from the further analysis. The strategies to solve the contradictory cases are discussed further on in the analysis.

In order to include as many of the different described conditions influencing participation in ANLb, ideally, a condition measuring *motivation, possibilities, legitimation, capacity, type,* and *area* would be included in the analysis. However, the selection of conditions for the analysis is not only just based on theoretical grounds but in combination with the necessity and sufficiency scores of the conditions. As the cooperatives and collectives form the cases in this research, the role of the organizations in achieving the desired participation rate is crucial to include in the analysis. Baser et al. (2008) and recent research by Dik, Termeer and Runhaar (2021) underline the importance of the present capabilities as commitment, engagement and attracting support to reach positive effects for biodiversity and a professional organization. All four conditions concerning the organization of the cases have high necessity scores as described earlier, and two are included in the first set of conditions. These are the conditions CAP1 and CAP3 which presence indicates that the present knowledge and expertise are appreciated by the majority of farmers and if the organization has enough capacity to approach farmers to participate actively. The presence of these conditions is expected to be important for a more than average participation, as the voluntary character of the ANLb might ask for conviction from the collectives to engage farmers, and farmers should see added value in the knowledge and expertise of the collective (or cooperative) in order to be willing to participate.
The corresponding necessity scores (both 0,800) and sufficiency scores (0,741 and 0,714), which are both quite high, indicate the relation between the conditions and the desired outcome in the QCA, and thus the importance of presence for achieving a participation rate of at least 30%.

The third and last condition included in the first truth table is the condition TYP1, which is present if more than 50% of the measures in the ANLb are focused on the target species meadow birds. Meadow birds represent in most grassland areas the most important kind of specie where the measures are focused on, and the analysis prior to the QCA indicated that in many of the above-average participation cases, this condition is present. Which can indicate that the presence of meadow birds might be a stimulation for farmers to take measures in order to protect them. The sufficiency (0,792) and necessity (0,760) underline this idea.

Despite the high sufficiency and necessity scores, the selection of the first three conditions leads to a large number of contradictory configurations, despite the high necessity scores. Below, the truth table with all the cases and the Boolean data of the preferred conditions is displayed, with in the last column the outcome (1 if the participation rate is at least 30%). The eight identified configurations

include only one outcome 1 and outcome 0 configuration. The other six configurations are contradictory.

Case	CAP1	CAP3	TYP1	Outcome
Collectief Alblasserwaard/ Vijfheerenlanden, Collectief Súdwestkust (mozaïek 4), Collectief Groningen West, Collectief Súdwestkust (mozaïek 3), Collectief Veluwe NMC Randmeerkust, ANV De Capreton, ANB Oost Brabant (collectief), Water Land en Dijken, ANLV De Lieuw Texel, Collectief Súdwestkust (mozaïek 1), Collectief Noord-Holland Zuid, Collectief It Lege Midden, Collectief Eemland	1	1	1	1
Collectief Utrecht Oost, ANOG, Collectief Deltaplan Landschap, De VALA regio West, ANV De Ploegdriever	1	1	0	C
ANLV Geestgrond, Collectief It Lege Midden (Leeuwarden), Agrarisch Collectief Krimpenerwaard, ANV De Hollandse Venen	1	0	1	C
Natuurrijk Limburg, ANV Veluwe IJsselzoom, Wierde en Dijk, Coöperatie Boeren met Natuur, VSB Rijk Maas en Waal	1	0	0	0
Collectief Súdwestkust (mozaïek 2), Bosk & Greide, ANB Oost Brabant (deelgebied)	0	1	1	C
Vereniging Streekbeheer Rijnstromen, ANV 't Broek, VANL Weststellingwerf, ANV Zonnestraal, Agrarische Natuurvereniging Baarle-Nassau, ANV Maashorstboeren, Poldernatuur Zeeland	0	1	0	C
Kopse Agrarische Natuurvereniging, ANV Camperland, VANL-TCW, Collectief Noord West Overijssel	0	0	1	C
ANV Hooltwark, ANV Groen Salland, ANV De Ommer Marke, Plattelands-coöperatie Peel en Maas, VAL Oude IJssel, ANV Land&Schap, Collectief Midden Overijssel	0	0	0	C

Figure 15. Truth table with three conditions.

In order to solve the contradictory cases, the first option suggested by Rihoux and De Meur (2009) is to add an extra condition to the analysis. The addition of an extra variable makes the potential present configurations more complex as there are more unique subsets possible. This makes more differences possible and decreases the chance of contradictory cases. Important, however, is the fact that too many conditions lead to the individualization of cases when the majority has unique configurations. This can be referred to as the problem of *limited diversity.* Therefore, a good balance between cases and conditions is crucial for good analysis. In an intermediate-N analysis, which is defined by Berg-Schlosser and De Meur (2009) as research with 10-40 cases, 4 to 6 or 7 conditions are recommended. As the analysis so far includes three variables, the addition of a fourth or fifth condition can be

justified if the concerned condition scores well on sufficiency, necessity and includes a degree of variation of presence in the involved cases. Just three conditions form a too small number of conditions for a slightly larger than an intermediate-N analysis as defined by Berg-Schlosser and De Meur (2009). With more than forty cases, contractionary cases were expected, and there are six in total when only the three conditions CAP1, CAP3 and TYP1 are included. In the following step of this analysis, two conditions are added in order to solve most of the contradictory configurations.

The condition MOT2 has been added on theoretical grounds in the first place. The presence of the condition represents that at least 50% of the farmers in the concerned area take some measures focused on biodiversity protection. The previously cited study by Bouma, Koetse and Brandsma (2020) shows that around 58% of Dutch farmers implement voluntary measures to protect biodiversity. Therefore, the presence of the condition indicates the willingness of farmers to do something for the biodiversity on their land. This condition has the highest score on sufficiency (0,899) but one of the lowest on the necessity with 0,320. However, this lower score is not a problem: where at the start of the selection process highly sufficient conditions are chosen to include in the analysis, this is different in the process of solving contradictory configurations. The addition of an extra condition can solve contradictory configurations, even if, for this condition, the necessity is not high.

The fifth condition which is added in the analysis is the condition LEG1, which measures the percentage of farmers seeing themselves as landscape manager, next to the main task as a food producer. This condition is also present if this counts for more than half of the farmers in the concerned area. If the condition is present, it can be argued that the majority of the farmers share attention for the state of biodiversity and the landscape. This indicates that the farmers are aware of the influence they can have on a more vital agricultural area, where production and nature conservation can go hand in hand, without full focus on efficiency and effectivity of production. The condition LEG1 has average scores on sufficiency and necessity, but with the addition of this variable, there are just three contradictory configurations remaining, concerning eight cases. The corresponding truth table with the added condition can be seen in figure 16 below.

Case	MOT2	LEG1	CAP1	CAP3	TYP1	Outcome
Collectief Noord-Holland Zuid, Collectief Súdwestkust (mozaïek 3), Collectief It Lege Midden	1	1	1	1	1	1
Collectief Deltaplan Landschap	1	1	1	1	0	1
ANV De Hollandse Venen	1	1	1	0	1	1
Wierde en Dijk	1	1	1	0	0	0
ANV Groen Salland	1	1	0	0	0	1
Collectief Eemland	1	0	1	1	1	1
Agrarisch Collectief Krimpenerwaard	1	0	1	0	1	1
Collectief Veluwe NMC Randmeerkust, Collectief Alblasserwaard/Vijfheerenlanden, ANLV De Lieuw Texel, ANV De Capreton	0	1	1	1	1	1
Collectief Utrecht Oost	0	1	1	1	0	1
ANLV Geestgrond	0	1	1	0	1	1
ANV Veluwe IJsselzoom, Natuurrijk Limburg	0	1	1	0	0	0
Collectief Súdwestkust (mozaïek 2), Bosk & Greide	0	1	0	1	1	1
ANV Maashorstboeren, VANL Weststellingwerf	0	1	0	1	0	C
VANL-TCW, ANV Camperland, Collectief Noord West Overijssel	0	1	0	0	1	C
ANV De Ommer Marke	0	1	0	0	0	0
Collectief Groningen West, ANB Oost Brabant (collectief), Collectief Súdwestkust (mozaïek 1), Water Land en Dijken, Collectief Súdwestkust (mozaïek 4)	0	0	1	1	1	1
ANV De Ploegdriever, De VALA regio West, ANOG	0	0	1	1	0	C
Collectief It Lege Midden (Leeuwarden)	0	0	1	0	1	0
Coöperatie Boeren met Natuur, VSB Rijk Maas en Waal	0	0	1	0	0	0
ANB Oost-Brabant (deelgebied)	0	0	0	1	1	0
ANV 't Broek, Vereniging Streek-beheer Rijnstromen, Agrarische Natuurvereniging Baarle-Nassau, Poldernatuur Zeeland, ANV Zonnestraal	0	0	0	1	0	0
Kopse Agrarische Natuurvereniging	0	0	0	0	1	0
ANV Land&Schap, ANV Hooltwark, Plattelandscoöperatie Peel en Maas,Collectief Midden Overijssel, VAL Oude IJssel	0	0	0	0	0	0

Figure 16. Truth table with five conditions.

Even with the addition of the fifth condition, not all contradictory cases have been solved. The addition of a sixth condition has been considered, but even if both remaining *capacity* conditions were added for example, still two contradictory cases would occur. Next to this, too many conditions could

lead to too many unique subsets and individualisation of cases. In the following paragraph, an attempt is made to assess the conditions or the outcome per contradictory configuration and adjust them if possible. Reconsideration of the set thresholds and raising or lowering this value in order to solve cases is suggested by Rihoux and De Meur (2009), but this led to the appearance of contradictory cases in other configurations, and the values of the contradictory cases were not always eligible to be modified as they lay out of the reach of a small threshold adjustment. Therefore, the choice has been made to recode the configurations in the contradictory configurations. This implies that in the configurations, it is argued that a condition is present instead of absent, which creates a new configuration. In the remaining part of this paragraph, the recoding of conditions or the outcome in the contradictory cases is justified, based on the suggested solutions by Rihoux and De Meur (2009).

6.3.2.1 Configuration mlECt

In this combination of conditions, the conditions CAP1 and CAP4 are present and both MOT3 and TYP1 are not. The three cases are ANOG, De VALA and ANV De Ploegdriever, of which the ANOG does not reach the 30% participation rate based on the data. The variable measuring the percentage of participants equals 10-20%, which approaches the average (20%), but not the set minimum used in this research (30-40%).

Case	M	L	E	C	T	Outcome
ANV De Ploegdriever	0	0	1	1	0	1
De VALA (regio West)	0	0	1	1	0	1
ANOG	0	0	1	1	0	0

Figure 17. Cases with configuration mlEct and contradictory outcomes.

For both the ANV de Ploegdriever and De VALA (regio West), it can be argued that the condition MOT2 is present, and therefore the configuration could be recoded to one where the condition MOT2 is present in these two cases. Both the cooperatives are quite small, and especially the area of ANV de Ploegdriever is one of the pioneering areas in the Netherlands when it comes to landscape restoration. In 2008 a combination of municipalities, civil society organizations and private parties started a collaboration to create funding instruments for landscape development with Dutch ministries in exchange for financial support. At that time, four areas were selected on the basis of their plans to realise a funding instrument, of which the area Ooijpolder-Groesbeek was one (Overbeek, De Graaff & Selnes, 2011). The authors state that at the start, especially local administrators had a high degree of commitment in the area itself, but that the engagement of citizens in and around the area has been strong. Before 2008, there had already been pilots for green-blue services in the area Ooijpolder-Groesbeek, which means that there was already experience and knowledge present in the area (Overbeek, De Graaff & Selnes, 2011).

In the area of the VALA, there is also a partnership between private parties such as LTO Noord, Friesland Campina and the Rabobank with the province Gelderland to facilitate and help farmers to make business operations more sustainable and future proof of environmental quality, water management and soil fertility, (VKA en Liemers, 2020). The participating farmers in this project led the way in circular agriculture, where the produced cow manure is reused on their own land to improve soil fertility (Hakkenes, 2018). Within this cycle, the farmers limit the deposition of fertilizers to prevent surface and groundwater from being polluted with too high concentrations of these substances. The farmers who participated at the time in this project were ahead of the national set climate targets, with a 20% reduction of CO_2 emissions. More than 250 farmers in the *Achterhoek* area have joined this more sustainable way of farming (Hakkenes, 2018). The VALA and the VKA work together in the pilot *Het Markemodel,* which is a bottom-up approach where farmers and other involved actors together search for quality objectives for water quality, biodiversity, ammonia and nitrate emissions and agricultural nature management and what the reward should be for the farmers when achieving the quality goals (Van der Horst et al., 2021).

The large number of participants in the project, and the engagement of the farmers and the agricultural collective to combine farming practices with more sustainable ways of farming and attention to the water and soil quality, led to the recoding of the configuration of these two cases. The cases now form the new configuration MlECt, in which the condition measuring *motivation* is present, and the configuration mlECt is now an *outcome 0 configuration*.

6.3.2.2 Configuration mLecT

The configuration mLecT includes three cases, of which the ANV Camperland has a positive outcome with a participation rate of 30-40%, and the other two cases in this configuration have outcome 0. Collectief Noord West Overijssel has a participation rate which is in line with the Dutch average, namely 20-30%. This percentage is thus slightly less than the participation in the ANV Camperland, which is an agricultural nature cooperative located in the area of the collective Noord West Overijssel. Recoding the two *outcome 0* cases within this configuration has not been an option as a brief analysis did not indicate that conditions are wrongly present or absent in the VANL-TCW or Collectief Noord West Overijssel. Therefore, the option suggested by Rihoux and De Meur (2009) to recode all the cases to outcome 0, or to delete the contradictory case is the most logical option. Here, the choice has been made to exclude the ANV Camperland for the remaining part of the QCA analysis, as this agricultural nature cooperative is located in the collective Noord West Overijssel. The data of this agricultural collective gives a broader view of the area, and therefore the presence of the ANV Camperland case is less necessary.

Case	M	L	E	C	T	Outcome
VANL-TCW	0	1	0	0	1	0
ANV Camperland	0	1	0	0	1	1
Collectief Noord West Overijssel	0	1	0	0	1	0

Figure 18. Cases with configuration mLecT and contradictory outcomes.

6.3.2.3 Configuration mLeCt

The last contradictory configuration includes the two cases, ANV Maashorstboeren and the VANL Weststellingwerf. This configuration is resolved by adjusting the outcome to 1 in the case VANL Weststellingwerf. The respondent indicated that questions could be interpreted in different ways and, therefore, the answers have been analyzed, and this resulted in recoding the outcome. The agricultural nature cooperative has nearly two hundred participants, according to its website, and 180 according to the respondent. This is largely due to an increase of members executing measures focused on the *droge dooradering* (ELAN, 2022). Compared to the total of 302 agricultural businesses in the municipality of Weststellingwerf, this is higher than the indicated participation rate of 20-30% by the respondent. Even if eighty of these members would not be farmers, still a participation rate of at least 30% would remain, which makes it safe to state that the participation rate is higher than indicated in the first instance. Therefore, the outcome can be adjusted, which means that both the two cases with configuration MLeCt have outcome 1 in the following part of the QCA.

Case	M	L	E	C	T	Outcome
ANV Maashorstboeren	0	1	0	1	0	1
VANL Weststellingwerf	0	1	0	1	0	0

Figure 19. Cases with configuration mLeCt and contradictory outcomes.

The third step of the QCA procedure has been completed with the resolving of the contradictory configurations. The configurations *mlEcT* and *mlECt* have been recoded to *outcome 0 configurations*, mLeCt to an *outcome 1 configuration* and the *new outcome 1 configuration* MlECt has been added to the analysis, representing ANV de Ploegdriever and De VALA (regio West).

6.4 Final reduction sets

In the fourth step in this QCA analysis, the minimum combinations of conditions which always lead to outcome 1 are identified. All the minimized sets are discussed on their coverage and how these reduced combinations of conditions can be interpreted.

6.4.1 Outcome 1 minimization

The minimization of the configurations is crucial for the identification of the conditions which have to be present in the outcome 1 cases. In addition, minimization of the configurations with outcome 0 has to be executed to understand which combinations of conditions do not lead to outcome 1 cases. With the Stata command *fuzzy,* six configurations are identified as the minimized sets for outcome 1, which are displayed in the table below.

Set	**Raw Coverage**	**Unique Coverage**	**Solution Consistency**
MOT2*LEG1*cap1*cap3*typ1	0,040	0,040	1,000
CAP1*CAP3*TYP1	0,520	0,200	1,000
mot2*LEG1*CAP3	0,360	0,200	1,000
LEG1*CAP1*TYP1	0,360	0,040	1,000
MOT2*CAP1*TYP1	0,240	0,040	1,000
MOT2*CAP1*CAP3	0,280	0,120	1,000
Total coverage = 1,000 **Solution consistency** = 1,000			

Figure 20. Minimization for outcome 1 configurations.

The configuration with the highest raw coverage is CAP1*CAP3*TYP1. These three conditions were among the highest scores on necessity, which makes it not illogical that this configuration leads to outcome 1 cases. The raw coverage value here indicates that in 52% of the outcome 1 cases, all the three conditions are present, disregarding the other two conditions. The unique coverage of 20% means that in 5 out of the 25 outcome 1 cases, only these three conditions are present, and the condition MOT2 and LEG1 are absent.
Based on the raw coverage, slightly more than half of the *above-average cases* include the presence of CAP1, CAP3 and TYP1. The presence of the conditions indicates that in these cases, 1) the majority of the measures are focused on meadow birds, 2) the farmers appreciate the knowledge and expertise of the agricultural collective, and 3) the collective has the capacity to approach farmers to participate in agricultural nature conservation actively.

Both the *capacity* conditions stand out as in all *outcome 1 cases*, one of the two conditions has to be present. The only exception is the configuration MOT2*LEG1*cap1*cap3*typ1. In this specific configuration, the *outcome 1* has been reached without the presence of one of the two capacity conditions. This configuration corresponds with only one case, and therefore has the same low score on raw and unique coverage.

The configuration mot2*LEG1*CAP3 occurs in 36% of the above-average cases, which equals 9 cases. This shows that in more than one-third of the cases, there is no need for farmers who take voluntary measures for biodiversity protection in order to reach a participation rate of at least 30%. In two of the 25 *outcome 1 cases,* only the LEG1 and CAP3 conditions are present, which indicates that if the majority of farmers see themselves as landscape manager in combination with the sufficient capacity of the collective to approach farmers actively, a participation rate of at least 30% of the farmers in the ANLb system can occur. It might be argued here that if the farmers have the right attitude as they see themselves not only as a producer of farming products, they can be involved in ANLb if approached by the collective. However, it is only in just two cases that only both conditions are present, with the desired outcome.

The next minimized set, LEG1*CAP1*TYP1, also has a raw coverage score of 36%. This subset shows that if the majority of the management packages in the ANLb are focused on meadow birds in combination with a majority of farmers who see themselves as landscape manager and appreciate the expertise of the collective, outcome 1 occurs. In 24% of the above-average cases, this also applies if the LEG1 condition is replaced by the MOT2 condition, indicating that the majority of farmers take voluntary measures for agricultural nature conservation. This is the set MOT2*CAP1*TYP1. Both of the minimized sets have a unique coverage of just 0,040, which means that only the presence of the concerned three conditions in the configurations occurs in just one case. In the other configurations where all three are present, at least one of the other two conditions is present.

The last minimized set, MOT2*CAP1*CAP3, is present in 28% of the outcome 1 configurations. Compared to the previous minimized set, the TYP1 condition is replaced by the CAP3 condition. Here, the combination of motivated farmers and an active and appreciated collective together lead to the desired participation rate. This applies to seven of the total 25 cases with a participation rate of at least 30%. The unique coverage is with 12% a little bit higher than in the previous two minimized sets, indicating that there are three outcome 1 configurations with only these three present conditions.

6.4.2 Minimization of the outcome 1 cases (with Logical Remainders)

As just five conditions are included in the analysis, the minimized subsets described above are relatively complicated with at least three conditions. In addition, the raw coverage scores are relatively low, which shows that the cases with a positive outcome have large differentiation in present and absent conditions.
More simple minimized sets are identified if the *logical remainders* are included in the analysis as *do not care configurations.* These minimized sets and the corresponding raw coverage and unique

coverage scores are shown in figure 21 below. In total, 32 unique configurations could have occurred as there are five conditions, which can be present or absent (thus, the total possible combinations is (2)^5 = 32). After solving the contradictory cases, thirteen *outcome 1 configurations* and eleven *outcome 0 configurations* have been identified. This means that there are eight (32 - 24) logical remainders. By including the logical remainders in the analysis, less complex minimized sets are identified by the used software. The software selects a number of the logical remainders and adds these to the observed *outcome 0* or *1 cases* to make simplifying assumptions (Rihoux & De Meur, 2009). In order to do this, the software assumes that the logical remainders have the same outcome as the cases they are added to. In the Venn-diagram, this can be visualised as follows: cases with the same configuration are expressed as a part of a broader zone by including logical remainders. Then, this broader zone can be expressed in a simpler set of combinations (Rihoux & De Meur, 2009).

Set	**Raw Coverage**	**Unique Coverage**	**Solution Consistency**
CAP1*CAP2*TYP1	0,520	0,200	1,000
LEG1*CAP1*TYP1	0,360	0,080	1,000
LEG1*CAP3	0,520	0,240	1,000
MOT2*cap1	0,040	0,040	1,000
MOT2*leg1	0,160	0,120	1,000
Total coverage = 1,000 **Solution consistency** = 1,000			

Figure 21. Minimized reduction set for outcome 1 and remainders as Do Not Care configurations.

In the Venn-diagram below, all possible combinations of conditions (32) are displayed in the boxes and the corresponding cases. In the figure, abbreviations are used for the cases. The Venn-diagram gives a clear overview of the division between outcome 0 cases, outcome 1 cases and the logical remainders. There are eight white boxes which represent the logical remainders, or in other words, the configurations that did not occur in any case in this research. If the logical remainders are included, the minimized sets are less complicated than the minimized sets in figure 20. The following example will illustrate this. The set CAP1*CAP2*TYP1 has still the highest raw coverage, but now also the same applies to the combination LEG1*CAP3. This minimized set includes thirteen outcome 1 cases and two logical remainders, which can be seen in the Venn-diagram below (figure 22). Now, it is assumed that the two logical remainders would also have outcome 1, so it can be stated that the presence of conditions LEG1 and CAP3 always leads to outcome 1. Without the addition of the logical remainders, the absence of condition MOT2 (0) has to be added to state that this configuration always leads to outcome 1. This minimized set (mot2*LEG1*CAP3) can be seen in figure 20 and has a lower raw coverage (36%) than the less complex set LEG1*CAP3, with a raw coverage of 52%.

The most important finding of this second minimization is the fact that as well as without the logical remainders, at least one of the capacity conditions seems to be crucial in the cases with a participation rate in the ANLb of at least 30%. This indicates that the role of the collective can be decisive in reaching the set participation rate if there is sufficient knowledge and expertise available, and the collectives can convince farmers to join agricultural nature conservation. The two sets scoring highest on raw coverage in figure 21, LEG1*CAP3 and CAP1*CAP2*TYP1, underline this view.

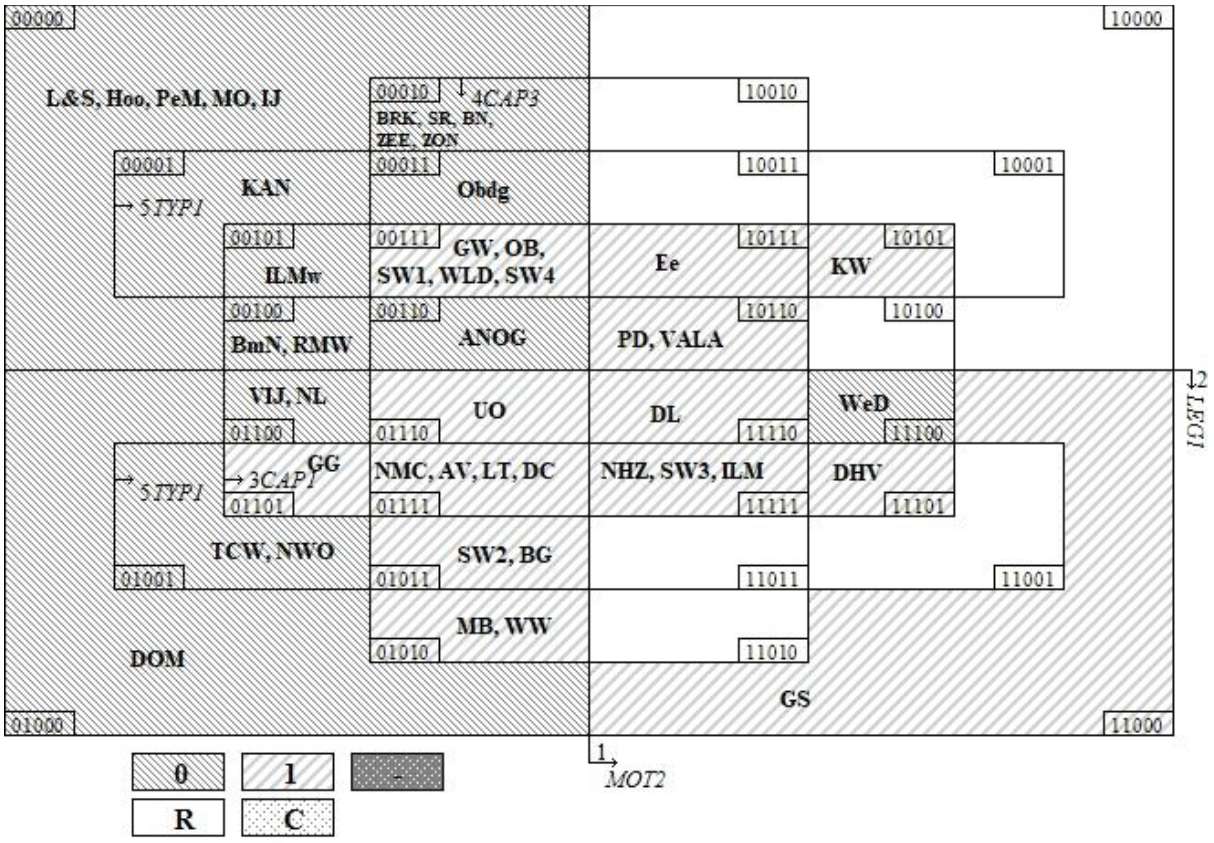

Figure 22. Venn diagram with outcome 0, outcome 1 cases and logical remainders.

If the different minimized sets shown in figures 20 and 21 are compared, the analysis with the logical remainders included gives less complex minimized sets, and two sets with a raw coverage of 52%. However, the two simple sets MOT2*cap1 and MOT2*leg1 have both low scores on the coverage, which makes that they do not offer much explanation on which conditions are necessary for a participation rate of 30% in the cases. However, the minimized sets for outcome 1 cases with the logical remainders included can be seen as reliable to draw conclusions from in this research for different reasons. At first, there are relatively few logical remainders with a total of eight on a total of 32 possible configurations. This means that 75% of all possible combinations of conditions are captured in this research. Furthermore, as the eight configurations did not occur in this intermediate-N analysis, there are no direct indications that this is different in other Dutch agricultural collectives or

cooperatives which are not included in this research. However, it might be useful to keep in mind that it could be possible that the condition combination of the logical remainders might occur in a case outside the scope of this research.

6.4.3 Outcome 0 minimization

Next to the outcome 1 configurations, the outcome 0 configurations also need minimization. By doing this, not only insight in the combination of conditions leading to a participation rate of at least 30%, but also the configurations leading to a lower participation rate.
In figures 23 and 24 below, the minimized sets for the outcome 0 configurations with and without including the logical remainders can be found. Notable is the fact that the raw coverage of the minimized sets is overall slightly higher than for the outcome 1 configurations.

Set	**Raw Coverage**	**Unique Coverage**	**Solution Consistency**
LEG1*CAP1*cap3*typ1	0,136	0,136	1,000
mot2*leg1*cap1	0,545	0,045	1,000
mot2*leg1*cap3	0,409	0,045	1,000
mot2*cap1*cap3	0,409	0,136	1,000
mot2*leg1*typ1	0,591	0,045	1,000
Total coverage = 1,000 **Solution consistency** = 1,000			

Figure 23. Minimization for outcome 0 configurations.

Set	**Raw Coverage**	**Unique Coverage**	**Solution Consistency**
mot2*leg1*cap3	0,409	0,045	1,000
mot2*leg1*typ1	0,591	0,045	1,000
CAP1*cap3*typ1	0,227	0,136	1,000
leg1*cap2	0,545	0,045	1,000
mot2*cap1*cap3	0,409	0,136	1,000
Total coverage = 1,000 **Solution consistency** = 1,000			

Figure 24. Minimization for outcome 0 and remainders as Do Not Care configurations.

The sets mot2*leg1*cap1 and mot2*leg1*typ1 cover both half of the outcome 0 cases, and for the first set, this is even slightly higher (0,591) if the logical remainders are included. The absence of the motivation condition combined with the legitimation combination and/or one of the capacity conditions leads in about half of the cases to outcome 0, indicating the raw coverage scores in figure 23. As well as for the minimized outcome 1 cases, most configurations exist of three (absent) conditions. This is interesting as it means that if three conditions are absent, the outcome is likely to be 0, and if three conditions are present, it is more likely that the outcome is 1. This is illustrated by the fact that of the 22 outcome 1 cases, 21 have a maximum of two present conditions. The only exception is the configuration MLEct in the cooperative Wierde and Dijk. For the 25 *above-average cases* applies that 22 of them have at least three present conditions. The three exceptions are the configuration mLeCt, representing ANV Maashorstboren and VANL Weststellingwerf, and the configuration MLect, representing the cooperative Groen Salland.

7. Conclusions

In this chapter, the sub-questions and main question are tried to be as complete and clearly answered as possible. The sub-questions are answered in the same order as they are addressed in this research. The first two sub-questions which had to be answered in this research are the following:

> *''How is success defined in the case of the adoption and implementation of measures focussing on biodiversity conservation and landscape restoration?''*
>
> And:
>
> *''To what extent does the degree of success differ between the collectives and cooperatives involved in this research?''*

Initially, four indicators for success were operationalized to assess the included cases in this research on their degree of success. The indicators are just like the other variables supplied by the respondents representing the collectives and cooperatives themselves.

The participation rate is the outcome used in the final analysis of the cases involved in this research. Based on data of BoerenNatuur, approximately 20% percent of the Dutch farmers participate in the ANLb system (BoerenNatuur, 2021; Runhaar, Polman, Dijkshoorn-Dekker, 2018). Since the revision of the AES system in the Netherlands in 2016, the number of participants has increased over the years, and therefore the threshold for the participation rate has been set at 30%. This percentage is slightly higher than the average participation degree in the agricultural collectives. It has been considered to select a higher minimum; however, the 30% threshold has not only been selected based on the idea that it is slightly higher than the 20% average, but also because a higher percentage is not directly feasible and an objective in itself. Before the revision of the system, a larger percentage of farmers participated in the ineffective so-called *legselbeheer.* The new system focuses more on core areas and quality, with more effective measures. Therefore, participation of all the farmers in an area is not aimed at, as the ANLb focuses on core areas.

Next to the participation rate, the three indicators of success: *effectiveness, compliance* and *continuity* are operationalized in this research. In the end, these indicators did not serve as an outcome in the qualitative comparative analysis, which has been used to identify the necessary conditions for the involved cases, as the degree of success has been expressed in the participation rate eventually. There are relatively few variations in these indicators, which made it less useful to assess a certain degree of

successfulness of the cases on these indicators. However, the three indicators help to give insight into the different cases and execution of measures in the current ANLb system.
The effectiveness of the cases is somewhat difficult to make a comparison between cases as in roughly a quarter of the cases, there has not been specified a certain degree of effectiveness. This can be explained by the fact that a number of the management packages in the ANLb do not include some kind of degrees, where tougher measures are rewarded by higher financial compensation. In the vast majority of collectives and cooperatives in this research, the impact has been rated average to strong. In just one case, the lowest impact is expected to occur, as well as the largest impact in just one case. Therefore, it can be stated that the estimated effectiveness is the same in the studied cases.

The indicator *compliance* is based on the inspection results in the collectives and cooperatives. All the management packages have requirements that must be met to receive the financial compensation in exchange for executing the measures. As well as with the degree of effectiveness, this indicator has little variation: in most cases, the compliance is rated nine out of ten, which is a very high score. The sound scores on effectiveness and compliance combined make the percentage of farmers executing measures crucial in the overall *successfulness* of executing measures in the ANLb, as it determines on which scale agricultural biodiversity protection takes place. The continuity rate indicates which percentage of the farmers is expected to extend the concluded ANLb contracts and continue executing measures. Therefore, the continuity rate tells something about the sustainability of the ANLb, as a high expected percentage of extended contracts means that the measures will continue to be executed in the following years. This continuity rate is 90-100% for most cases, followed by 80-90%. In just a few cases, this percentage is lower, which can also result from farmers who do not have a successor or quit for other reasons in the farming business.

The highest level of variety occurs in the indicator participation rate of the collectives and cooperatives involved in this research. All the participation ranges from 0-10% to 90-100% occurred in the involved cases, with the majority around 20%. The large variation in these percentages asks for insight into the differences between present conditions, which can lead to the observed differences in the participation rate. The last part of this research analyses the question of which conditions should be present to achieve a participation rate of at least 30%. The findings serve to answer the third sub-question:

> *''Which success conditions can be identified in the studied collectives and cooperatives, and to what extent does the success depend on these conditions?''*

After carefully testing and analysing all the variables collected in this research, five conditions are selected as the success conditions. The conditions measure the *motivation* and *legitimation* of farmers,

the *capacity* of the collectives and cooperatives and the *type* of management packages executed in the ANLb. The motivation condition is present in a cooperative or collective if the majority of the farmers are expected to take voluntary measures focused on biodiversity protection, with a certain impact that the measures have some impact on the production and yield. This indicates that the farmers make a real effort and are motivated to do something for the biodiversity and agricultural nature conservation by themselves.
In nearly two-thirds of the above-average participation cases, half of the farmers see themselves as a producer of food products and as landscape manager. This means that the farmers are not only concerned with maximum yield and efficiency but also with the fact that farming practices have their impact on the landscape and that one should take care of a balanced and healthy landscape. The most occurring conditions in the cases with a 30% participation rate are the two *capacity* conditions. The first condition is present if most farmers are expected to appreciate the available knowledge and expertise in the collective and/or the agricultural cooperative. This condition can be important to be present as it might determine if the farmers see it as useful to participate in the ANLb via the collective. The presence of the second capacity condition indicates that the collective has sufficient capacity to actively approach farmers in order to start participating in agricultural nature conservation. Next to the two conditions measuring *capacity*, the most occurring condition is the one which measures if more than 50% of the measures are focused on meadow birds. In eighteen of the 25 cases with above-average participation, this condition is present.

In thirteen of the total 25 above-average cases, the focus of the taken measures lies on meadow birds; the majority of the farmers in the case area appreciate the knowledge and expertise of the collective or cooperative, while the collective actively approaches farmers to participate in the ANLb.
If some non-observed combinations of conditions are included, the same applies to the *legitimation* condition combined with the active approaching of farmers to participate in the ANLb by the collectives. Thus, if the majority of farmers see themselves as landscape manager, and the collective makes an effort to engage this group of farmers in agricultural nature conservation, higher participation can be achieved. This is possibly the result of the awareness and willingness these farmers already have to protect the environment and biodiversity, and the collective has its role in pointing out the usefulness of participating in the ANLb system.
The presence of either an active collective or the appreciation of the knowledge and expertise by the farmers seems crucial for a higher participation rate: in 24 of these 25 cases, at least one of the capacity conditions is present. In 17 cases, both of these conditions are present.

If more than half of the farmers in the case area take voluntary measures, the ANLb participation rate in the collective or cooperative is nearly always at least 30%. This condition, taking voluntary measures, is present in ten of the 25 cases with this participation rate, and just in one case with lower

participation. This means that the condition is not necessary for higher participation, but if the majority of the farmers take voluntary measures focused on biodiversity protection, the majority of farmers are likely a member of the ANLb.
To come back to the sub-question, it can be stated that it is especially important that either the knowledge and expertise of the collective should be appreciated or that the collective actively approaches farmers to participate in the Dutch ANLb. If both conditions are present, there is only one case with a participation rate below 30%. The same applies to the number of present conditions: if there are three conditions present or more, this leads to a participation rate of at least 30% in 22 out of the 25 cases. This leads to the answering of the main question:

''Which conditions are necessary for the successful adoption and implementation of measures focussing on biodiversity protection in Dutch agricultural collectives and agri-environmental cooperatives?''

Five conditions have emerged in this research as the important conditions to reach the set 30% participation rate in the Dutch ANLb system. The conditions have been carefully selected based on their sufficiency, necessity, and presence in cases with this minimum participation rate. There is not one of the five conditions that must always be present in order to achieve the set minimum participation rate. However, some conditions are nearly always present in these cases, or almost only in the cases with a minimum ANLb participation rate of 30%.
If the majority of farmers in the area of the collective or cooperative take voluntarily measures focused on agricultural nature conservation, this means that in ten out of the eleven cases, there is a participation rate of at least 30% in the ANLb. However, this condition is present in just 40% of these cases with the minimum participation rate, which makes this *motivation* condition not directly necessary. The two *capacity* conditions measuring the usefulness of the knowledge and expertise provided by the collectives and cooperatives and the capacity of collectives to actively approach farmers are more necessary to reach the participation rate of 30%, based on the data in this research. Without one of these two conditions, just one case achieved this minimum participation rate.

If the different identified combinations of present conditions in this research are taken into account, there are five combinations leading to a participation rate of 30%, which covers together all the *above-average participation* cases.
The two simplest sets exist of the present condition *motivation* and the absence of the *legitimation* condition or the first *capacity* condition measuring the appreciation of the knowledge of the collective. The presence of the condition *legitimation* (the majority of farmers see themselves as landscape manager) in combination with the presence of the second *capacity* condition concerning the sufficient capacity to approach farmers to participate in the ANLb actively. If the majority of the

measures are focused on meadow birds and the knowledge and expertise of the collective are appreciated by the majority of the farmers in the area, the addition of the second *capacity* condition or the *legitimation* condition always leads to a participation rate of 30% in the involved collectives and cooperatives in this research.

The minimum combinations of cases show the complexity of how the presence of different conditions together can lead to a participation rate of at least 30%. These twenty-five cases are divided over thirteen different kinds of combinations, whereby two clear conclusions can be drawn that this set participation rate is almost always achieved if:

1) The majority of farmers already take voluntary measures focused on biodiversity protection, independent of participation in the agricultural collective;
2) At least three of the five selected conditions are present.

A third conclusion is that in more than 80% of the cases with an above-average participation rate in this research, one of the *capacity* conditions is present, which makes it possible to state that at least one of these conditions is necessary to achieve this. This finding emphasizes the important role of agricultural collectives in engaging farmers in agricultural nature conservation and in helping make this more sustainable way of farming the new standard.

The five identified conditions are in line with previous research, which is, on the one hand, logical as the conditions are defined and based on a number of these researches. Yet, this research combines the identification of the conditions with an assessment of the involved cases and the differences in the indicators of success. The importance of the presence of an agricultural collective actively approaching and motivating farmers to participate in the ANLb is, for example, in line with the findings of Barghusen et al. (2021). The fact that most of the measures are focused on the agricultural nature type *grassland* (see BoerenNatuur, 2021) was already known; however, in this research, this has also been translated into a success condition. Runhaar, Polman and Dijkshoorn-Dekker (2018) found out that around 80% of Dutch farmers combine one to four self-initiated conservation activities, and in this research, the relation between the ANLb participation rate and which percentage of the farmers takes specific measures has been researched.
Notable is the fact that the absence of perceived barriers to participate in the ANLb by farmers has not been directly identified as a success condition for *above-average* participation. These barriers can be former investments defined as path dependence and lock-in by, for instance, Mills et al. (2017) and Vink and Boezeman (2018), or possible high ground prices, limiting the shift to a more nature-inclusive farming style. However, the fact that the absence of these perceived barriers has not been

identified as a highly necessary or sufficient condition in this research indicates that this problem of limited possibilities seems to not directly come to the front in the involved ACs and ANCs.

Lastly, the different combinations of present conditions in the above-average collectives and cooperatives seem to correspond with the finding that particular conditions may differ in importance per location (Knowler & Bradshaw, 2007). In some areas, certain conditions appear not to be present to achieve a higher participation rate than the Dutch average. Probably the best example here is the condition which is present if the majority of the measures are focused on meadow bird protection. The presence of these kinds of birds seems to have an attracting effect on participation, but in some areas, this condition just cannot occur as its habitat is more suited for other species.
As stated in the research aim, it was not expected to deliver just one set of conditions which always lead to success, and this research underlines the fact that the importance of conditions differs. However, five conditions in different combinations of occurrence are identified, which seem necessary for higher farmer participation in Dutch agri-environmental schemes.

8. Discussion and recommendations

8.1 Discussion

First, it must be emphasized here that in this research, the cases are mainly used to identify success conditions and not to rank the collectives and cooperatives. Based on single surveys, an indication of the characteristics of the cases has been made. Therefore, this view does not have to correspond completely with reality or guaranteed likeness.

The findings in this research seem to correspond with current knowledge on agricultural nature conservation in the Netherlands and previous research which has been done on, among others, farmers' motivations to participate in agri-environmental schemes and approaches to agricultural nature conservation. However, Dik, Runhaar and Termeer (2021) stated that the performance of agricultural collectives and how this can contribute to more effective AES has not yet been researched at the time. Where the authors of the mentioned research identified necessary characteristics of the collective to reach more agrobiodiversity, this research focuses on the participation rate. This can be seen as one of the four indicators determining the execution of the ANLb in the cooperatives and collectives.

The gathered data indicates that not only financial compensation plays a role in the motivation of farmers to participate in the ANLb, which corresponds to the research of Lokhorst et al. (2011). Motivation, possibilities (or ability and demand) and legitimation, as identified by, for example, Runhaar et al. (2017) and Westerink et al. (2019), are tried to capture as conditions in the analysis. Just as the role of the collectives is captured in the *capacity* condition. With that, previous research has been combined by identifying the most important success conditions for *above-average* farmer participation in the Dutch ANLb, using QCA.

The research method and analysis made it possible to answer this research's sub-questions and main question. The findings give a concise overview of the participation rate in a combination of 47 agricultural collectives and agricultural nature cooperatives and the conditions which lay on the basis of above-average participation. In the analysis of this research, the cases have been assessed on the participation of farmers in the ANLb. The other three indicators of success: effectiveness, compliance and continuity are included and discussed but have not been used in the QCA as the outcome. Eventually, these indicators seemed to show few variation, however, if they could have been combined in one outcome, the success conditions in the cooperatives and collectives could have been assessed on more data than only the participation rate.

Another important remark is that during the period of writing this thesis, the focus on the subject and related research questions have been changed several times. In principle, this is not a problem in itself, as this is logic in the research process. However, this research led to some problems linking the collected data to the adjusted research questions and definitions in this research. For some conditions, these could have been measured more precisely, with slightly different questioning or better defining of some of the concepts used in the survey. Also, in the meantime of this research process, more authors have done research on agricultural nature conservation in Dutch agricultural collectives. Due to the long duration of this study, some of the results and researched cases might be already subject to change, or researched by others.

8.2 Recommendations

8.2.1 Recommendations for further research

In the upcoming decades, balancing nature conservation, biodiversity protection, and agriculture will remain one of the biggest challenges within this domain. With the establishment of the agricultural collectives in the ANLb system, the positive effects for biodiversity much depend on the willingness of farmers to participate and the role of the collectives. This places much responsibility on these actors; therefore, it is extra important that more research is carried out into which approach leads to a good implementation of agricultural nature and landscape management. Next to identifying success conditions for a higher participation rate in Dutch AES, this research offers a dataset with nearly fifty cases and a large number of variables that can be used for further research. The first recommendation for further research is to assess ACs and/or ANCs on a different defined outcome, or all the indicators of success combined, possibly with extra added indicators. More research on the conditions which can improve the participation accumulates the knowledge on the necessity of specific conditions which can help to improve the ecological impact of measures focused on biodiversity protection and landscape restoration in agricultural areas.

Further research ideally combines indicators of success used in this research with ecological data, such as the number of observed species or the total number of hectares under agricultural nature management. This kind of data helps to specify better which collectives and cooperatives agricultural nature conservation is well executed and leads to positive effects for biodiversity and landscape. As this research can be seen as a kind of ‘state-of-the-art’ overview of the ANLb system in the Netherlands, with data mostly provided by persons involved in the studied cases, more in-depth research of single cases can be useful to gain more detailed insight into the presence and absence of success conditions for sound execution of the ANLb. Collected data in the dataset might also serve as

a zero measurement of the execution of the ANLb in 2021 to find out how cases and variables have changed over the years if similar research is conducted in a few years.

8.2.2 Recommendations collectives and cooperatives

The findings in this research help better understand which conditions are expected to lead to a higher participation rate in the Dutch ANLb, or at least occur in cases with *above-average* participation. This study can therefore be helpful for members of the collectives in order to see which conditions are present in the different cases, based on the definitions used in this research. The finding that the collectives and cooperatives have an essential role in engaging farmers in agricultural nature conservation can stimulate the collectives to evaluate their own role. If sufficient knowledge is available in the collectives, which is appreciated by the farmers, combined with the capacity to actively approach farmers, the participation in the ANLb is expected to be above the Dutch average. It must be said that collectives are dependent on the available budget and time here and partly on the motivation of the farmers in the area to participate. The other three conditions selected in this research seem less dependent on the role of the collective, although joining the collective could ensure that more farmers see themselves as landscape manager next to food producers alone.

Knowledge sharing and other forms of cooperation between the collectives and cooperatives seem probably the best advice for better execution of the Dutch ANLb, which can be given based on this research. There is not just one path of success conditions leading to higher participation, and the importance of the conditions seems to differ per area.

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Figures

Cover image
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Figure 1
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Figure 2
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Figure 3
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Figure 4

Johansson, M., Rahm, J. and Gyllin, M. (2013). Landowners' participation in biodiversity conservation examined through the value-belief-norm theory. Landscape Research 38 (3): 295–311.

Figure 5
Van Oosten, C., Runhaar, H., & Arts, B. (2021). Capable to govern landscape restoration? Exploring landscape governance capabilities, based on literature and stakeholder perceptions. *Land Use Policy*, *104*, 104020.