Factors playing a role in applying or not applying Common Agricultural Policy (CAP) measures focused on increasing biodiversity in arable farming in the Betuwe.

Source: Biodiversity in Arable farming (Wur, 2022).

Colophon

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Title:	Factors playing a role in applying or not applying Common Agricultural Policy (CAP) measures focused on increasing biodiversity in arable farming in the Betuwe.
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Foreword

Biodiversity in arable farming has been under pressure for several years. The Common Agricultural Policy (hereinafter CAP) aims at restoring biodiversity. A new policy has been in place since 2023 and will apply until 2027. The CAP is an important source of subsidy for arable farmers. Measures from the subsidy have goals related to climate, soil and air, water, landscape, and biodiversity. This research focuses on eco-activities from the CAP that contribute to biodiversity restoration. Many of these eco-activities have overlapping goals. This research aims to unravel the reasons that motivate arable farmers in the Betuwe to apply biodiversity restoration measures from the new CAP. The research question is formulated as follows:

Which factors play a role in applying or not applying CAP measures aimed at increasing biodiversity in arable farming in the Betuwe?

This research was carried out at the Radboud University in Nijmegen as part of the master's degree in Spatial Planning, specialization in Planning, Land, and Real Estate development. During this research, I was supervised by C. Vitale from Radboud University. I would like to thank her for her involvement and helpful feedback. Furthermore, I would like to thank the arable farmers from the Betuwe for their time and answers given during the interviews. I hope that this research will provide interesting insights into the importance of implementing the CAP measure in arable farming in the Netherlands for a more sustainable future.

Keywords

Arable farming

Biodiversity

Climate mitigation and climate adaptation

Common Agricultural Policy (CAP)

Behavioural change

Abstract

The focus of arable farming in the Netherlands has traditionally been on production. Nowadays, the focus has shifted towards sustainable agriculture to reduce the climate burden and restore biodiversity. This goal is also supported by the Common Agricultural Policy (CAP) from the European Union, which has been renewed since 2023. The CAP policy was drafted by the Rijkdienst Voor Ondernemend Nederland (RVO) to comply with European farming regulations and to keep Dutch agriculture sustainable in the future. Research, however, shows that not all CAP measures are being applied and it is unclear why. The goal of this research is therefore to find out what drives farmers when it comes to applying - or not applying - CAP measures. This research focuses on arable farms in the Betuwe. The main research question is phrased as follows:

Which factors play a role in applying or not applying CAP measures aimed at increasing biodiversity in arable farming in the Betuwe?

This research aims to answer several sub-questions through literature review, document analysis, and interviews. Fifteen arable farmers from the Betuwe were interviewed. The interviews were coded, and the data were analyzed based on the conceptual model. In the discussion, the possible interrelationships between the indicators from theory were examined. Also, new indicators were identified. The results show that several factors play an important role in whether CAP measures are applied or not, while others have no actual influence. The main factors that influence whether farmers apply CAP measures concern finances and the current cropping plans. When it comes to farmers ability, this research showed that the higher the financial compensation (finances) the greater the ability of croppers to apply the CAP measures is. The more the cropping plan is in an advanced stage of implementation, the less farmers are able to apply CAP measures. It was found that financial subsidy only plays a role when the amount of time and labour that a farmer must put into the activities is in balance with the amount of the subsidy.

When it comes to willingness, factors with an average influence on the actual implementation of CAP measures are personal belief/attitude and personal/moral norms. These indicators are only playing a role when several of them are present. Human capital, labour, and time have also an average influence.

During the making of this study, the deadline for completing the CAP measures was delayed by the RVO. This caused the survey to be conducted be based on classification expectations. It is recommended that the survey will be repeated when the results are definitive. When the policy was announced, most of the cropping plans were already fixed. This has had a major adverse effect on the implementation of CAP measures. It is recommended that the survey is repeated at a time when farmers' cropping plans are not yet finalized. In addition, not all farmers have formally submitted their CAP applications yet. These are expected to be completed by next year so a follow-up survey might provide more representative results of the final arable farms classification.

Table of contents

1. Introduction

1.1 General introduction

In the past, the focus of farming used to be on production. Nowadays, the focus has shifted more and more toward sustainable agriculture (Buck, Rijn, Roling & Wossink, 2008). The reason for this shift is the increasing effect of climate change in rural areas. Agriculture is the main user of land and water and still plays a dominant economic role in many rural areas of Europe. It may not come as a surprise that the production and quality of cultivated crops and their use of water are influenced directly by local climate variables and atmospheric CO2 (Ciscar et al., 2011). In addition, studies show that the stress imposed by climate change on agriculture will intensify the regional disparities between European countries (IPCC, 2007; European Environmental Agency, 2008; Stern, 2007). Ciscar et al. (2011) investigated crop responses to changing climate conditions and found that the 2080s climate would have a rather dramatic spatial agricultural effect and serious impact on aggregated regional production. This regional production is dependent on regional conditions such as the presence of rainfall, droughts, or forest fires (Ciscar et al., 2011).

The effect of climate change on rural areas in the Netherlands is evident according to the Dutch Meteorological Institute (KNMI, 2021). According to KNMI's most recent climate scenario, farmers need to take heavy rainstorms and related phenomena such as thunder and wind in consideration for their crop plan. Besides that, long periods of drought will also be more common in the future. On average, the Netherlands has a period of extreme drought every ten years; according to the KNMI, this period can reach up to once every two years in 2050 (Zandstra & Goosen, 2010; KNMI, 2021). These changes obviously have an effect on farming in the Netherlands. These effects can be both positive and negative. For example, a rise in temperature can lead to the advancement of the growing season which gives crops a longer period to grow and therefore leads to an increase in production. On the other hand, temperature rise can lead to an increase in diseases and pests, a breakthrough in crop resistance, and better survival chances for parasites in mild winters (Zandstra & Goosen, 2010). With more frequent periods of drought, the supply of water is also becoming increasingly important since agriculture is reliant on water supply. It is, therefore, crucial to look at possibilities to keep farmland wet without having to impact nature in periods of drought (Blom, Paulissen, Vos & Agricola, 2008). Besides climate change having an impact on agriculture, agriculture itself also has an impact on climate change. In 2010, CBS (2010) calculated that a total of 222 billion kg of CO2 equivalents were emitted in the Netherlands only in the year 2007. Of this amount, 13% was emitted by primary production agriculture (Landbouw en Klimaat, 2010). This is a problem since we have seen that climate change has predominantly a negative effect on agriculture.

In order to promote sustainable agriculture in the Netherlands, the Dutch government has reserved 226.6 million euros for the transition towards sustainable agriculture and an area-specific approach where each area gets its own set of guidelines in order to limit the negative effects of climate change (Rijksoverheid, 2022). This means, for example, switching to organic or nature-inclusive agriculture or to promote innovation in farming in order to address the negative impact that climate change has on Dutch agriculture (Smit, 2022). Part of the Dutch agriculture policy draws upon the Common Agricultural Policy (CAP) as first approved by the European Union in 1962. This policy contains a set of measures that farmers can apply in order to make agriculture more sustainable. Since the start of the year 2023, there is a new CAP with extra focus on climate, nature, and environment. The new vision of these measures is to make agriculture sustainable by

rewarding future-proof farmers more strongly compared to the previous policy. Within this policy, there are different classifications that farmers can reach by implementing certain measures. These classifications, known as gold, silver, and bronze, are linked to grants that farmers receive (RVO, 2022) and will be analyzed in further detail later in this thesis.

1.2 Problem statement and research aim

The CAP measures as drafted by the Dutch government in 2023 are created to better cope with the effects of climate change on arable farming in the Netherlands; the Dutch CAP policy aims to comply with the European policy that also encourages member states to take responsibility when it comes to sustainable arable farming (RVO, 2022). The problem is however that because of the voluntary character of these CAP measures, not all farmers take part in this initiative (Burton, Kuczera & Schwarz, 2008). This is a problem since the current way of farming is not sustainable for the future and has a severe negative impact on agriculture in general and impacts farmers in the long run (Zandstra & Goosen, 2010; Blom et al., 2008).

It is unclear what motivation farmers have regarding the adoption (or not) of these measures and also how strong these motivations are. No research has been done focusing specifically on the extent to which new CAP measures have been implemented or not in the Netherlands (2023). This research, therefore, aims to identify the factors based on which farmers are able, motivated, and willing to adopt the CAP measures on their farms or not. The case study in which this will be investigated is the Betuwe area. This area is chosen for the rich presence of arable farms and farms variety, in terms of farm size, crop type, and a balance between family businesses and new companies. This will form a good, varied test group for Dutch arable farms in general.

In order to identify farmers' motivations in applying or not the CAP measures, the theory about behavioural change is used. This theory helps to identify different factors that might play a role in farmers' motivations in adopting or not adopting CAP measures. These factors will be used as a starting point to identify whether these actually play a role or not in the specific context of farmers in the Betuwe.

This research is guided by the following main question:

Which factors play a role in applying or not applying CAP measures aimed at increasing biodiversity in arable farming in the Betuwe?

To answer the main question, the following sub-questions are considered:

1. What is meant by biodiversity in arable farming and how can this be achieved?
2. What are the goals of the CAP regarding biodiversity and how can farmers contribute to this?
3. To what extent are farmers willing to adopt CAP measures?
4. To what extent are farmers able to adopt CAP measures?
5. Do farmers have the ambition to increase their level of engagement with regards to the CAP measures?

2. Relevance of research

2.1 Societal relevance

Climate change might have a big impact on the future of agriculture. Existing scholarship shows that as a result of climate change, weather will change causing more rain, more frequent periods of drought, decreased water quality, and overall higher temperatures (KNMI, 2022) The above-mentioned factors negatively influence the quality and production of both crops and meat. This is a problem since citizens are reliant on farmers for their daily food (Eijsackers, Straalen & Evenblij, 2012). If traditional farming is continued the way it is now, it can affect the daily life of citizens. If agricultural land is depleted and crops need to be imported, customers will experience more expensive products. A price raise can already be seen in protein-rich products which will only continue to increase when Dutch arable farmers do not change their ways to crops that are protein-rich (Eijsackers et al., 2012).

Besides the importance of sustainable agriculture in ensuring the future of agriculture, society can gain from biodiversity since it provides us with oxygen and purified water and air. When biodiversity is high, the risk of pests and diseases is lower. This is a big advantage for society since pests and diseases are a big health risk for the end consumer. Even the pesticides that are used to combat these diseases are harmful to people. Biodiversity measures can address these problems without harming nature in the process (Smit, 2022). In traditional arable farming, crop protection agents are used. These protectors usually contain chemicals which unfortunately not only get rid of the unwanted but also cause harm to our health and the environment. Pesticide exposure for example is linked to cancer, endocrine disruption, and many other diseases. Pesticides can also be toxic to other organisms such as birds, fish, or insects living in the ground (Aktar, Sengupta & Chowdhury, 2009). In other words, when biodiversity is not stimulated, societal needs such as food, nutrition, and good health are endangered (Eijsackers et al., 2012).

In order to overcome these problems, this research aims to give policymakers insights into the motivation of farmers for adopting the CAP measures and thus preserve and restore biodiversity. Policymakers can learn from this in order to make the CAP measures more attractive and accessible which will ultimately help farmers to become more climate conscious. This will have a positive outcome on the quality and availability of the essential products that Dutch society uses on a daily basis. Besides this, higher biodiversity in the landscape also contributes to climate restoration and thus to the future of human existence (Eijsackers et al., 2012).

2.2 Scientific relevance

The role of farmers in landscape conservation and nature protection has been officially recognized in the European Union's Common Agricultural Policy since the early 1990s. After implementing this policy, Burton, Kuczera & Schwarz (2008) investigated the cultural resistance of farmers to voluntarily contribute to and adopt these agri-environmental schemes. The study is a response to several studies across Europe that have suggested that voluntary measures often produce little change in farmers' attitudes when it comes to intensive farming because there is little trust in governmental advice and farmers choose commercial interests over societal interests (Brotherton, 1991; Wilson, 1997). However, there is a growing interest in understanding more about factors that can be used in order to 'nudge' farmers towards more environmentally responsible actions without forcing them to do so (Barnes et al., 2013). According to several authors, this nudging will not only help to overcome the lack of voluntary actions but will also create long-term change as the effects of encouraged voluntary action is more likely to persist

over time compared to enforced behavioural change (Ayer, 1997; Ahn & Ostrom, 2002). In order to do so, it is important to discover how this voluntary action can be triggered and what indicators optimize social and intrinsic goals. Research of this kind has more recently focused on social psychological insights that can be used in order to understand farmers' attitudes and behavioural regarding environmental management (Burton 2004; Burton & Wilson, 2006; Spash et al., 2009).

The following studies try to identify specific variables that influence farmers' environmental behavioural by using quantitative approaches (Lokhorst et al., 2011; van Dijk et al., 2015; Thompson et al., 2014). For example, research conducted in Poland shows that farmers who see a clear economic interest in their farms are most likely to participate in farming schemes (Was et al., 2021). Risk aversion also turned out to be an important factor, but it appears less often in the literature (Was et al., 2021). Several studies found that the attitude of farmers towards the environment does not influence the extent to which they actually adopt nature conservation measures (Hammes et al., 2016; Vermunt et al., 2022). The fact that Hammes et al. (2016) found that farmers' attitude towards the environment does not play a big role in farmers' decisions is a useful insight to take into consideration when establishing a conceptual model. Personal value factors are not always a motivation for farmers to adopt regulations. Vermunt et al. (2022) also indicates that factors related to farmers' attitudes toward the environment alone have a small impact on their level of participation. This means that farmers do not apply eco-measures based on their attitude towards the environment alone; this is consistent with the study by Hammes et al. (2016).

Several authors have examined the relationship between willingness and ability when it comes to behavioural change. These studies show that behaviour is a constant interaction between -aspects of- ability and -aspects of- willingness (Gasson, 1973; Dwyer et al., 2007, Burton & Wilson, 2006; Splash et al., 2009). These authors found that when it comes to the reasons behind behavioural change, a distinction can be made between ability and willingness. When it comes to willingness, a more psychological approach tends to be used in the literature. To establish a level of willingness, authors look at attitudes and social and cultural influences. The ability to adopt refers instead to factors such as economics, compatibility, or other external drivers (Mills et al., 2017).

The studies mentioned above show that some research is done regarding farmers' motivation to implement nature conservation measures. However, no research has been done by combining these factors within the specific context of the Dutch CAP measures. This research intends to do so by elaborating on the study of Mills et al. (2017) and others by using new psychological insights combined with the established approach of using known barriers such as financial constraints. This research does not only look at the vision of farmers on nature but also at the variety of factors that influence the ability of farmers to adopt CAP measures. This also represents an addition to the current scholarship.

3. Literature review

3.1 Behaviourism

Changing people's behaviour can be necessary to address societal problems. In order to change people's behaviour, it is important to analyze why people are taking certain decisions and what the underlying patterns are (Watson, 2017). The study that focuses on analyzing behaviours is described as behaviourism. Behaviourism is defined as "a natural science that takes the whole field of human adjustments as its own. It is the business of behaviouristic psychology as its goal to be able, given the stimulus, to predict the reaction'' (Watson 2017, p16).

Within this field of research, there is a specific movement that focuses on behavioural change. There are different approaches how to analyze and change behaviour, such as the psychological approach, sociological approach, administrative approach, and so on. Behavioural change is mostly known by behaviouralists like Pavlov (classical conditioning), Thorndike (instrumental learning), and Watson. Watson's groundbreaking article on behaviourism in 1913 assumed that our behaviour is ''either a reflex evoked by a stimulus or a consequence of our individual history of earlier exposure to reinforcements and punishments paired with our current motivational states and stimuli'' *(Watson, 1913, p159).* He thereby viewed psychology as a natural science with the goal of predicting and controlling behaviour and the potential to improve society through the application of behavioural principles (Watson-Thompson, Rakos & Anderson-Carpenter, 2021). In order to establish behavioural change, old routines of behaviour have to be replaced by new routines. Behaviourists have conducted different studies on what approaches are the most effective in order to trigger those new routines (Greaff et al., 1993; Zak-place & Stern, 2004; Winfield & Whaley; 2002; Danter, 2005). Within this study, the focus lies on both administrative (governmental) and psychological approaches to behavioural change (Simon, 1995).

3.1.1 Administrative approach to behavioural change

An administrative approach to behavioural change refers to the set of mechanisms that governments use in order to trigger behavioural change (Bovens et al., 2017). In order to trigger changes, governments have different instruments. Traditionally, a distinction can be made between the roots, the whip, and preach instruments (Bovens et al., 2017). The 'roots' as an instrument stand for an economic approach where behaviour is steered by using financial incentives such as subsidies, loans, or rewards. An example of this approach is the 'Regeling Agrarisch Natuurbeheer' (SNL) where Dutch farmers get subsidies when they incorporate natural elements in their fields (Rijksoverheid, 2023). The instruments that fall under the 'whip' approach are instruments that are aimed at changing behaviour as a result of laws and force. The regulations on chemical plant protection products are an example of this. Finally, the government can use instruments that fall under 'preach'. These instruments are usually campaigns that try to convince individuals by educating them (Tummers, 2019).

3.1.2 Psychological approach to behavioural change

An alternative approach to behavioural change looks at behaviour from a psychological perspective. Within the literature, models of behavioural change have been developed according to this psychological perspective. Some examples of these models are the communication/persuasion model, health belief model, integrated model of behavioural prediction, locus of control, responsible environmental behaviour, social learning, and the stages-

of-change model (Heimlich & Ardoin, 2008). A model that is specifically focused on achieving change in behaviour related to the environment is the 'responsible environmental behaviour model' (Hungerford & Volk, 1990). This model is based on a study from Hungerford and Volk (1990) that challenged the statement that knowledge or effect alone can lead to behaviour change (as presented by Ramsey & Rickson, 1997). According to this model, the following variables play a role in whether a person would adopt a different behaviour or not: intention to act, lotus of control, attitudes, sense of personal responsibility and knowledge. According to their theoretical model, knowledge alone is grossly insufficient to act responsibly towards the environment. However, knowledge of the environment and its regulation could spark a good attitude which could translate into good intentions to act and eventually trigger environmental-oriented behaviour. Ajzen & Fishbein (1980) also found a relationship between attitude, intention of acting and behaviour. According to the authors, subjective norms and beliefs are the indicators that trigger a certain attitude that in turn influences intention of action and eventually the change in behaviours. These models show that attitude on its own does not influence behaviour directly but can be an indicator for creating an intention of action which eventually leads to a certain behaviour or to a certain change (Akintunde, 2017). In this research, the psychological approach is used since this approach seems to be linked directly to farmers' behaviour.

When it comes to motives of behavioural change, a distinction can also be made between ability and willingness. When it comes to willingness, the psychological approach is used. To establish a level of willingness, authors look at attitudes and social and cultural influences. The ability to adopt refers to factors such as economics, compatibility, or other external drivers (Mills et al., 2017). The aspects ability and willingness will be the two aspects that are used to understand farmers' behaviour and will be elaborated further later in this chapter. These aspects are chosen since there seems to be a clear connection between relationship and willingness and farmers' level of behavioural change (Gasson, 1973; Dwyer et al., 2007, Burton & Wilson, 2006; Splash et al., 2009).

3.2 Willingness and ability for behavioural change in agricultural context

Farmer environmental behaviour is a complex phenomenon that is also very dependent on the specific context of the farm and farmer. Siebert et al. (2006) point out that willingness and ability to cooperate in achieving biodiversity objectives cannot be reduced only to the location of a holding, attitude or values of a farmer but has to be looked at in a holistic matter which includes all relevant social, cultural, and contextual factors. According to the author, each of these interconnected factors plays a role in the individual farmers' response to voluntarily undertake environmental activities. Therefore, the connection between ability and wiliness should form the basis of any theoretical model in this field (Siebert et al., 2006).

3.2.1 Willingness

Willingness to adopt can be defined in this research as the extent to which farmers are motivated (and thus willing) to adopt CAP measures. In the specific field of agriculture, farmers' willingness to adopt biodiversity measures depends upon the farming style that a landowner has (Hammers et al., 2016). According to this, farmers can be divided into four groups, namely: traditional, idealistic, modernist, or profit-maximalist. Traditionalists stick to what they have been doing historically and are unwilling to change; these farmers are also described as conservative (Hammers et al., 2016). The idealistic farming style is a style where farmers strive for an idealistic outcome where not only the results for their own farm are taken into consideration but also the

'greater good' (Hammers et al., 2016). The modernist (or innovator) is a farmer type who is open to trying out new approaches and practices; this new approach is usually an external driver. The profit-maximalist farmer style fits a farming style where farmers are guided by the decisions that are best for their farm on a commercial level. These groups of farmers differ based on farming styles, farm management, views on agricultural issues, agricultural goals, and economic success (Hammers et al., 2016). These different groups show also different attitudes toward nature conservation. For example, traditionalists have a negative attitude towards nature conservation, while idealists have a more positive attitude towards nature conservation and believe that communal arrangements play an important role in protecting nature and landscape (Hammers et al., 2016). Like idealists, modernists also have a positive attitude towards nature conservation, but it appears that often modernists do not use the common arrangements for nature conservation. Finally, profit-maximalists also appear to have a positive attitude toward nature conservation and make more use of communal schemes compared to the other groups (Hammers et al., 2016). However, even though these groups differ in attitude towards nature conservation, it does not seem to influence the extent to which they are willing to adopt agricultural measures according to Hammes et al. (2016). The same study by Hammes et al. (2016) also shows that farming style is connected to a farmer's attitude towards conservation, but this attitude does not necessarily influence the actual level of participation of farmers in adopting biodiversity measures.

3.2.2 Theory of Planned Behaviour

In order to measure willingness, Mills et al. (2017) use the Theory of Planned Behaviour (TPB) to demonstrate that the behavioural intentions of a person are directly related to his or her attitude and actions (Ajzen, 1991). Since a person's action cannot be explained by a person's attitude alone, more factors are included. Since a positive attitude alone will not necessarily lead to action so in order to establish action, underlying indicators are used (Mills et al., 2017). These indicators are derived from the psychological approach to behavioural change and include (1) personal attitudes, (2) subjective/social norms and (3) perceived behavioural control.

(1) Personal attitude refers to the extent to which a person has a favorable or unfavorable opinion about a situation or object (Beedell & Rehman, 2000). This study looks at a person's attitude towards biodiversity. (2) Subjective/social norms refer to a perceived social pressure that is felt to perform a certain behaviour (van Dijk et al., 2015). At last, (3) perceived behavioural control refers to the perception of the ease or difficulty of performance of the behaviour (Burton, 2004; van Dijk et al., 2015). Later on, response-efficacy was also added to this list. According to this study, the higher is the level of perceived efficacy, the more an individual is likely to persist with the new behaviour (Homburg & Stolberg, 2006). At last, authors added self-identity to this list. Self-identity is the extent to which behaviour is considered to be part of the self (Terry et al., 1999) and reflects a farmer's personal value system; it is suggested that behaviour associated with self-identify is more like to persist over time and therefore able to establish more long-term change (Charng et al., 1988).

An overview of the factors that will be investigated when looking into willingness to adopt certain measures, are presented in the table below (see **Table 1**).

Construct	Definition	Empirical evidence

Personal beliefs/ attitudes	Strength of belief that a consequence will result from behaviour. The degree to which a person has a favourable or unfavourable evaluation of a behaviour or object.	(Beedell and Rehman 1996, 2000)
Subjective/ social norms	Perceived social pressure felt from significant others to perform a certain behaviour.	(Lokhorst et al. 2011; van Dijk et al. 2015; Beedell and Rehman 1996, 2000; Burton 2004; Ajzen and Fishbein 1980)
Perceived behavioural control	Perception of the ease or difficulty of performing a behaviour. Degree of control felt over the performance of the behaviour.	(Berton 2004; van Dijk et al. 2015; Beedell and Rehman 1996, 2000; Ajzen and Fishbein 1980)
Response efficacy	The degree to which performing a specific behaviour is believed to deliver the desired outcome.	(Homburg and Stolberg 2006; Karrer 2012)
Self-identity	The extent to which a certain behaviour is considered to be a part of the self.	(Terry et al. 1999; Charng et al. 1988; Lokhorst et al. 2014; Sulemana and James 2014; Burton and Wilson 2006)
Personal/ moral norms	Self-expectations based on internalised values. Sense of personal responsibility awareness of need, awareness of consequences. The degree of regret anticipated if the behaviour is not performed	(Lonkhorst et al. 2014; Schwartz 1977; Johansson et al. 2013; Gorsuch and Ortberg 1983; Ajzen 1991)

Table 1 Key constructs influencing farmers' willingness to engage in environmental behaviour (Mills et al., 2017).

3.2.3 Ability

There are several factors that seem relevant when it comes to farmer's ability to change. A farmer's ability to adopt measures derives from the economic status of a farm, compatibility with the farming system and external drivers (Mills et al., 2017). There is a substation body of evidence that has shown a relation between a farm's characteristics (such as labour, finances, or time) and a farmer's ability to adopt new environmental measures. These factors can either facilitate or constrain environmental behavioural change (Dwyer et al., 2007; Mills et al., 2017). Besides these factors, farm size (Vanslembrouck et al. 2002), farm type (Wilson & Hart, 2000), tenure, dependency on farm-income, amount of non-intensively used farmland and bio-geographical conditions of the farmland are also influencing farmers' ability to adopt eco-measures (Wilson & Hart, 2001; Kabii & Horwitz, 2006). These factors are all perceived to have a significant effect on participation in agri-environmental activities. When farmers have a higher farm-income, they are more able to apply eco-measures (Wilson & Hart, 2001). Also, bio-geographical conditions of the farmland influence the ability of farmers to adopt eco-measures. For example, if farmland is not suited for a specific type of crop, farmers are able to plant this crop. It is also argued that farmers

are more likely to engage in environmental schemes through networking with other farmers and informal sharing of knowledge (Sligo & Massey, 2007; Oreszcyn et al., 2010). This can be seen as social- and human capital of farmers.

The **Table 2** below describes the main characteristics that influence the ability of farmers to engage in behavioural change aimed at nature conservation.

Construct	Definition	Empirical evidence
Biophysical characteristics	Type of farm	(Dwyer et al., 2007; Wilson & Hart, 2000; Kabii & Horwitz, 2006; Vanslembrouck et al., 2002)
Finance	Financial situation of farm	(Dwyer et al., 2007; Fish et al.,2003; Crabtree et al., 1999).
Human capital	Understanding the regulations and experience with similar regulations in the past	(Burton, 2004; Burton & Wilson, 2006)
Labour	Means in terms of labour	(Mills et al., 2017)
Social capital	Access to social network	(Morris & Evans, 2004; Woods, 2004; Burton, 2004).
Time	Means in terms of time	(Mills et al., 2017)

Table 2 Key constructs influencing farmers' ability to engage in environmental behaviour (Mills et al., 2017).

3.2.4 Level of engagement

In order to measure the level to which farmers are actually adopting CAP measures, their level of engagement can be identified. The level of engagement refers to the extent to which individuals are interested and motivated in such a way that they actually engage and get into action (Mills et al., 2017). There are different aspects of looking into engagement such as the nature and extent of engagement. There can also be looked at sources of advice, levels of trust, and the continuity of relationships (Mills et al., 2017).

Literature shows that farmers' engagement is expressed in many ways. There has been an increase in the number of advisors that deliver environmental advice as a result of upcoming environmental schemes and policies (Klerkx & Proctor, 2013). Besides external advisers, governmental bodies also tend to offer more advice when it comes to implementing eco schemes. According to Sutherland et al. (2013), the level of trust between those advisors determines the level of engagement of farmers. Governmental bodies for example are not always considered trusted sources of advice (Oreszczyn et al., 2010; Hall & Pretty, 2008).

In order to identify levels of engagement, the different classifications within the CAP system can be used. This system uses a point system that divides farmers into a basic premium, bronze, silver, or gold classification group. These different groups and corresponding activities can be used in order to identify different levels of engagement and behavioural change within this engagement. When a farmer only receives a basic subsidy, not enough effort is done to apply eco-measures in order to get to the bronze level. The level of engagement can therefore be considered zero to little. Whenever a farmer falls into the bronze qualification, some effort is done to apply eco-measures.

The engagement can therefore be considered little to moderate. When a farmer falls into the silver qualification, quite a lot of effort has gone into applying eco-measures. The engagement can therefore be considered moderate. When a farmer falls into the gold category, lots of eco-measures are applied. The engagement can therefore be considered moderate to high.

3.3 Conceptual model

This research aims to gain insight into the extent to which factors for willingness to adopt and factors for the ability to adopt contribute to the level of engagement that farmers have regarding the CAP policy. The figure below (see **Figure 1**) shows a schematic representation of this theoretical model. The conceptual model points at five indicators that have a direct influence on willingness to adopt – provided that some of these factors are combined. When only one of the indicators is present, the relationship is not strong enough to create a sense of willingness that actually puts an individual into action. The more indicators are present, the stronger the relationship with willingness according to literature. Furthermore, it was suggested that behaviour associated with self-identify is more like to persist over time and therefore able to establish more long-term change. It also suggests that when farmers are intrinsically motivated to improve biodiversity and already worked on this before the CAP policy, they are more willing to adopt.

When it comes to the ability to adopt, several indicators are pointed out in the literature, namely finance, labour, time, biophysical factors of the farmland, and behaviour change. According to the literature, when the above-mentioned factors are present, farmers are more able to adopt certain measure but when these factors are absent or less present, farmers are less able to do so. When it comes to social and human capital, literature pointed out that farmers are more able to adopt environmental schemes when they network with other farmers and share information and knowledge.

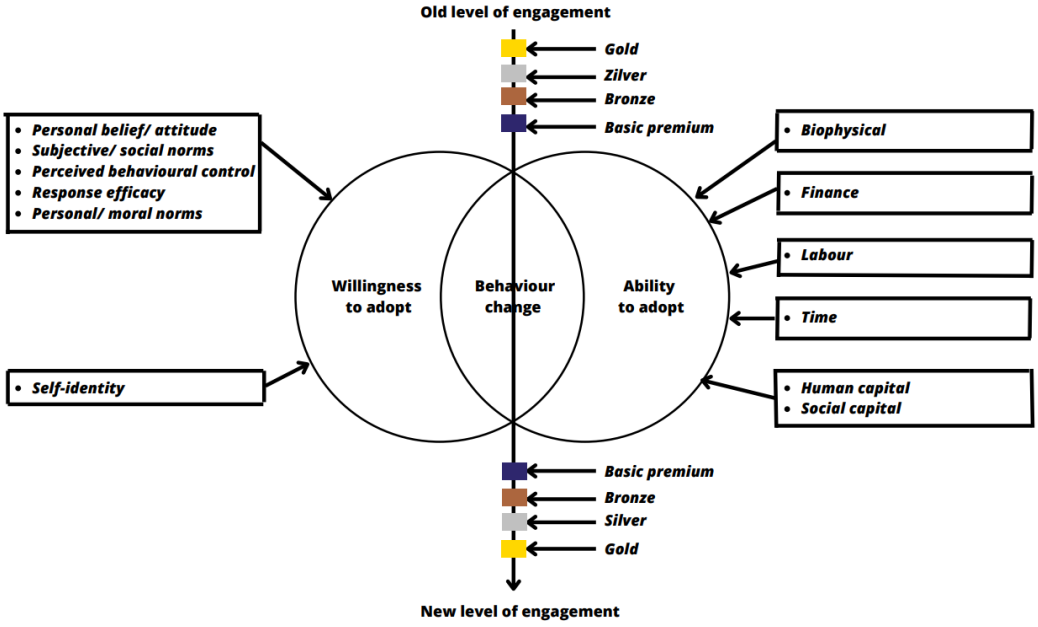


Figure 1: Conceptual model, source: own work.

4. Research strategy and methods

4.1 Main research strategy

The goal of this research is to identify what motivates farmers to adopt or not adopt the CAP policy. To gather data involving these motivations, a qualitative research approach was used. This approach was chosen because qualitative research methods offer the opportunity to gain insight into motives, emotions, and obstacles that cannot be captured in figures or other quantitative data. Qualitative research offers the opportunity to talk to respondents who can provide more information about the content of the process and elaborate on possible motives and choices within (Verhoeven, 2018). In order to answer the main research question, a research strategy was followed which is illustrated in **figure 2.**

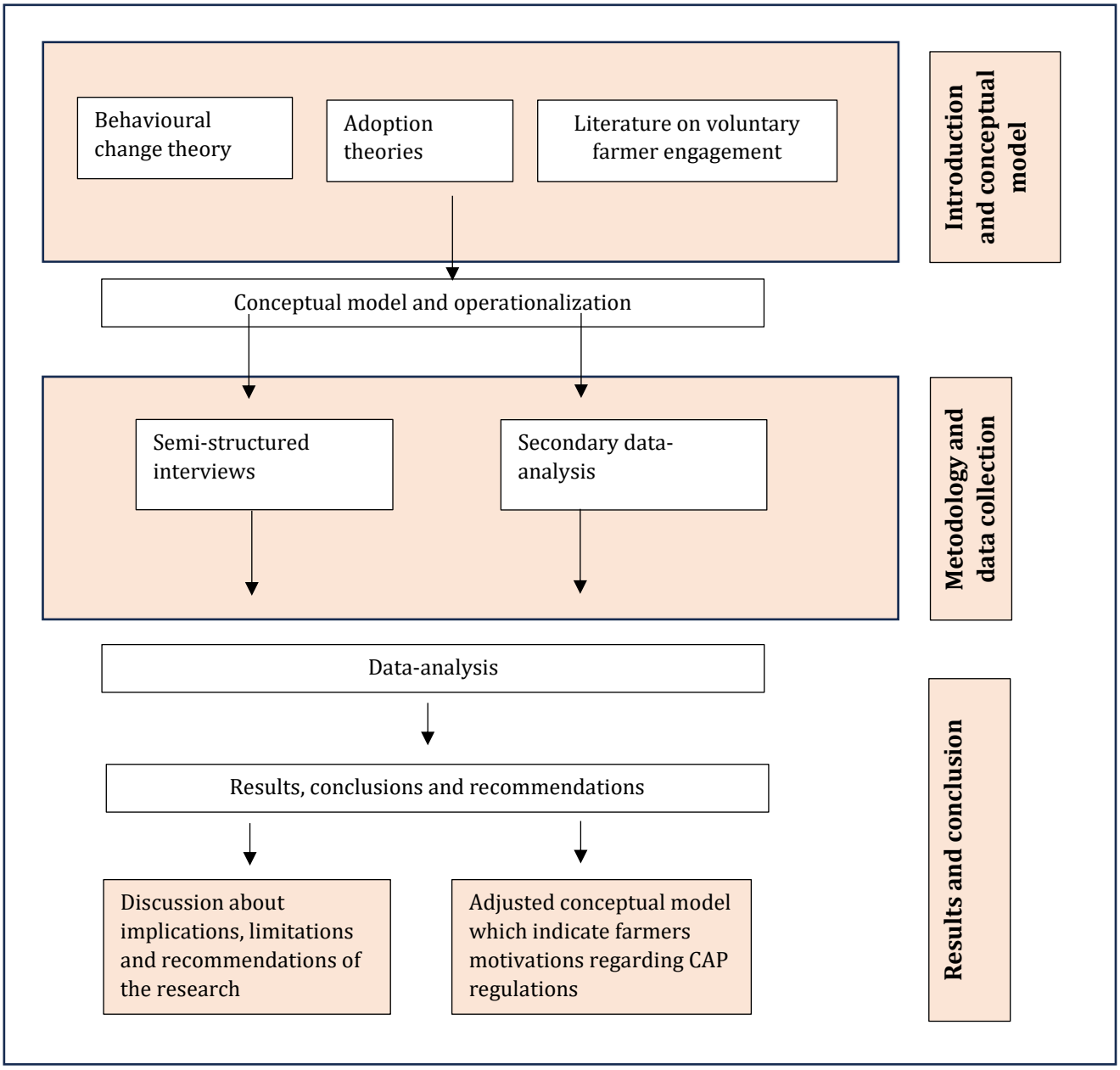


Figure 2: Outline of research strategy (own work).

As showed in the **figure 2** above, the research started with an exploration of relevant research regarding behavioural change, motivations for adopting voluntary eco-measures and adoption theories in general. This enabled the researcher to understand what research is already conducted regarding farmer motivation. The researcher took note of the context in which this research is conducted in order to make the call on whether the research is relevant for this specific study. In order to structure the research, the conceptual model as compiled by Mills et al. (2017) was used. This model contains key factors of both willingness and ability to adopt eco-measures. The elements within these models were operationalized for data collection.

The operationalized key-concepts as derived from Mills et al. (2017) were also used to give structure to the interviews. The operationalized concepts that are made measurable are transferred into questions. These questions are used to gather empirical data from the respondents related to the key-variables of this study. Besides data collected during interviews, a secondary data-analysis was also done. The data that was used for this analysis concerns policy documents and governmental websites. All the data that was collected was analysed using the coding system which will be elaborated on later in this chapter.

After analysing the data, conclusions were drawn up. This conclusion contains an answer to the research questions of this research. Following from the conclusions, recommendations for implementation and further research were also drawn up. The implications of the conclusions are discussed in the discussion chapter. Based on the conclusions, an adjusted model is drawn up which shows the factors that motivates farmers, specifically in the Betuwe area and with regards to the CAP-measures.

4.2 Research methods and data collection

To collect data for this research, several research methods were used. Existing knowledge on the subject was collected through a literature review. This method is used because it provides the researcher with information on all the existing relationships and other relevant insights on the subject. Literature is found, selected, and analyzed. The databank Google Scholar was used for this purpose. Scientific articles such as papers, articles, and books were consulted. Search terms that are used are terms such as: biodiversity in arable farming, willingness to adopt, and ability to adopt.

Besides literature review, desk research was also conducted. Desk research is a qualitative data collection method that is exploratory in nature. This method is chosen so the contents of existing documents can be analyzed. Documents from the Dutch government's 'Rijk Dienst voor Ondernemend Nederland' (hereafter RVO) were analyzed. These are documents that address the CAP regulations.

Another data collection method that is used, are interviews. To select respondents for these interviews, the snowball method is used. This means that participants were asked to assist in identifying other potential respondents for this research. Interviews are chosen because they allow targeted data to be collected on topics that are relevant to this study. This study is specifically based on semi-structured interviews. The first step for conducting semi-structured interviews is to arrange an interview guide; this consists in a number of questions based on the main concepts underpinning this research. The order of the topics and the wording of the questions are not fixed and can be adjusted according to the open (or semi-open) answers of the respondent (Verhoeven, 2012). This allows further questions to be asked in order to get relevant data from the interviews. The interviews were well prepared so there was a high degree of control over the situation during the interview from the interviewer. In addition, the interviews were recorded which facilitated the analysis. A total of fifteen arable farmers from the Betuwe were interviewed. Twelve interviews were conducted face to face. This made it possible to also take the

respondent's body language into consideration. This was not possible for three interviews which were conducted by telephone. Because fifteen farmers were interviewed, a representative study can be formulated based on the results.

In order to get a representative group of farmers, farmers were chosen across the Betuwe. Farmers were also selected on the type of crops they produce. The interviewees are numbered to preserve their anonymity. The **Table 3** below shows the respondents list and includes the expected classification based on the CAP, which was also one of the criteria taken into account for the respondent selection.

Respondent	**Classification**	**Respondent**	**Classification**
1	Silver	9	Gold
2	Gold	10	Gold
3	Basic-premium	11	Bronze
4	Silver	12	Bronze
5	Gold	13	Silver
6	Gold	14	Basic-premium
7	Bronze	15	Bronze
8	Gold		

Table 3: Expected classification CAP, source: own work.

In the **Table 4**, the research methods used per each research questions are presented:

Question	**Method**
What is meant by biodiversity in arable farming and how can be this achieved?	Literature review/Desk research
What are the goals of the CAP regarding biodiversity and how can farmers contribute to this?	Literature review/ Desk research
To which extent are farmers willing to adopt CAP measures?	Literature review Analyze documents and interview
To which extent are farmers able to adopt CAP measures	Literature review Analyze documents and interview

Do farmers have the ambition to increase their level of engagement with regards to the CAP measures?	Literature review Analyze documents and interview

Table 4 Research method per question, source: own work

4.3 Data analysis

To analyze the data, interviews were transcribed. The raw audio files are changed into transcripts which allowed the researcher to start the coding process by using Atlas ti. The coding process is used to process the interviews. Coding is a process in which the data is divided into different parts that are then linked to labels (Bryman, 2012). The first step in this is open coding. All statements that are relevant to the research or relate to the central themes of the research are hereby marked. In this way, all relevant information has been collected (Boeije, 2014). The relevant data that has been marked is then given a code (see **Annex B**). In this way, after coding, a list of codes is created that describes the core of the relevant statements (Boeije, 2014).

After this open coding, axial coding was applied. In this axial coding, all selected statements are assigned to specific sub-topics in the form of a code tree. In this step, the previously created codes are described and ordered in relation to each other. By categorizing the statements under different codes, the data is structured, and it is clear on which topics statements have been made. Different main and subcodes then become visible. As a result, a code name is created in which all main and sub-codes are visible (Boeije, 2014).

To clarify which factors influence farmers the most in their decisions to adopt or not the CAP measures, the CAP classification system is used. In order to receive the subsidy from the CAP, the farmer must comply with the set standards and requirements. The amount of the subsidy depends on the number of points and corresponding qualifications (bronze, silver, or gold) that the farmer scores from the CAP (RVO, 2023). First, the farmers will be divided into different groups depending on their farm style and characteristics. Secondly, the interviews with farmers will be analyzed to identify which factors are important for the farmers. Thirdly, connections will be made between the motivation of farmers and their level of engagement. These connections will help to identify which factors were important for the farmers that have a high level of engagement and are therefore stronger connected than other factors. The last step in the analysis process is to establish connections and relationships between all the different indicators based on the theory and empirical data found in desk research and interviews. This was done by drawing up a table where the data per category can be compared. Based on this comparison, answers can be found to the research questions.

4.4 Reliability

When designing a research study, the degree of reliability is important (Verhoeven, 2018). Reliability is based on accuracy and consistency.

To ensure accuracy in this research, an interview guide was used while interviewing all respondents in order to make sure that the same topics were addressed to all farmers. A codebook was also used in order to analyze all interviews in the same matter. Using an interview guide also ensured that this codebook could be applied to all interviews. During the coding process, ATLAS.ti was used in order to work precise and prevent mistakes creeping in when processing big loads of

data. After conducting the interviews, they were sent back to the interviewee for approval. In this way, the accuracy of the data was increased because it was verified that no errors have crept into the elaboration of the interview (Verhoeven, 2018).

In order to ensure consistency within this research, the concept of repeatability is important (Van Thiel, 2014). This means that the research should achieve the same results when it is being carried out under different circumstances. In order to do so, a wide variety of farmers were selected as respondents for this research. As a result of this, the likelihood of interview results being influenced by a specific participants input is reduced. However, it can never be 100% ensured that respondents will feel the same when interviewed after a certain period of time. Also, it is not guaranteed that context will be the same. In order to still try and maintain an acceptable level of consistency, the researcher has tried to be transparent when interpreting data by nuancing relationships that were found and putting them into context. The results chapter also describes per variable what key concept is measured and how this is measured. Should this research be repeated, these steps and explanations can be taken in consideration in order to establish a level of repeatability and therefore consistency in the results.

4.5 Validity

Validity can be distinguished in terms of internal and external validity. With internal validity, the validity of the analysis and conclusions is particularly important. It is important to use a structured conceptual model to make sure that the indicators that are measured are clear (Verhoeven, 2018). To ensure this, definitions are used that occur in the existing literature. External validity concerns the generalizability of a study. By conducting as many interviews as possible, the likelihood that the statements are representative of the entire population is increased (Verhoeven, 2018).

The literature review was used to give structure to the analysis and interviews. The central topics that are found in the empirical data will be compared with the central topics from literature. In that way, a structural approach to analyze the data is used. This ensures that the data collected from the interviews actually provides data that is related to the main topics of this research. The interview questions used for the data collection are developed based on literature and central topics from the main question. This increases the validity of the research (Verhoeven, 2018).

4.6 Research ethics

In order to prevent ethical issues while conducting this research, a few measures were put into place. First of all, the rights of research participants (respondents) are protected in this research by giving them access to the transcribed interviews. This allows respondents to make it known whenever they feel like their answers were not in line with the reality or they explained themselves in the wrong way. Another way to ensure rights of respondents is to ensure anonymity in the interviews. It is not made clear in the research results which farmer said what. Data is also not shared between the farmers. At last, it was ensured that farmers contribution is voluntary. Farmers were invited to participate in this research, but there are no personal ties between the researcher and the farmer which could have indirectly made famers feel like they were forced to join this research (Bhandari, 2023).

Besides ensuring the rights of research participants, the researcher also ensures to maintain academic integrity by being honest, ethical and thorough in his academic work. This is showed for example in the last chapter of this thesis where the limitations of this research are enclosed. This allows the reader to put the results of this research into perspective. Whenever someone else

work was used in this research, credit is always given by using references. This also contributes to academic integrity (Bhandari, 2023).

5. Results

5.1 Introducing biodiversity in arable farming

When it comes to arable farming, there are several ways that farmers can increase the biodiversity of their farmland and take advantage of biodiversity benefits. To increase biodiversity in arable farming, there must be attractive habitats for wild plants and animals. For this, plants need suitable habitat, the right neighboring poles and suitable soil. Animals need suitable nesting opportunities, hiding places and food nearby (Wur, 2023).

In arable farming, enhancing biodiversity requires a variety and continuity of measures. Arable farming is defined as the growing of arable crops. What is commonly in arable farming is the large use of crop monocultures. There are great opportunities for the future to increase biodiversity in smart ways. For example, by combining agronomic and ecological knowledge with the right innovative technologies. This could involve capitalizing on beneficial interactions between crop production and the restoration of biodiversity. This in turn improves soil quality, crop health, and profitability. This will be able to be supported by GPS, robotization, ICT and sensor technology. Wageningen University has presented 15 promising agroecological building blocks that stimulate the increase of biodiversity. These building blocks have been implemented at the farm level. The 15 building blocks can be divided into crop systems, management and biodiversity elements (Alkemade et al., 2009).

5.1.1 Cropping plan

The cropping plan in arable farming describes which crops are grown on a farm. There is still a rotation pressure that represents the order and with what frequency in which crops are grown (Alkemade et al., 2009). Expanding the plan and making the right crop choices will increase biodiversity. This can be done by applying new crops, rest crops, green manures, and leguminous plants. With an expanded and better crop plan, diseases and pests will be suppressed which will have a positive effect on the main crop. The decrease in pests and diseases will also reduce the need after using plant protection products (CBD, 2010).

The second building block in the cropping system is strip cropping (WUR, 2023). This is a cultivation system in which crops are grown in alternation in long narrow strips. The advantages of this cultivation system are relatively low labour input with high crop diversity at plot level. Research shows that, on average, yields are at least equal to those of monocultures, disease pressure is lower and insect diversity is about two to four times higher. In strip cropping, green manures are also used as much as possible during the winter so that food and shelter are also present during this period (Davidson & Bergsma, 2011).

The third building block is agroforestry. Agroforestry is an agricultural system in which the cultivation of trees or shrubs (perennial woody crops) is deliberately combined with agricultural crops or farm animals on the same plot (Alkemade et al., 2009). Woody crops provide structural diversity in a predominantly open agricultural landscape. They provide a stable microclimate, soil nutrients and food, nesting, and shelter for birds, mammals, insects, earthworms, and other organisms. The goal of agroforestry is to promote landscape diversity and support biodiversity by forming and connecting permanent habitats (Wur, 2023).

The fourth building block in cropping systems is mixed cropping. In mixed cropping, two or more crops or varieties are grown together in different configurations between them. This involves combinations with minimal crop competition, higher yields, and the varieties utilize natural resources (De Bie & van Dessel, 2011). In addition, mixed cultivation increases the robustness of the production system. It also provides the opportunity for natural pest control and can reduce or

spread the risks of damage during extreme weather events. It also makes more efficient use of available soil resources (De Bie & van Dessel, 2011).

5.1.2 Management

Within management, the focus is on healthy soil with fewer disturbances resulting in higher biodiversity. This also includes a few building blocks. The first building block is reduced tillage which is a measure in which the soil is tilled less deeply and/or less intensively (Davidson & Bergsma, 2011).

Besides growing crops, it is also important to have a habitat for the organisms, this can be done through a catch crop/rest crop and green manures. A positive example is a green manure crop that covers the soil of the plot. This offers continuity in food and habitat availability and greater diversity in the landscape (Davidson & Bergsma, 2011).

Integrated Pest Management provides a cropping system in which preventive measures and the use of non-chemical methods reduce the use of chemicals as much as possible. It offers the least possible disruption to agricultural ecosystems and natural pest control is encouraged in the process (Alders, 2011). Chemical crop protection products are mostly used in arable farming to prevent crop losses which have a negative effect on biodiversity.

The final building block of management is smart fertilization and organic matter. With smart fertilization, fertilization should match the desired mineral composition for the plants and soil, reducing disturbance in the soil and in surface and groundwater. When animal manure is applied, residues of biocides (detergents and disinfectants, antibiotics and other drugs) and heavy metals (via feed) are also applied to the soil. These substances cause a gradual decline in soil life and thus biodiversity (Alders, 2011). Organic matter plays an important role in healthy soil. In this regard, organic matter provides a habitat for soil microorganisms and large organisms in the soil. The higher the level of organic matter, the more diverse and richer the life in the soil.

5.1.3 Biodiverse elements

In order to increase biodiversity, landscape elements should be connected to each other. This can be done on a large scale as well as on a small scale. Another biodiverse element is varied field edges. Field edges are mostly seen along field boundaries and form a network with relatively undisturbed and permanent habitats for biodiversity. This measure includes multiple-choice options such as dry or wet elements, annuals or perennials and herbaceous or woody elements (Wur, 2023).

Farmers can also make use of interior field elements. These can be line-shaped elements that thread through the plots. This mimics smaller plots (Wur, 2023). By dividing the plots, the habitat is improved which promotes biodiversity (Wur, 2023). In addition, the elements serve as corridors for insects and birds.

Another biodiverse element addresses periodic or phased management. To minimize side effects on wild species from disturbances, management of biodiverse elements such as field edges and ditches, among others, can be carried out in phases (Aalders, 2011).

The final building block is green yard planting. The farmyard can have a valuable role in promoting biodiversity. Decorating the yard with green elements can provide a wide variety of habitat for wild species (Wur, 2023).

5.2 Introduction to the Common Agricultural Policy (CAP)

The origin of the CAP has its roots in Western Europe. The CAP's main objective was to promote the productivity of the agricultural sector to guarantee a stable food supply at affordable prices to consumers on the one hand and to keep EU agriculture viable on the other. This was encouraged

by subsidies and guaranteeing high prices for products. In 2017, a new CAP was introduced for the period from 2021 to 2027 (Rijksoverheid, 2023).

5.2.1 CAP operation

The CAP distinguishes between farmers with less than 75% grassland and those with more than 75% grassland. Therefore, since this study focuses on arable farming, the conditions for agrarians with less than 75% percent grassland will be used. In order to receive the subsidy from the CAP, the farmer must comply with the set standards and requirements. These standards and requirements will be described in this paragraph. The amount of the subsidy depends on the number of points the farmer scores from the CAP. For example, a farmer can participate in the eco-measurement scheme. In short, this scheme means that additional compensation can be obtained per hectare based on eco-activities on top of the basic premium. These activities consist of improving the following 5 goals, namely:

1. Climate
2. Soil and air
3. Water
4. Landscape
5. Biodiversity

As mentioned, the amount of the subsidy depends on the number of points a farmer scores on the farm. In addition to the basic premium, the premium can be increased by the eco-schemes; this determines the classification of farms in the bronze, silver and gold category. First up is the basic premium.

The basic premium is paid for each hectare of eligible land in use. These lands must meet various conditionalities. These conditionalities consist of standards and requirements also called Good Agricultural and Environmental Conditions (GAEC) and management requirements. As an example, the land must not be used for non-agricultural activities for more than 90 days in the grant year (Conditionaliteiten GLB 2023, 2023). When the farmer meets the basic premium money is considered as a supplement to agricultural income. The amount is approximately 220 euros per eligible hectare of farmland. There is also an additional premium for the first 40 hectares. This is about 54 euros per hectare. If the farm has more than 40 hectares of eligible farmland, the additional land (50 hectares - 40 hectares =10 hectares of additional land) is not covered by the additional payment of about 54 euros per eligible hectare of farmland.

When it comes to the point system regarding the bronze, silver, or gold group, a distinction is made based on the region of belonging. A distinction is made in two regions in the Netherlands. Regio 1 includes 'Veenkoloniën', 'Oostelijke beekdalen en ontginningen' and 'Zuidelijke beekdalen en ontginningen'. Region 2 includes the 'Bouwhoek, Hogeland and Oldambt', 'Noordlijk Weidegebied', 'Flevopolders', 'Westelijk Holland' and 'Zuidwestelijke Delta and Rivieren'. Depending on the region a farmer falls in, there is a different fee per hectare. This is based on the differences in yields (amount of harvest) and costs (contractor). The study area falls under region two, 'Zuidwest Delta and Rivieren'.

The eco scheme consists of 22 different activities that contribute to the above five goals. Implementing certain eco-activities generates a certain number of points (some eco-activities yield more points than others). It is important to score enough points in all five goals. The total value of the points determines which eco-premium (bronze, silver, gold or basic premium) will be

reimbursed. Here the threshold value for bronze is 54 euros, silver 100 euros, and gold 200 euros per eligible hectare. This premium is reimbursed in addition to the basic premium. This eco scheme is briefly summarized in four steps:

1. Calculate the entry requirement and the five goals.
2. Choose the eco-activities.
3. Obtain enough points and value with the activities for the threshold requirement.
4. Go for eco-premium bronze, silver or gold.

Besides these subsidies, there are various subsidy options such as making the farm more sustainable or an extra payment for young farmers. These subsidies are not addressed in this study (RVO, 2022). Thus, this study distinguishes between bronze, silver, and gold classifications.

5.2.2 Regulations CAP

To participate in the eco-rule, there is an entry requirement. This requirement is the minimum points per goal, shown in **Annex A**. The CAP's rulebook contains 22 eco-activities. These activities are divided into different categories namely, main crop, soil crop, crop measures, peat measures, non-productive farmland and sustainable farm. All 22 eco-activities can be found in Annex A.

5.3 Willingness to adopt CAP measures

Data from the interviews were collected to describe the factors supporting the willingness to apply the CAP measures. The results are structured by the main concepts derived from theory. As showed by the conceptual model (see **Figure 1**). The farmers' wiliness to adopt CAP measures can be determined by (a) personal belief, (b) social norms, (c) perceived behaviour control, (d) response efficacy, (e) self-identity, and (f) personal/moral norms.

Each factor will be discussed in more details as follow.

(a) Personal belief/ attitude

While researching personal belief/attitude, I investigated the opinions of arable farmers in the Betuwe about biodiversity restoration based on the CAP. As a main finding, I found that many arable farmers believe that CAP eco-activities contribute to biodiversity restoration. Six arable farmers on fifteen are convinced that it will contribute to biodiversity restoration. Five arable farmers on fifteen see little or no contribution from the eco-activities that should contribute to biodiversity restoration. The remaining arable farmers expect a contribution but want to see it in practice first.

Respondent 7 says: *"I see that as something very positive. I think a combination between nature and farming is very possible." (personal communication, 26-4-2023)*[1]

It is indicated here that in addition to the positive contribution that the eco-activities offer, it is also easy to combine with farming. This answer neatly shows that in addition to the result on person belief/ attitude, the arable farmer is positive about it on other indicators from the theory because the respondents shows that the economic side of farming (finances) can be combined with the attitude towards nature. This benefits the application of eco-activities and the intrinsic contribution to biodiversity restoration.

Two arable farmers with the opinion that the eco-activities from the CAP do not contribute to biodiversity restoration think that the landscape in the Betuwe offers sufficient biodiversity. The

[1] Quote in original language (Dutch): *"Ik zie dat als iets heel positiefs. Ik denk er heel goed een combinatie mogelijk is tussen natuur en boer."*

landscape is very diverse compared to, for example, the arable farmer in the Flevopolder. There the landscape is very monotonous, and the plots are larger with homogeneous cultivation. Here in the Betuwe there is a diversity of farmers. Examples are fruit growers, livestock farmers, and arable farmers. In addition, the Betuwe offers a lot of floodplains where there is a lot of biodiversity. For these reasons, in their opinion, eco-activities would have a higher contribution in the Flevopolder or similar landscapes than here in the Betuwe. In addition, it is striking that one of these farmers is taking measures from his own initiative that also happens to serve as an eco-activity. As a result, he does not see a contribution from the CAP because he himself already carries out several eco-activities. These are activities such as woody elements.

It is notable that there are several arable farmers who have no insight into biodiversity restoration based on eco-activities. This is mainly because it is a new policy and there is no known data to show that it actually contributes. It is expected to help but how much is unknown.

For example, respondent 1 says: *"I think it helps, but I really have no idea how much and how or what." (personal communication, 21-4-2023)*[2]

(b) Subjective/ social norms

When investigating social norms during my interviews, I have been looking into the extent to which farmers feel social pressure in applying or not certain measures. Subjective/ social norms are described in this thesis as perceived social pressure felt by significant others to perform a certain behaviour. This definition is derived from Mills et al. (2017). As one of the main findings, I found out that arable farmers do not feel any social pressure to implement eco-activities; this means that social pressure does not influence whether or not to apply eco-activities. However, farmers do still consider their community. This is done to create appreciation from people to farmers, among other things.

For example, respondent 12 says: "*Public opinion must be for you, not against you. Hence those field edges."(personal communication, 26-4-2023)*[3]

This quote reflects the respondent's willingness to accommodate the community when it comes to the way he implements eco-measures.

Several arable farmers have land located against homes. When the wind is toward the home, the arable farmers try not to spray pesticides so as not to bother the neighboring residents. When there is no other option, farmers still want to grow a healthy crop, so it is sometimes necessary to spray pesticides in the wrong wind direction. Another example mentioned is that when a crop is sprayed to death, the farmer wants to cover it as soon as possible to avoid yellow plots. This is done to avoid creating negative reactions from the community. For example, to gain support from the community, buffer strips of herbs are planted along bike paths instead of where the community can enjoy them less. This shows that the farmer wants to contribute to increasing biodiversity.

(c) Perceived behavioural control.

During the interviews, I investigated to what extent eco-activities are effective for biodiversity restoration in the opinion of farmers. Perceived behavioural control is defined in this thesis as the perception of the ease or difficulty of performing a certain behaviour. Degree of control felt over the performance of the behaviour. This definition is derived from Mills et al. (2017). Arable

[2] Quote in original language (Dutch): *"Ik denk dat het helpt, maar ik heb echt geen idee hoeveel en hoe of wat".*
[3] Quote in original language (Dutch): *"De publieke opinie moet wel voor jou zijn, niet tegen jou. Vandaar ook die akkerranden."*

farmers mainly give the answer that the eco-activities contribute to biodiversity restoration. Here there is a difference in arable farmers who see an actual contribution and arable farmers who expect the contribution but are not sure. There are also arable farmers who see the contribution as minimal or non-existent.

Respondent 7 gives an example of this. I quote: *"I saw for example in sugar beets where you used to spray easy aphids, now there is much more focus on conservation of natural enemies. And we experienced ourselves that it works. So do not immediately grab the sprayer and kill insects but make sure you create a landscape where the natural enemies are comfortable. That suppresses your damage threshold." (personal communication, 26-4-2023)*[4]

This is a real-world example that matches the policy. This example corresponds to biodiversity increasing measures, as introduced in Section 5.1.1. In the management section (see section 5.1.2), this sidesteps integrating pest management based on non-chemical methods. Because there is a focus on maintaining natural enemies, in this case, natural enemies that eat the aphids in the sugar beets. There is no need to directly spray the aphids to death. Here it is important to have a habitat where the natural enemies can live and reproduce, the eco-activities provide this. In this way, there is less need to use plant protection products that, for example, combat more than just the aphids that are harmful to the sugar field. There is an ecosystem service here.

A distinction is also made in eco-activities. Arable farmers from the Betuwe consider that certain eco-activities have a lower contribution to biodiversity restoration than others. As an example, eco-activity long-term grassland is mentioned by respondent 9. According to respondent 9, this is an eco-activity that contributes only to a little extent to biodiversity. In relation to non-productive agricultural land activities according to Annex A, for example, this is true. The benefit of eco-activity is that organic matter is built up in the soil which promotes soil biodiversity. This is not readily apparent when looking only at the crop and not the soil. Desk research (section 5.1.2) indicates that increasing organic matter also improves water balance, characterizing the soil as healthier because soil microorganisms and large organisms in the soil benefit. The higher the level of organic matter, the more diverse and richer the life in the soil. According to respondent 2, the eco-activity buffer strip with herbs actually provides biodiversity. In addition to the biodiversity provided by the herbal mixture, partridges are also spotted that were not there before. This is a clearly visible result of the eco-activity. The interview with respondent 11 shows that the measures actually contribute to the goal. Without the measures, the goals were not met. The comment here is that the measures must remain workable. According to him, the measures are only carried out of it is necessary.

(d) Response efficacy

During the interviews, I investigated what arable farmers think about the extent to which eco-activities contribute to the restoration of biodiversity as a common goal. Response efficacy is defined in this thesis as the degree to which performing a specific behaviour is believed to deliver the desired outcome. This definition is derived from Mills et al. (2017). Here the question was asked what influence arable farmers have on the common goal of biodiversity restoration and what the relationship is with government, industry, and individuals. It was asked whether only arable farmers are responsible for biodiversity restoration or are multiple parties responsible for it such as governments, industry, and private individuals. The interviews show that most arable farmers see eco-activities as a common goal to increase biodiversity. The common goal here is the

[4] Quote in original language (Dutch): "*Ik zag bijvoorbeeld bij de suikerbieten waar je vroeger makkelijke luizen spuit, dat er nu veel meer focus is op behoud van de natuurlijke vijanden. En we hebben zelf ervaren dat het werkt. Dus niet meteen de spuit grijpen en insecten dood maken maar zorgen dat je een landschap creëert waarbij de natuurlijke vijanden zich prettig bij voelen. Dat onderdrukt je schadedrempel.*"

restoration and enhancement of biodiversity. The results show that farmers believe it is a common goal that requires a joint effort. This means that governments, businesses, and individuals must also contribute to achieve the goal. Six of the arable farmers interviewed expect that they can contribute to the common goal. The comment here is that it is uncertain whether it can be achieved.

For example, respondent 3 said: *"If we all do it together it will help quite a bit. But is it enough? I have my doubts about that." (personal communication, 28-4-2023)*[5]

These arable farmers do have some confidence in eco-activities with respect to the common goal of biodiversity restoration and enhancement. Only the expectation of the contribution is very limited. It is also indicated that arable land is there to produce food and not to develop biodiversity. According to respondent 6, this does not always go together. Biodiversity can hinder cultivation.

Respondent 10 expects that the private sector can make a high contribution to increasing biodiversity. This, according to him, can be done to green private gardens, just as it was in the past. Looking at section 5.1.3., this is a form of biodiverse elements. This is a measure for increasing biodiversity in the yard through greening. This measure can also be applied in private gardens. According to respondent 10, there used to be more greenery in the garden such as flowers. Nowadays, gardens are mostly paved or even completely paved. This is bad for biodiversity. Besides increasing biodiversity, private individuals also become aware of increasing biodiversity and experience that they themselves can contribute to this.

(e) Self-identity

The study also examined the indicator self-identity. Self-identity can be defined in this thesis as the extent to which certain behaviour is considered to be a part of the self. This definition is derived from Mills et al. (2017). Based on the intrinsic motivation to increase and preserve biodiversity, the self-identity of arable farmers was described. This included asking for examples and characteristics that provide biodiversity restoration and conservation based on self-identity. Twelve of the arable farmers interviewed indicated that, in addition to eco-activities, they themselves carry out activities to preserve and/or increase biodiversity. Some arable farmers gave a single example of this, but the majority of arable farmers have multiple and even many examples of this.

Respondent 2, for example, has a warm feeling for nature and creates pools and hedges on his own initiative. Another arable farmer indicated that he pays explicit attention to birds' nests while working the land. When he sees them, he saves them and provides an opportunity for birds to grow there.

Respondent 15 works with volunteers to implement biodiversity-enhancing measures. Together with volunteers, he plants hedges on his land. Besides planting the hedges, they have coffee together and discuss the subject. This provides additional awareness for the farmer but also for the volunteers. The farmer, therefore, hopes that the hedges will provide a place for birds to nest. In addition, the volunteers also help keep up with nature.

[5] Quote in original language (Dutch): *"Als we met zijn allen doen zal het best een beetje helpen. Maar is het genoeg? Daar heb ik mijn vraagtekens bij."*

Three of the interviewees clearly indicate that they themselves do not make any additional contribution to biodiversity restoration and conservation. Respondent 14 indicates that this requires extra time and attention. and that he does not have this time.

Various measures are also taken that benefit crop production but also increase biodiversity at the same time. For example, respondent 13 implements green manure in his operations. This had already been implemented in the operations before this was an eco-activity. Another interviewee indicates creating places for birds of prey. This is done to put posts in the fields and plant and maintain hedges. The birds of prey eat the mice which can damage crops. Planting hedges is, based on the desk research section 5.1.3, a measure that increases biodiversity through biodiverse elements. It is also an eco-activity. The creation of a habitat for natural pest controllers (birds of prey that control mice) falls under non-chemical pest control based on literature research (section 5.1.1). These are self-initiated activities that promote biodiversity but at the same time promote cultivation.

(f) Personal/ moral norms

As the last indicator of the theory, the indicator personal/ moral norms were examined. Personal/ moral is defined in this thesis as self-expectation based on internalized value, sense of personal responsibility, awareness of need, awareness of consequences and the degree of regret anticipated if the behaviour is not performed. This definition is derived from Mills et al. (2017). This was carried out by examining the value the arable farmers place on increasing biodiversity and in doing so their personal justification. The interviews show that most of the farmers place a value on increasing biodiversity. The interviews also show that there is a limit.

As respondent 1 pointed out: *"I think the more birds in the country the better. But there is a limit to that. Preferably not whole plots full of geese." (personal communication, 21-4-2023)*[6]

A distinction is made as to what is meant for biodiversity.

For example, respondent 2 said: *"I like it, but I also like to see flowers, bees and butterflies and not just mosquitoes and wasps." (personal communication, 26-4-2023)*[7]

Arable farmers thus place a value on specific biodiversity here. In this example with certain species of birds and certain flowers, bees and butterflies.

Organic arable farmer respondent 5 says: *"I take full responsibility for that to arrange that as optimally as possible in my organic household." (personal communication, 21-4-2023)*[8]

This answer indicates that in addition to the requirements regarding organic arable farming, the arable farmer takes his own responsibility to apply it as optimally as possible. This goes beyond the requirements for organic farming.

Final overview

The willingness to adopt is made visible in the figure below. The **figure 3** shows how much an indicator influences whether or not eco-activities are applied. 100% means that the indicator has great influence, 0% means that the indicator has no influence.

[6] Quote in original language (Dutch): *"Ik vind hoe meer vogeltjes in het land hoe beter. Maar daar zit wel een grens aan. Liefst niet hele percelen vol met ganzen."*
[7] Quote in original language (Dutch): *"Ik vind het mooi maar wel ook graag bloemen, bijen en vlinders zien en niet alleen muggen en wespen."*
[8] Quote in original language (Dutch): *"Ik neem daar alle verantwoording voor om dat zo optimaal mogelijk regelen in mijn biologische huishouding."*

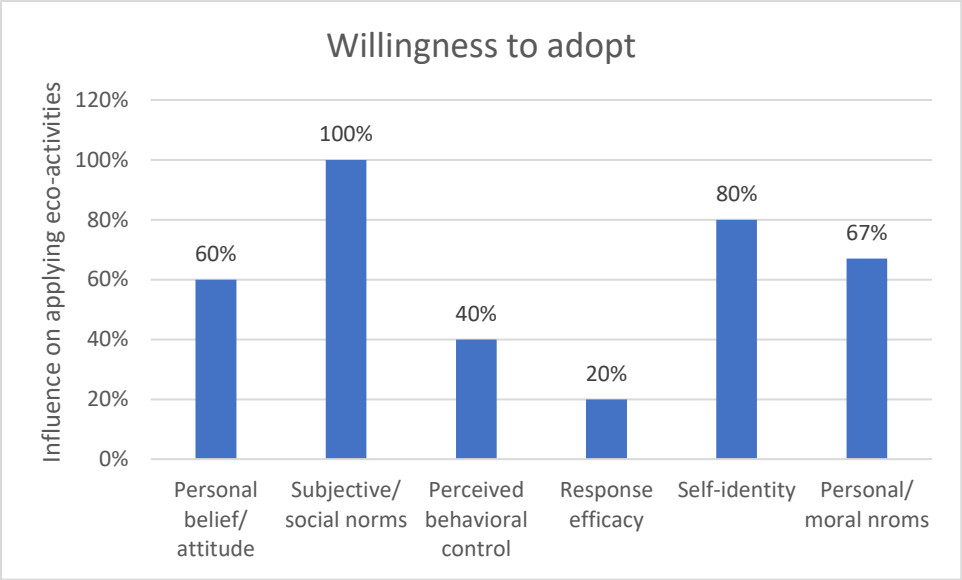


Figure 3: Willingness to adopt, source: own work

5.4 Ability to adopt CAP measures.

Besides the extent to which farmers are willing to adopt CAP measures, research was also conducted on the extent to which farmers are able to adopt measures as a result of their (a) biophysical condition of farmland, (b) finances, (c) human capital, (d) labour, (e) social capital and (f) time. The results per each analyzed factors are presented below.

(a) Biophysical condition of the farmland

When investigating the biophysical condition of the farmland during my interviews, I have been looking into the type of farm that the farmers have. Both the history of the farm and the current situation including crops, area, and type of soil have been investigated. The possibilities regarding the applicability of eco-activities were investigated. Questions were asked about the conditionalities of the farm regarding the possibility of applying the eco-activities. The interviews revealed that all arable farmers have opportunities for applying eco-activities.

First, the history of arable farmers in the Betuwe can be discussed. Most arable farms are family farms that have existed for more than 100 years. It has often passed from father to son. In the past, arable farms were mixed. This means that a farm consisted of both arable farming, livestock farming, and fruit growing. Later, farms began to specialize in arable farming. A few still have a small amount of hard fruit. With the arrival of the Betuwe line, several farms moved. Farms also moved because of the arrival of housing, industry, or nature. Some arable farmers did not take over a farm but built it up themselves. However, they already had an affinity for arable farming.

For example, respondent 12 says: *"Actually, this is a family business. My grandfather and great-grandfather started in Elst. I transferred to Herveld in 1985 because we lost the land to industry." (personal communication, 26-4-2023)*[9]

Most arable farmers deal with leased land. On these, the lessor has hardly any influence on the management. For Respondent 5, however, the lessor does have an influence on operations. A requirement for the lease is that organic cultivation is used. This arable farm is therefore

[9] Quote in original language (Dutch): *"Eigenlijk een familiebedrijf. Mijn opa en mijn overgrootvader zijn begonnen in Elst en ik ben in 1985 overgestapt naar Herveld omdat we de gronden kwijtgeraakt zijn aan de industrie."*

completely organic. In addition, another arable farmer has user restrictions on a small portion of the land, such as no animal manure and no pesticides. In the case of the other arable farmers, the lessor has no influence on the farm management as the arable farmer wishes.

The size of farms varies between 15 and 150 acres. On average, farms have an average of around 78 hectares. The figure below shows it clearly. Respondent 15 is the farm with the most hectares (150) and respondent 4 has a farm with the fewest hectares (15). The horizontal orange line represents the average amount of hectares of the 15 respondents, which is equal to 80 hectares.

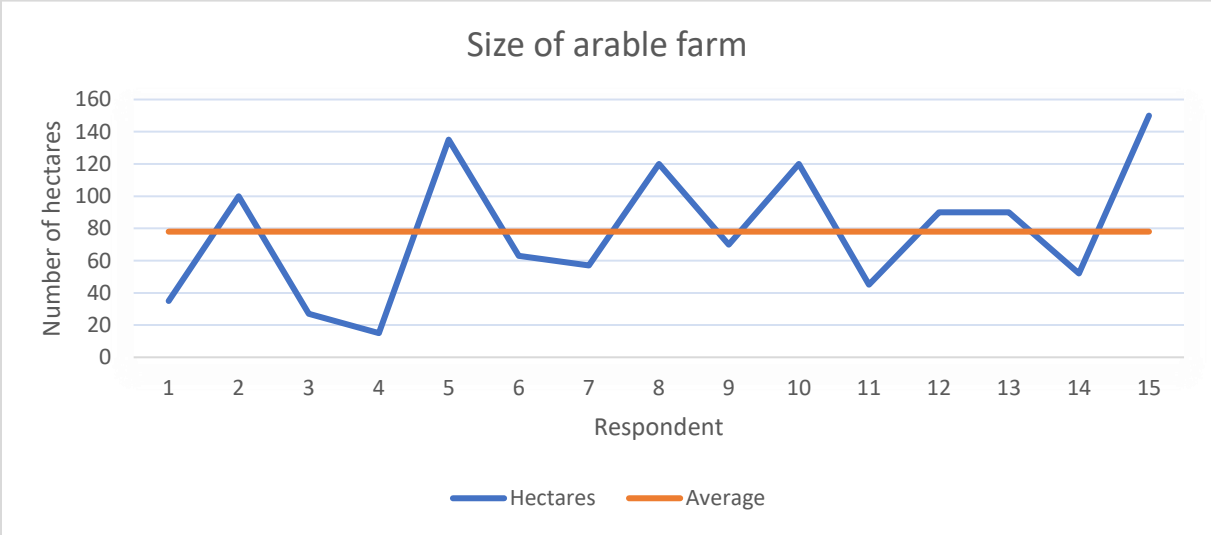


Figure 4: Size of an arable farm, source: own work

Arable farmers in the Betuwe grow their crops on river clay and a small percentage on sandy soil. This clay ranges from light river clay to very heavy river clay. The heavier soils consist of a higher percentage of lutum, which causes the soil to retain water longer. As a result, the land is more likely to be too wet to perform work on. This is a limiting factor for growing potatoes, for example. Potatoes have been planted late due to the wet spring, causing the development of the plant to be behind schedule compared to other years. As a result, the crop is also expected to be ready to harvest later. The eco-activity early harvesting of root crops (no later than August 31st) is therefore hardly applied. The advantage, however, is that the soil retains water longer in dry times so that the plant has water available longer compared to light soil. The most common crops grown on it are various types of cereals, sugar beets, potatoes, various types of beans, and onions. A few arable farmers grow a small amount of grass, corn, pumpkins, grape, and various fruits.

A distinction can be made in the cropping plan. Some of the arable farmers have as their main crop grain and some potatoes. Grain can take place more often in the cropping plan and is less labour-intensive than potatoes. Different types of grain are therefore most commonly grown by arable farmers.

Several arable farmers grow potatoes; it is notable that two of these farmers (respondents 1 and 13) have built up their own marketing circle. One of these two farmers only supplies the product to private individuals and catering companies. The other farmer supplies a small portion to the market and takes care of his own local sales for the rest. In addition to growing the potatoes, they also sort, package and sell the product. This is done through a farm store, online web shop and delivery to the catering industry. Because of the many customers, the farmers are less dependent on the large market and the potatoes are mostly sold locally. When selling at home, the buyers come to the farm and experience farming.

In the cropping plan, every arable farmer uses corn. The crop counts as an eco-activity rest crop. Therefore, this eco-activity is most commonly used. Various types of cereals are used for crop rotation. This does not apply to the cultivation of potatoes. The NVWA (Dutch Food and Consumer Product Safety Authority) has a general regulation stating that in the Netherlands, potatoes may only be grown once every 3 years on the same plot. This is to control the spread and infection of potato blight and not to hinder the export of propagation material such as bulbs, plants, and seed potatoes. It is possible to get an exception to this, but it is not common practice. This restriction does not apply to the cultivation of wheat. Nevertheless, crop rotation occurs on the soils where wheat is grown to reduce the risk of disease.

In addition, the eco-activities buffer strip with herbs, grass-clover, nitrogen-fixing crop/protein crop, green cover, and green fallow are most frequently applied. Examples of eco-activities that are not applied are strip cropping and wet cropping. These eco-activities are not applied because they do not fit within arable farmers' operations.

(b) Finances

During the interviews, the influence of the financial support (subsidy) obtained on the basis of applying the eco-activities was investigated. This is part of the farmer's income. No distinction is made here between the assets of arable farmers. The study shows that arable farmers make distinctions in applying certain types of eco-activities. Because several activities fit well into farm management and are also applied without financial support, financial support does not affect them. Consider, for example, rest crops and green cover. Dormant crops are part of a farmer's cropping plan and green cover is often sown after a particular crop, improving soil quality. Financial support is not the reason for this, but arable farmers want to claim it. Eco-activities that are usually not part of farm management, such as buffer strips with herbs, woody elements, and green fallow, are applied only because arable farmers receive compensation for them.

From the interviews, respondents 2 and 15 revealed that they planted hedges on their own initiative. The financial compensation from the GBL is not the reason for this. They planted them for personal reasons. This is exceptional because many arable farmers are opposed to woody elements because these can be detrimental to crop production. Activities must at least break even and if there is something extra in return it becomes interesting. Without sufficient financial support, the measures are often not implemented because it comes at the expense of cultivated land and thus yields. Financial support is a weighty element to apply additional eco-activities in farm management to get into a higher classification. However, many arable farmers want to keep the current cropping plan. If small activities bring a higher classification, they are willing to apply them.

Interestingly, arable farmers who report that they farm extensively quickly fall into a higher classification than those who do not. For example, Respondents 6 and 10 grow extensively, which means that they have a lot of rest crops. Respondent 6 reports that he wants to go for the maximum subsidy, classification gold. According to him, this maximum subsidy is higher than past subsidies. Therefore, the maximum subsidy is the driver to apply the eco-activities, according to respondent 6. Respondent 10 says that because of the extensive cultivation, he quickly arrives at silver. Through some minor adjustments within the farm management, he expects to get into gold. This depends very much on the measures that need to be taken. If the measures cause such a reduction in crop yields that the reduction exceeds the increase in value of the classification from silver to gold, the eco-activities will not be carried out. The farmer then expects to remain in the silver classification.

For organic arable farmers, the financial support for applying the eco-activities has no impact because an organic farm automatically receives the highest premium. However, respondent 5 (organic arable farmer) reports that if the eco-activities do affect the premium, it will depend very much on the level of compensation for applying the eco-activities.

(c) Human capital

When examining human capital during my interviews, I looked at the influence of knowledge about CAP and biodiversity on the adoption of eco-activities. This included asking whether the arable farmer consults a consultant or obtains the knowledge by other means. Since 2023, the policy has changed with a new regulation. This means it is a new regulation for everyone, advisors, policymakers, and the arable farmers themselves. The interviews show that seven arable farmers consult advisors. Respondent 6 is very satisfied with consulting an advisor.

He reports: *"It is the first year that I enlist someone to take care of things. Before, I always did it on my own but I cannot do that anymore. The advisor is knowledgeable and also goes lightning fast." (personal communication, 27-4-2023)*[10]

The matter is so complex compared to last year that respondent 6 is forced to consult an advisor. Because of the complexity, not even all advisors know how the new regulations work.

For example, respondent 9 says: *"I have always done it myself but this year I already need two advisors and even they do not know exactly of how what and where." (personal communication, 28-4-2023)*[11]

Arable farmers themselves also indicate that knowledge about the policy and regulations still need to develop further, both for themselves and the RVO (Rijk Dienst voor Ondernemend Nederland). The RVO is the contact point for questions and on their website, arable farmers have to fill in the data. Arable farmers call the RVO a lot when there are questions. According to the arable farmers, they too do not know exactly how the regulations work.

Eight arable farmers do not use consultants. They mainly study the regulations themselves, a few with their wives. Information is gathered from the RFO, trade magazines, and the media. There are also many consultations with fellow arable farmers.

Because of the complex matter, some arable farmers are demotivated to gain knowledge about eco-activities. As a result, fewer eco-activities are applied.

In addition to knowledge about regulations, knowledge about the eco- activities contribution to biodiversity is another factor that helps determine its application. When arable farmers do not know the usefulness of eco-activities, the measures are less likely to be applied.

For example, respondent 9 reported: *"Something is sown on the grass. Something is mowed once. So what does that contribute to biodiversity? Very little." (personal communication, 28-4-2023)*[12]

This example shows that the contribution of the eco-activities helps determine their application. When the eco-activities are useful and this is known to the farmers, the eco-activities are applied sooner. The lack of knowledge about the results of the eco-activities is partly due to the fact that

[10] Quote in original language (Dutch): *"Het is het eerste jaar dat ik iemand inschakel om dingen te regelen. Voorheen deed ik het altijd alleen maar dat kan nu niet meer. De adviseur heeft wel kennis van zaken en gaat ook razendsnel."*

[11] Quote in original language (Dutch): *"Ik heb het altijd zelf gedaan maar dit jaar heb ik al twee adviseurs nodig en zelfs die weten nog niet precies van hoe wat en waar."*

[12] Quote in original language (Dutch): *"Er wordt iets ingezaaid op het gras. Er wordt een keer gemaaid. Wat draagt dat dan bij aan de biodiversiteit? Heel weinig."*

there are new eco-activities and therefore limited knowledge about them among farmers. The farmers expect to know more about this in the coming years.

(d) Labour

During the interviews, I asked how the amount of labour that has to be done, relates to the eco-activities affects the adoption of the eco-activities. The arable farmers said it depends on the specific eco-activity. Eco-activities that are already in the cropping plan without the CAP are not influenced by the indicator labour. When eco-activities are not standard in the cropping plan, the amount of labour required by an eco-activity is a strong determinant of its application. This means that eco-activities that require a lot of effort are applied less quickly and eco-activities that require little effort are applied faster.

For example, respondent 1 says: *"Does not matter to me much if I have to drive around an extra time. I have the machines." (personal communication, 21-4-2023)*[13]

This answer is about sowing the eco-activity buffer strip with herbs. So on these farm lands, no work has to be done such as planting potatoes or sowing wheat, for example. The eco-activity eliminates other activities but also replaces them. The farmer himself has the machinery needed to carry out the labour. This allows him to do the labour himself and not need help from other companies. As a result, the eco-activity is more likely to be applied. If he will have the labour done by third parties, it is usually more expensive than doing it himself. As a result, the eco-activity is more profitable in the farmer's eyes. For arable farmers who have the labour done by third parties, the costs incurred weigh more heavily to carry out the eco-activity. This goes closely with the compensation in return.

For example, respondent 15 said: *"I do not mind the extra effort but I think the work is underpaid." (personal communication, 20-4-2023)*[14]

This answer indicates that the farmer is willing to do the labour involved in an eco-activity but that the financial compensation must be realistic. In his view, this is not always the case now. In addition to the labour, there may be adverse effects associated with eco-activities. Respondent 12 reported that buffer strips with herbs blow weeds into the crop. The herbs and weeds in the buffer strips bloom. These seeds end up on the ground, both in the buffer strip and in the crop. This adversely affects the current year and the following year. The seeds will then germinate, necessitating earlier use of plant protection products to ensure optimal crop performance. Thus, it is not only about the labour to be done in the current year but also its consequences in the following years. This also applies to the eco-activity woody elements.

Respondent 10 reports: *"Trees long he plot I'm not going to put anyway because they take too much water away from the crops and give wet slabs. So that is counterproductive twice." (personal communication, 3-5-2023)*[15]

(e) Social capital

When investigating social capital during my interviews, I have been looking into the extent to which farmers feel the social influence in applying or not certain measures. Social capital is hereby associated with the social network of the farmer. As one of the main findings, I found out that

[13] Quote in original language (Dutch): *"Maakt me niet zoveel uit als ik een keer extra moet rondrijden. De machines heb ik."*

[14] Quote in original language (Dutch): *"Ik vind de extra moeite niet erg maar ik vind dat de werkzaamheden onderbetaald worden."*

[15] Quote in original language (Dutch): *"Bomen lang he perceel ga ik sowieso niet zetten want die nemen te veel water weg bij de gewassen en geven natte plakken. Dus dat werkt twee keer averechts."*

arable farmers mainly determine whether eco-activities are applied or not based on their motivations. Their motivations are farm specific because each arable farmer has a different way of running a business, so there are differences among arable farmers with respect to choices about applying eco-activities. This does not stop arable farmers from discussing eco-activities and helping each other. Thirteen of the fifteen arable farmers indicated that they consult with fellow arable farmers about the CAP and eco-activities.

For example, respondent 3 said: *"It is more information exchange but in the end, of course, I decide for myself. If it is not interesting for me then of course another grower has no influence on that." (personal communication, 28-4-2023)*[16]

This answer indicates that there is actual social contact about the CAP and eco-activities. Questions are asked of each other and in this way knowledge is shared. This can lead to certain eco-activities being applied sooner than if there was no social contact about them.

For example, respondent 1 reported: *"A colleague who is all excited about sowing soybeans. That is not feasible for me right now but it could be if that is just the push to get from silver to gold. That could be quite interesting but that is not applicable for me yet this year." (personal communication, 21-4-2023)*[17]

This answer is about eco-activity nitrogen-fixing crop/protein crop and shows that it is of positive influence with respect to applying the eco-activity. Further in the interview, respondent 1 revealed that he will calculate it. If the eco-activity offers enough points to get into the gold classification, he is strongly considering applying it next crop year. Applying the eco-activity this year takes extra labour because the cropping plan is largely already fixed and sown. For the next crop year, it is more attractive.

In addition to mutual social exchanges, there is an arable study club in the Betuwe which comes together on a regular basis to discuss new developments in arable farming. Six of those interviewed say they are members of this. The study club organizes meetings for learning and for social contact. During the meetings there are lectures by colleagues and/or advisors in addition there is room to discuss and ask questions about the topics. The CAP is also offered as a topic. This allows arable farmers to talk about how the CAP is implemented within their operations. Farmers learn from each other but ultimately decide which eco-activities they implement and which they do not.

Farmers who have no contact with fellow farmers and are not members of the study club consult an advisor.

(f) Time

The last indicator of the theory on the ability to adopt is time. During the interviews, respondents were asked about how time affects the adoption of eco-activities. It appears that there is a split based on time for doing the activities and time for studying and completing the CAP. Going into the time for applying the eco-activities. The answers from the arable farmers show that most of them are willing to make time to apply the eco-activities. It should be noted, however, that the compensation for it should be proportionate. Arable farmers refer to this with contract workers. Respondent 13 compared it to the time spent by contract workers on realizing eco-activities. Here

[16] Quote in original language (Dutch): *"Het is meer informatie uitwisselen maar uiteindelijk beslis ik natuurlijk zelf. Als het voor mij niet interessant is dan heeft een andere teler daar natuurlijke geen invloed op."*
[17] Quote in original language (Dutch): *"Een collega die is helemaal enthousiast over sojaboontjes zaaien. Dat is voor mij nu niet haalbaar maar dat kan als dat net het zetje geeft om van zilver naar goud te komen. Dat kan best interessant zijn maar dat is dit jaar voor mij nog niet van toepassing."*

he wonders if it can matter because it takes too much time to realize it in relation to the compensation that is paid in return.

The interviews show that completing the new CAP takes many times more time than in previous years with the old CAP. Respondent 5 reported that filling out the CAP used to take an hour. Now it takes some arable farmers days. In addition, the CAP has become much more extensive according to respondent 15.

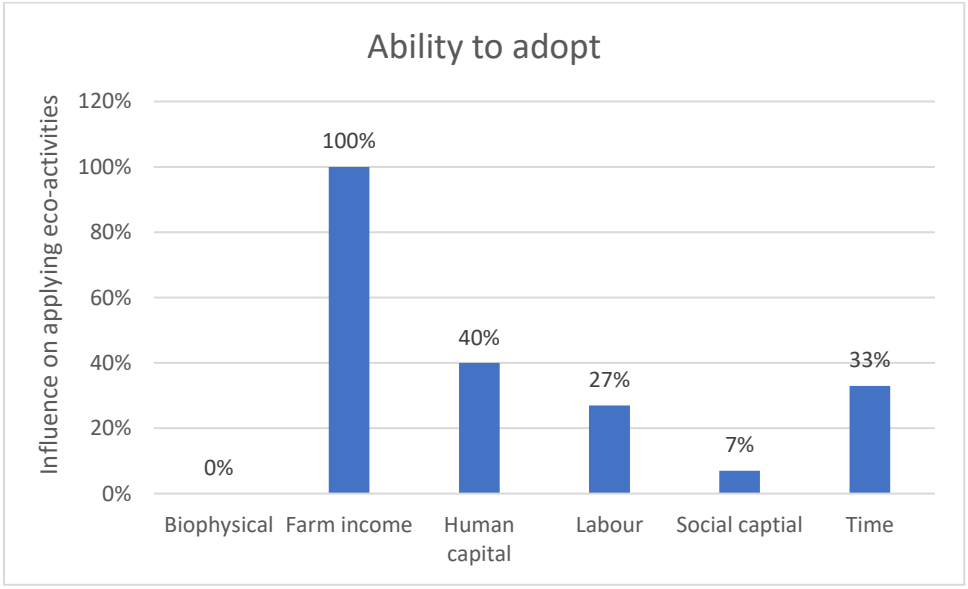
Respondent 10 reports: *It is ridiculous how many hours you spend on the new CAP application. I have not finished it yet but I have already spent at least ten times as much time as I used to and I am only halfway through it." (personal communication, 3-5-2023)*[18]

This answer gives a negative impression of the impact of the time the arable farmer spends filling out the new CAP application. He expects to spend less time on it in the future because it will not be entirely new. Respondent 6 chose to consult an advisor. He did not do this in previous years but the complexity of the system has made it a necessity. He reports saving time in completing the CAP by consulting an advisor.

With regard to applying eco-activities, the time it takes arable farmers to complete the CAP is not a positive indicator. Several arable farmers still take the time to figure it out as well as possible. Here the influence is neutral. There are also arable farmers who take a lot of time, which prevents them from delving further into the eco-activities. This has a negative impact on adopting the activities.

Final overview

The overall ability to adopt CAP measures by farmers in the Betuwe is made visible in the figure below (see **Figure 5**). The figure shows how much an indicator affects the adoption or non-adoption of eco-activities. 100% means that the indicator has great influence, and 0% means that the indicator has no influence. When, for example, finances scores a 100%, it means that this factor is important for all farmers.



[18] Quote in original language (Dutch): *Het is belachelijk hoeveel uur je kwijt bent aan de nieuwe GLB-aanvraag. Ik heb hem nog niet helemaal af maar ik ben al minimaal tien keer zoveel tijd kwijt als dat ik vroeger was en ik ben pas halverwege."*

Figure 5: Ability to adopt, source: own work

5.5 Level of engagement

In order to shed the light on the current level of engagement of farmers regarding applying the CAP measures, the different classification levels are used. Since the actual classifications have not yet been allocated, farmers were asked in which classification they believe they fall according to the documentation they processed thus far. They were also asked what their expectations, whether they want to stay in the current expected classification, or whether they aspire to get a higher classification.

(a) Gold

During the interviews, I found out that six of the arable farmers interviewed expect to get into the gold classification. One arable farmer has an organic arable farm which automatically puts this farm in gold. The other five do not have an organic arable farm but still expect to get into gold. This is due to many eco-activities applied on the farm. The farms include many rest crops as eco-activities. In addition, eco-activities nitrogen-fixing crop/ protein crop, buffer strip with herbs, and grass clover are widely applied. The desk research described in section 5.1 that the above eco-activity increases biodiversity. This falls under crop systems according to literature research.

For example, respondent 6 who expects to get into gold said: *"I try my best to stay there. I am lucky with my crops that I fall into that easily. I am being rewarded now for the work I always did." (personal communication, 27-4-2023)*[19]

Respondent 6 has an arable farm with many rest crops. In addition, eco-activity nitrogen-fixing crop/ protein crop is applied on the farm. This creates the expectation that the farm will be in the gold classification. Like respondent 6, the other 5 also strive to remain in the gold classification.

Six of the arable farmers interviewed expect to get into classification gold. One arable farmer of these grows organically. Five arable farmers grow many rest crops and eco-activities such as nitrogen-fixing crop/protein crops, buffer strips with herbs and grass clover are applied in farm management. The arable farmers would like to remain in this classification in the future and would like to expand in it where possible.

(b) Silver

During the interviews, I found out that three of the interviewed arable farmers expect to enter the silver classification. These arable farmers differ from arable farmers in the gold classification because they apply fewer rest crops. Instead, more potatoes are grown. Potatoes do not serve as an eco-activity unless the row crop is harvested early, eco-activity early harvesting row crop (no later than August 31) or early harvesting row crop (no later than October 31) will then apply. In the point system eco-activities (see **Annex A**) it can be seen that especially eco-activity early harvesting of a harvested crop (no later than October 31) scores a few points. In addition, arable farmers do not expect to harvest early because of two reasons. First, 2023 had a wet spring which resulted in potatoes being planted late. As a result, the crop is behind in development relative to other years. The second reason given is that potatoes grow the fastest in the last period before harvesting. In this period the crop makes the most kilos and thus yields for the arable farmer. So, the eco-activity will have to yield so much that it offers proportionally equal or more than the increasing kilograms of potatoes.

[19] Quote in original language (Dutch): *"Ik doe mijn best om daar te blijven. Ik heb geluk met mijn gewassen dat ik daar makkelijk in val. Ik word nu beloond voor het werk wat ik altijd deed."*

In addition, several lands will also be taken out of production to apply eco-activities, thus gaining more points. Respondent 10 wants to straighten plots to make it easier to grow and harvest. The corners that drop out are taken out of production and declared as eco-activity green fallow. Arable farmers benefit from straight parcels. This allows the plot to be used more optimally than one with many corners, for example. Applying certain eco-activities on the unused plots goes well with crop production.

The arable farmers in the silver classification are striving to get into the gold classification. When that is no longer possible this year because the crop plan is already largely fixed, they want to delve more deeply into it next year in order to get into gold after all. The biggest reason for this is the higher financial compensation for doing so.

(c) Bronze

During the interviews, I found out that four of the arable farmers interviewed expect to fall into the bronze classification. These arable farmers are more focused on growing crops than applying the eco-activities. These farms nevertheless apply eco-activities to such an extent that they expect to score higher than just basic premium. For example, in addition to rest crops, respondent 11 has a long row of trees that serves as an eco-activity woody element. This tree row scores very high on biodiversity in particular in the point system eco-activities (see **Annex A**).

Three of the four arable farmers in the bronze classification are striving to get into the silver classification. The other farmer (respondent 15) reports that it is no longer possible to get into a higher classification. The farm would have to make too many adjustments. The cropping plan will have to be adjusted and he will have to have more landscape elements. Respondent 15's farm consists of large plots by Betuwe standards. Respondent 15 compares it to farms with small plots. For them it is more attractive to put a hedge, for example. For the large plots he has, it is less likely to be attractive.

Respondent 12 who expects to get into classification bronze tries to get into classification silver. Classification gold is not possible for him. Too much would have to change from the current cropping plan. Looking at the next year, he wants to study the cultivation of beans (eco-activity nitrogen fixing crop/ protein crop) in order to get enough points for the classification silver. Based on a conversation with an advisor, he wants to look into this.

Also for these arable farmers, the biggest reason to move up in classification is financial compensation.

(d) Basic premium

During the interviews, I found out that two of the arable farmers interviewed do not expect to fall into the above classification (respondents 3 and 14). They expect to receive only the basic premium that all arable farmers receive. These farms contain few eco-activities. Eco-activity rest crops are present on the farms. This activity is not expected to count for enough to get into the bronze classification. Respondent 14 came up very short to still get into classification bronze. Because the cropping plan was so fixed, no changes were made that would have given the farm extra points, allowing it to qualify for the bronze classification.

He reports: *"Big reason not to apply it is complexity and administrative burden involved." (personal communication, 24-4-2023)*[20]

[20] Quote in original language (Dutch): *"Grote reden om het niet toe te passen is complexiteit en administratieve lasten die erbij komen kijken."*

This was about the eco-activities. When the scheme will be less complex and provide a lower administrative burden, the arable farmer is more willing to apply more eco-activities. According to him, because it is now complex and the administrative burden is high, fewer eco-activities are applied.

Respondent 3 reports that he is not going to adjust the cropping plan this year. However, he will look into eco-activities this year and if it fits well within the business operations next year.

Final overview

The **figure 6** beneath shows the expected level of engagement according to farmers' expectations.

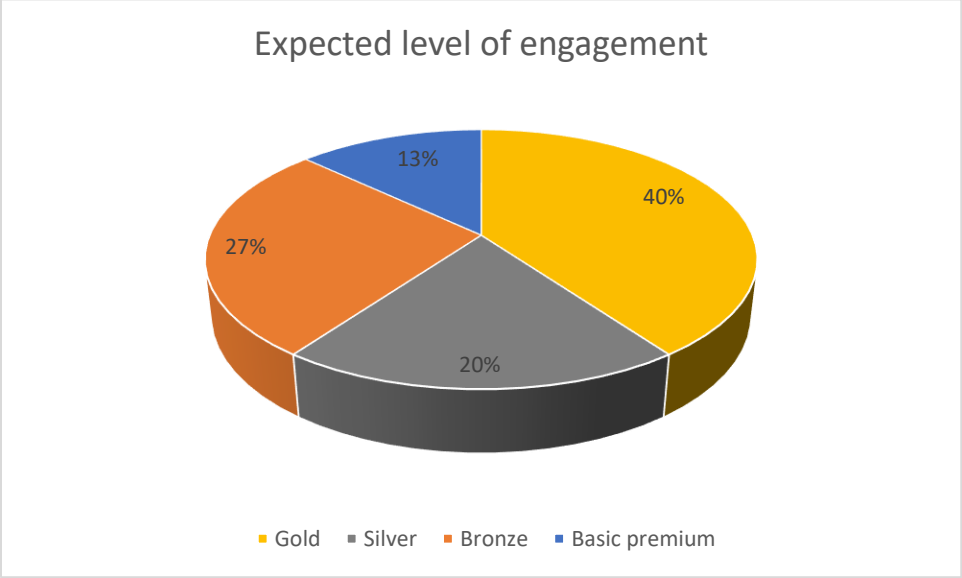


Figure 6: Expected level of engagement, source: own work.

The figure below shows the classification the arable farmers want to achieve. This is what they aspire to, and by applying extra eco-activities they try to get there. One farmer is not aiming for a higher classification. He expects to stay in bronze. All the farmers try to stay out of the basic premium and claim the compensations associated with the bronze, silver or gold classification.

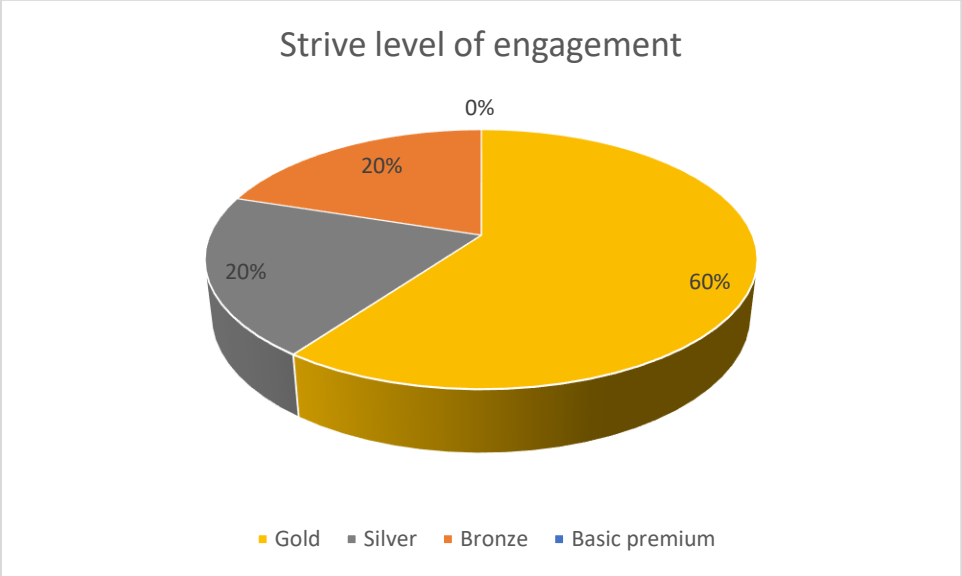


Figure 7: Strive level of engagement, source: own work

6. Discussion

6.1 Farmer motivations

The interviews show that there are several indicators that affect farmers regarding their willingness and ability to adopt CAP measures.

First of all, arable farmers use a cropping plan that includes crop rotation. Even though this was not an indicator derived from theory, it seemed to play important role in farmers' motivation. Crop rotation is used to prevent diseases. For certain crops, this is determined by law. Certain types of grain are sown in the autumn, as was the case last year. Labour has been done and costs incurred for this. The new CAP was announced in January 2023, so some labour has already been done for the 2023 crop and future labour has already been decided. This makes certain eco-activities require extra effort to implement. As a result, major changes to the crop plans based on the CAP might be supported by farmers. If the eco-activities are known on time, they can be better implemented in the cropping plan, which is expected to result in more eco-activities being adopted. In addition, it was also found that farmers are more likely to adopt eco-measures when they fit in with their existing cropping plan and corresponding business model. For example, a farmer that has a viable cropping plan based on potatoes will be less likely to suddenly change to a more protein-rich crop compared to a farmer that already has an empty piece of land with can be easily used for a new crop. This shows that the existing cropping plan that farmers have been using is also a factor that influences the level to which farmers find themselves able to adopt CAP measures.

Another indicator that was found refers to the complexity of the policy and the extent to which farmers feel like they understand the policy, which has to do with the indicator human capital. During the interviews, arable farmers gave their opinions on regulations and policies. The opinions of the arable farmers indicate what they think of the policies and regulations. This influences whether or not they apply the eco-activities. In addition, they indicated what changes they would like to see in the policy. The changes are expected to promote the application of eco-activities. Mainly people say that the policy is too complex and that the theory (policy) does not always match the practice (arable farming). It was also stated by the farmers that the policy is changed too often, resulting in a lack of confidence in the policy. Several arable farmers spent several hours on the phone with the RFO to fill in the CAP as well as possible. During the conversations, it became clear that the RFO does not always give good advice because they do not understand it themselves. This violates the trust in the policymakers and the policy which demotivates the arable farmer to apply eco-activities. The arable farmers who were interviewed in this research claim to miss a connection between the policy on paper and in practice. Because it is a new policy, arable farmers understand that changes will take place during implementation. Nevertheless, this is perceived as negative. As a result, confidence in the policy decreases among farmers, resulting in fewer eco-activities being applied and the policy being taken less seriously. This shows that there is also a connection between trust in policymakers and the level of engagement of farmers.

When farmers ability to adopt is analyzed, it was found that all farmers farm on the same type of land, which is clay land. This is related to the factor biophysical conditions of the farmland. It can be concluded that all farmers are able to apply biodiversity measures, based on the conditions of their farmland. It is however interesting to note that even though all farmers claim to have the possibility to apply eco-measures considering the biophysical conditions of their farmland, not all farmers choose to do so. This shows that in the Betuwe, biophysical conditions of the farmland are not playing a role in farmers motivations to apply or not apply CAP measures. Even if farm

conditions offer opportunity to apply eco-activities, farmers in the Betuwe are not influenced by this opportunity to change their behaviour.

On the contrary, finances seems to be directly related to farmers' ability to apply CAP measures. Farmers in the Betuwe claim they are more able to change their behaviour when subsidies are higher. This relationship applies to all the farmers that were interviewed. In addition to this, there is also a strong relationship found between finances and labour. It can be concluded that financial subsidy is only interesting for farmers when the amount of work that has to be conducted does not cost more than the subsidy yields. This relationship was also found between finances and time. It seems that whenever the amount of the subsidy is worth the time and labour that has to be put into the eco-activities, a farmer is more able to adopt the CAP measures. This shows that when time and labour are low and income is high, farmers are more able to adopt CAP measures.

Another positive relationship that was found is the relationship between farmers' knowledge about the CAP policy and measures and their ability to adopt CAP measures. Currently, farmers seem to be insecure about the correct way to apply CAP measures and this lack of knowledge seems to be an obstructive factor. It was found that when farmers have more knowledge about the CAP measures, they are more able to adopt these measures.

A strong relationship was also found between a farmer's intrinsic motivation to improve biodiversity and their willingness to adopt CAP measures. It can be concluded that when farmers are intrinsically motivated to work on biodiversity and have a proven track record of this, they are more willing to adopt CAP measures.

6.2 Comparison with theory

When the findings are compared with theoretical underpinning of this research – on the factors playing a role in changing or not behaviour –several things stand out. First of all, no relationship was found between the biophysical conditions of farmland and farmers' ability to adopt CAP measures. This is not corresponding with the literature since several authors claimed this to be a direct relation to farmers' ability to adopt either positively or negatively (Dwyer et al., 2007; Wilson & Hart, 2000). According to theory, when farm conditions are beneficial farmers are more able to change their behaviour and when farm conditions are not suitable, farmers are less able to change their behaviour. This research showed that even when farmland is suitable for applying eco-measures, this does not motivate farmers more to apply these eco-measures.

Furthermore, the relationship between finances, time, labour and ability to adopt CAP measures correspond to the one emphasized in the literature (Dwyer et al., 2007; Fish et al., 2003). However, current research only shows that there is a connection whereas this research also shows what this connection entails, namely that farmers outweigh the height of the financial subsidy towards the amount of work and time they have to set aside in order to adopt CAP measures.

When it comes to social and human capital, only human capital seems to be related to farmers' ability to change their behaviour and commit to biodiversity measures. Even though most of the farmers do speak and consult with other farmers in their network, these contacts do not seem to influence their behaviour when it comes to applying eco-activities. Most farmers mention in this regard that this is not possible since each farm has its own characteristics. The farmers that use a -paid- advisor, do however seem to be motivated by the advice of this professional. However, most farmers do not make use of an advisor of that sort.

According to theory, farmers' willingness to adopt CAP measures depends on the presence of five indicators which all strengthen each other. First of all, it was found by Mills et al. (2017) that attitude alone does not trigger willingness and therefore behaviour directly. According to the data of this research, no definitive answer can be given on that connection since it was found that most

of the farmers that indeed had a positive attitude towards biodiversity, also dispose of other indicators of willingness such as high social norms, perceived behavioural control and personal/moral norms. Nevertheless, most of the farmers that agreed on having a positive attitude towards biodiversity, also emphasized that their main goal is to grow crops and not to preserve nature. Even though this cannot be seen as a hard conclusion, it does indicate that just a positive attitude is indeed not enough.

The findings above do however strengthen the hypothesis that the other indicators that form a part of willingness, indeed strengthen each other. The results show that especially personal/moral norms and social norms in combination with a positive attitude, play an important relationship in farmers' willingness to adopt. When it comes to social norms, it was found that social norms do not influence the willingness for applying eco-measures in general, but only relate to the way that farmers carry out eco-activities in terms of timing and location. This relationship is somewhat different compared to the way it was described in theory. According to this study, social norms do not directly influence the willingness to adopt but they do influence the way that eco-measures are implemented and how society can be involved in this.

When it comes to self-identity, a strong relationship was found between this factor and the willingness to adopt. It was found that when farmers are intrinsically motivated to work on biodiversity and have a proven track record of this, they are more willing to adopt CAP measures. It stays however unclear whether this is a long-term effect as described in theory (Charng et al., 1988) since this research is only conducted over a short period of time.

Perceived behavioural control and response efficacy seem to be of less influence and therefore not as strengthening as the other indicators in applying a relationship between these factors and farmers' willingness to adopt CAP measures. Literature also suggested that the higher the level of perceived efficacy, the more an individual is likely to persist with the new behaviour (Homburg & Stolberg, 2006). This could not be tested in this study since no long-term research was done.

7. Conclusion

The aim of this research was to identify which factors play a role in applying or not applying CAP measures aimed at increasing biodiversity in arable farming in the Betuwe. The motivation behind this research is to shed light on why not all farmers are adopting the CAP measures that are created by the Dutch government to improve biodiversity in arable farming and secure arable farming in the Netherlands for the years to come. This study aimed to learn more about farmers' motivations and provide insights to policymakers on how to trigger behavioural change in farmers when it comes to voluntarily adopting CAP measures. In order to do so, a conceptual model was designed in which willingness and ability to adopt are pointed at key factors that determine a farmer's level of engagement in adopting CAP measures. Literature was used to identify indicators that altogether form this willingness and ability. Through the lens of this conceptual model, interviews with fifteen arable farmers in the Betuwe were conducted. Interview questions were all derived from the dimensions of the conceptual model in order to test whether these indicators indeed explain farmers' willingness and ability to adopt CAP measures. Using the coding process, these interviews were analyzed to not only confirm existing relationships but also look for new relationships and the difference in strength between different relationships among the indicators take into account.

To follow, first the sub-questions are answered based on this analysis. Eventually, the main research question is answered.

What is meant by biodiversity in arable farming and how can this be achieved?

Biodiversity stands for the variety of life. Farmers can increase the biodiversity on their farmlands by creating a suitable habitat for plants and animals. In arable farming, this requires variety and continuity. This can be done in different ways but mainly by using different crop systems, farm management, and introducing biodiversity elements. In order to improve biodiversity in arable farming, CAP measures give some guidance on this. These eco-activities can be divided into activities related to main crops, soil crops, cultivation measures, peat measures, non-productive agricultural land, and sustainable farming. The main- and soil crops that are listed as eco-activities contain a list of crops that are beneficial for biodiversity in terms of restoring farmland and the biodiversity within the farmland. Farmers can plant these crops (for example grass or a fiver crop) in order to improve biodiversity on their farmland. When it comes to cultivation measures, farmers can use natural enemies in order to control insects that cause disease and infestations. Peat measures include extended grazing in terms of daytime or day and night grazing. Non-productive farmland is also a way to improve biodiversity by for example creating buffer strips with herbs. Lastly, farmers can improve biodiversity by implementing organic farming.

What are the goals of the CAP regarding biodiversity and how can farmers contribute to this?

The CAP's main objective was to promote the productivity of the agricultural sector to guarantee a stable food supply at affordable prices to consumers on the one hand and to keep EU agriculture viable on the other. This was encouraged by subsidies and guaranteeing high prices for products. In 2017, a new CAP was built for the period from 2021 to 2027 which focuses more on the future of arable farming by implementing sustainable goals and encouraging farmers to make use of biodiversity elements on their farmland. Farmers can contribute to this by complying with the set standards and requirements. These standards and requirements are pointed out in the CAP regulations and concern the following topics:

These activities consist of improving the following 5 goals, namely:

1. Climate
2. Soil and air
3. Water
4. Landscape
5. Biodiversity

The amount of the subsidy depends on the number of points the farmer scores from the CAP. For example, a farmer can participate in the eco-measurement scheme. In short, this scheme means that additional compensation can be obtained per hectare based on eco-activities on top of the basic premium through the classifications of bronze, silver, and gold.

To what extent are farmers willing to adopt CAP measures?
When it comes to farmers' willingness to adopt CAP measures, a few indicators were used: personal belief/attitude, subjective/social norms, perceived behavioural control, response efficacy, personal/moral norms, and self-identity. This research shows that farmers are willing to adopt CAP measures for several reasons. The personal belief/attitude of farmers plays an important role in this since results showed that farmers that have a positive attitude towards biodiversity are more willing to implement eco-schemes. However, just a positive attitude is not enough for farmers to actually adopt CAP measures. This research shows that whenever a positive attitude towards biodiversity is combined with at least one of the following factors: perceived behaviour control, social norms, response efficacy, or moral norms - a farmer is willing to change their behaviour. Farmers are also more willing to implement CAP measures if they are intrinsically motivated to improve biodiversity, which is mostly seen by farmers who already carried out eco-activities in the past on their own initiative.

To what extent are farmers able to adopt CAP measures?
When it comes to farmers' ability to adopt CAP measures, the following indicators were used: biophysical conditions of the farmland, finance, labour, time, human capital, and social capital. it was found that farmers are able to adopt CAP measures as long as it does not interfere with their cropping plan or other financial planning. This research showed that only when the finances (subsidy) outweigh or at least compensates the amount of labour and time that goes into carrying out the eco-activities, farmers are able to adopt CAP measures. Besides this, human capital also plays a role in whether farmers are able to adopt measures. A relationship was found between farmers' knowledge about the Cap policy and measures and their ability to adopt CAP measures. Currently, farmers seem to be insecure about the correct way to apply CAP measures and this lack of knowledge seems to be an obstructive factor. It was found that when farmers have more knowledge about the CAP measures, they are more able to adopt these measures. It was also found that when the eco-activities are known in time, they can be better implemented in the cropping plan, which is expected to result in more eco-activities being adopted. In addition, it was also found that farmers are more likely to adopt eco-measures when they fit in with their existing cropping plan and corresponding business model. It was found that the excising cropping plan that farmers have been using is also a factor that influences the level to which farmers find themselves able to adopt CAP measures.

At last, in the Betuwe biophysical conditions of the farmland are not playing a role in farmers' motivations to apply or not apply CAP measures. Even if farm conditions offer the opportunity to apply eco-activities, farmers in the Betuwe are not influenced by this opportunity to change their behaviour.

Do farmers have the ambition to increase their level of engagement with regard to the CAP measures?
In order to measure the level of engagement, the qualification system in terms of bronze, silver, gold, and basic premium was used. This research showed that fourteen of out fifteen farmers have the ambition to increase their level of engagement with regard to the CAP measures. This shows that almost all farmers find themselves willing and able to increase at least one step on the ladder toward a gold qualification. Trust seems to be an important factor in this as also mentioned in terms of willingness and ability. When the trust in policy and policymakers is low, fewer eco-activities are applied and the policy is taken less seriously.

The main question was formulated as follows:

Which factors play a role in applying or not applying CAP measures aimed at increasing biodiversity in arable farming in the Betuwe?

In order to answer this question, desk research is conducted, interviews are analyzed, and empirical data is compared with literature. When comparing the factors derived from the theory with the empirical data, a few final results apply. **Table 4** shows the influence of the factors from the conceptual model according to the context of this research.

Motivations	**Influence on adopting CAP measures**
Willingness to adopt	
Personal belief/attitude	Average influence
Perceived behavioural control	Little influence
Self-identity	No influence
Subjective/social norms	No influence
Response efficacy	Little influence
Personal/ moral norms	Average influence
Ability to adopt	
Biophysical conditions of the farmland	No influence
Human capital	Average influence
Social capital	Little influence
Finances	Big influence
Labour	Average influence
Time	Average influence
New factors derived from empirical data	
Business model farm/ current cropping plan	Big influence

Table 4: Influence indicators, source: own work.

The figure above shows that not all factors play a role in farmers' motivation to apply or not apply CAP measures. For example, subjective/social norms seemed to play no role at all in farmers' motivations to actually implement, but only in the way they implement (location, timing).

Also, the biophysical condition of the land also did not play a role in the Betuwe specific. The factors that play the biggest role in farmers' motivation are self-identity, finances and a farm's business model/ cropping plan. If the CAP measures fit in with the existing cropping plan, farmers

are more likely to adopt these measures. Factors that play an average role are personal belief, personal norms, human capital, labour & time. A more specified list of variables that play a role according to this research is presented below:

1. **Personal belief/attitude**: when farmers have a positive attitude towards biodiversity, combined with at least one factor of the following: perceived behaviour control, social norms, response efficacy, moral norms, they will be more willing to adopt CAP measures.
2. **Social norms**: when farmers choose to apply eco-activities, they will be guided by social norms with regard to how and when they apply these activities. Social norms, therefore, do not have a direct influence on the willingness of farmers but do influence the way that activities are carried out (when a farmer decides to do so as a result of other factors).
3. **Self-identity**: when farmers have already carried out eco-activities voluntarily in the past, they are more likely to apply eco-activities with regard to the CAP measures as well
4. When farmers find it their **responsibility** to apply biodiversity measures, combined with at least one of the following factors: attitude, perceived behaviour control, social norms, or response efficacy, they will be more willing to adopt CAP measures.
5. Only when the **finances** (subsidy) outweigh or at least compensate the amount of labour and time that goes into carrying out the eco-activities, farmers are able to adopt CAP measures.

When the original theoretical model based on theory is compared with the findings, a revised theoretical model can be provided in which the variables that are of the biggest influence are pointed out. In the model above, only the indicators that seem to be part of the willingness and ability according to this research are presented, arranged from most important to less important.

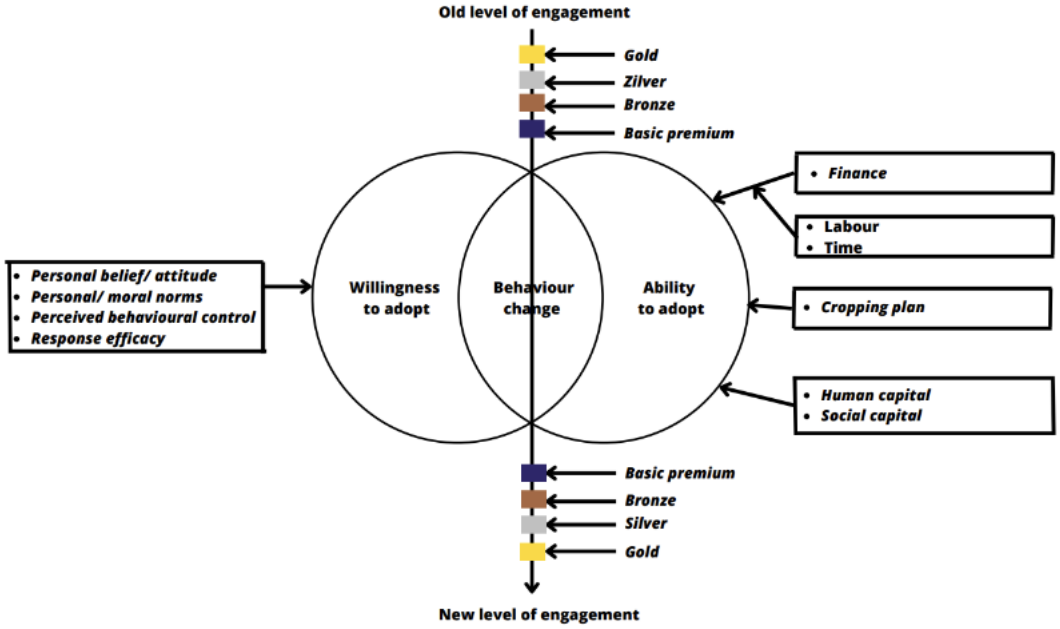


Figure 8: Adjusted conceptual model, source: own work.

The adjusted conceptual model is focused specifically on farmers in the Betuwe and gives a clear idea about farmers' motivations and the relationships between factors triggering their motivation. The model shows that when it comes to farmers' willingness, four indicators are important. These

indicators can be found on the left side of the model. The fact that those four indicators are all shown in the same text box, represents the indicators mutually reinforcing each other. The model is showing that the more indicators are present, the stronger the link between willingness and behavioural change. When it comes to farmers' ability to adopt, several separate indicators are shown. Most of the indicators have a direct link to farmers' ability to adopt. However, when it comes to finances, the model shows that this indicator (finance) is only important to farmers when the subsidy they receive outweighs the amount of labour in terms of money and time. The financial indicator is only motivating farmers when the labour they have to carry out is costing them less (in terms of time and money) compared to the subsidy they receive.

The model shows that the indicators on the left and right sides that form part of the willingness and ability of farmers to adopt CAP measures can eventually establish a new level of engagement.

8. Research limitations

Below, four main limitations of this study are pointed out. The first, concerns the timeline of the CAP implementation. The deadline for completing the CAP was moved during the survey to June 15, 2023. The study was also completed during the same month. The complexity of the scheme caused the deadline to be delayed. Arable farmers were given additional time to complete the CAP as a result. This has caused some of the arable farmers to delve into the matter later. This is way the classification is based on expectations and not final determinations. As a result, results may differ from the actual classification. This has an adverse effect on the validity of the study. The actual classification may differ from the expectations of the arable farmers.

This CAP regulation a new regulation and therefore there is a lack of knowledge. As a result, errors/misconceptions are more likely to occur which means that the policy is not implemented optimally. Several arable farmers see this year as a transitional year and expect to implement the regulation better in their operations next year. Arable farmers' cropping plan was known and partially applied in the fall of 2022 while the new CAP became known in January 2023. This affected the application of eco-activities. For example, because wheat had already been sown, no other eco-activities were applied to those lands. In addition, relatively minor changes are taking place in the current policy which is causing confusion to arable farmers. In addition to confusion, arable farmers are also getting doubts about the policymakers.

This research has focused on arable farmers in the Betuwe region. Therefore, the study is not representative of all arable farmers in the Netherlands. Arable farmers in the Betuwe must deal with factors that do not apply to other arable farmers in the Netherlands and vice versa. These include the type of plots and soil type. In addition, arable farmers in the Betuwe are not representative of all arable farmers in the Netherlands. Arable farmers in the Betuwe have a different perspective on arable farming than, for example, a farmer from the Flevopolder or the Achterhoek.

Regarding the use of semi-structured interviews, some disadvantages apply with respect to the analysis of the results. Compared to a structured interview, the questions may be partially different for each interview. The researcher has a great influence on this during the interview. Although the main line is the same, certain parts of the interview are explored in more depth than other interviews. As a result, certain questions are treated more specifically than in other interviews. This results in the results being more difficult to compare making evaluation more difficult. This limitation is greatly reduced in structured interviews. In addition, three interviews were conducted by telephone. Because these interviews were not conducted face to face, nonverbal communication was not considered during the interview. Non-verbal communication

has several advantages including the visibility of emotions and managing the communication process. This is not possible by telephone which may have resulted in different answers than if the interview had been conducted face to face.

9. Recommendations

9.1 Recommendations follow-up research

For a follow-up study, there are several recommendations that will allow the topic to be examined even more closely.

This year of the new CAP can be described as a transition year. As a result, the ideal moment to evaluate this policy has yet to come. When the new CAP is actually implemented, a better review of this policy and farmers' motivation can be conducted. The biggest cause of this is that the policy was unknown when the crop plan went into effect. A definitive policy prior to the adoption of the cropping plan will be able to prevent this. It is therefore recommended that this research will be repeated next year before farmers have their cropping plan finalized. This will create a more representative picture of the results of the CAP measures implementation.

This research shows that there are more variables that affect adoption. These include confidence in the policy and the current cropping plan. These aspects were not included in the conceptual model and were not examined to the same extent as the other variables from the theory. For a follow-up study, it is recommended that these variables are also examined so that the results are more representative.

It is also recommended to carry out the research when farmers definitively know in which classification they fall. This ensures that the survey is conducted on final decisions and not on expectations. This will strengthen the reliability of the study.

When the study is repeated and where the policy is thus in effect for several years, the changes in arable farmers will become visible. It will be visible which factors become more and less important over the years. This study can be seen as a baseline measurement. It is recommended that follow-up studies be compared with each other and with this study.

9.2 Recommendations policymakers

Regarding recommendations to policymakers, there are several issues that can be improved. First of all, some work can be done regarding the complexity of the regulations. Because of the complex regulations, seven of the fifteen respondents made use of an advisor. This includes the observation that advisors also do not understand the full regulations. The consultants are a cost to the farmer which proportionally reduces the financial result of the subsidy and thus the money for the eco-activities does not fully reach the farmer. Due to lower compensation, the eco-activities are less applied. This also applies to government employees who perform labour based on this complex policy. With a less complex policy, the labour can be expected to decrease, and costs can be saved because fewer employees are needed in order to explain the policy. In addition, the time taken by arable farmers to understand the scheme negatively affects the rate of application of eco-activities. Because arable farmers spend a lot of time completing the CAP, they are demotivated from applying eco-activities. This can be prevented by designing the regulation in such a way that it is completed in less time. This will increase the motivation to apply eco-activities. Good knowledge about the policy is necessary to get the possibility of applying it. Information provided by the government to the arable farmers will be able to ensure good knowledge about the policy. As a result, arable farmers will understand the scheme sooner, fewer advisors need to be consulted and this should save time in completing the CAP.

Finally, arable farmers benefit from a long-term vision that allows them to make farm adjustments based on the policy whenever they want. At present, there is insufficient confidence in the policy, which means that these adjustments are minimal. With good confidence in a long-term vision, arable farmers will anticipate the policy sooner. With the emergence of a mutual trust, there should be fewer costs related to monitoring implementation which will make more money available to realize the policy. The policy was changed when it was already in place. This creates unrest and ambiguity. It is important to create a policy where there is no need to adjust it. Arable farmers indicate that in many ways the theory (policy) does not match the practice (implementation of the measures). It is said that the policy is developed on the basis of a calendar also called calendar farmers. This means that crops must be harvested on a certain date or sown before a certain date. However, with calendar farming, weather conditions are not sufficiently considered. Weather conditions strongly influence the possibilities with regard to carrying out arable farming. As a result, policies are less likely to be taken seriously and applied. Therefore, it is important to develop a policy that does not require adjustment and match with practice. All these factors reinforce each other so that applying all the mentioned measures will be able to have an additional stimulating effect for achieving the goals of the policy.

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Annex

Annex A: Point system eco-activities

Point system eco-activities

	Points/ha				
Main crop	**Climate**	**Soil and air**	**Water**	**Landscape**	**Biodiversity**
Grass clover	4	4	0	1	1
Grassland with herbs	2	4	1	3	1
long-term grassland	4	4	3	1	1
Perenial cropping	4	4	4	1	1
Wetland cultivation	3	0	0	1	2
Rest crop	4	4	4	2	2
Nitrogen-fixing crop/protein crop	3	2	0	1	1
Strip cropping	0	2	2	2	2
Fiber crop	4	4	4	2	3
Early harvesting of a row crop (no later than August 31)	2	2	4	1	1
Early harvest of harvested crop (no later than October 31)	0	3	0	0	0
Soil Crop					
Green cover	2	3	3	1	1
Underseeding cathc crop	2	1	1	1	1
Cultivation measures					
Biological control	0	4	2	1	2
Peat measures					
Extended grazing: daytime grazing	2	3	0	2	1
Extended grazin: day and night grazing	3	4	0	2	2
Non-productive agricultural land					
Buffer strip with herbs (along arable aldn or permanent crop)	2	4	4	30	60
Buffer strip with herbs (along grassland)	0	0	3	30	60
Groeen fallow	2	4	0	10	40
Woody element (hedge, thicket)	4	2	0	40	60
Woody element (other woody elements)	4	2	0	40	60
Sustainable farm					
Organic farm (Skal)	4	4	2	1	2

(RVO, 2023)

Annex B: Code Group Manager

Code Group Manager

Search Code Groups

Name	Size	Created by	Created	Modified by	Modified
ANLB	2	Jonathan van Essen	09-05-2023 13:56	Jonathan van Essen	09-05-2023 13:56
Biophysical conditions of the farmland	6	Jonathan van Essen	11-05-2023 11:25	Jonathan van Essen	11-05-2023 11:25
Classification	3	Jonathan van Essen	09-05-2023 15:12	Jonathan van Essen	09-05-2023 15:12
Crop species	10	Jonathan van Essen	09-05-2023 13:54	Jonathan van Essen	09-05-2023 13:54
Farm income	1	Jonathan van Essen	11-05-2023 11:28	Jonathan van Essen	11-05-2023 11:28
History	3	Jonathan van Essen	09-05-2023 13:56	Jonathan van Essen	09-05-2023 13:56
Human captial	1	Jonathan van Essen	11-05-2023 14:36	Jonathan van Essen	11-05-2023 14:36
Influence landowner	2	Jonathan van Essen	09-05-2023 15:15	Jonathan van Essen	09-05-2023 15:15
Labour	1	Jonathan van Essen	11-05-2023 11:29	Jonathan van Essen	11-05-2023 11:29
Level of commitment	2	Jonathan van Essen	11-05-2023 11:30	Jonathan van Essen	11-05-2023 11:30
Most frequently used measure	2	Jonathan van Essen	09-05-2023 15:14	Jonathan van Essen	09-05-2023 15:14
Perceived behavioral control	1	Jonathan van Essen	11-05-2023 11:23	Jonathan van Essen	11-05-2023 11:23
Personal belief/ attitude	1	Jonathan van Essen	11-05-2023 11:22	Jonathan van Essen	11-05-2023 11:22
Personal/ moral norms	1	Jonathan van Essen	11-05-2023 11:25	Jonathan van Essen	11-05-2023 11:25
Policy	7	Jonathan van Essen	31-05-2023 12:51	Jonathan van Essen	31-05-2023 12:51
Response efficacy	1	Jonathan van Essen	11-05-2023 11:24	Jonathan van Essen	11-05-2023 11:24
Self-identity	2	Jonathan van Essen	11-05-2023 11:24	Jonathan van Essen	11-05-2023 11:24
Social capital	1	Jonathan van Essen	11-05-2023 11:29	Jonathan van Essen	11-05-2023 11:29
Subjective/ social norms	2	Jonathan van Essen	10-05-2023 11:36	Jonathan van Essen	10-05-2023 11:36
Time	2	Jonathan van Essen	09-05-2023 13:55	Jonathan van Essen	09-05-2023 13:55

Annex C: Interview guide

Interview guide for arable farmers in the Betuwe in English

Name interviewee:
Date:

Introduction

1) Can you describe your business?
a) How large is the farm?
b) Is it a tenant farm? If yes,
i) What is the owner's influence on the operation of the business?
2) What is the history of the business?
a) Is it a family farm?
3) How have you seen the CAP change over the years?

Willingness to adopt

1) What is your opinion on biodiversity restoration based on the CAP?
2) Do you experience social pressure to contribute to biodiversity?
3) To what extent are the measures effective?
4) To what extent do you think the measures contribute to biodiversity restoration as a common goal?
5) How do you identify yourself with contributing to biodiversity restoration?
6) What value do you place on increasing biodiversity?

Ability to adopt

1) What are the conditionalities of your farm?
a) What type of soil?
b) What crops?
2) To what extent is financial support from the CAP responsible for applying the measures?
3) How much influence does knowledge of the CAP and biodiversity have on the application of the measures for you?
a) Do you have consultants for this or do you seek this out yourself?
4) To what extent is performing the additional labour responsible for applying the measures?
5) What is the influence of colleagues for applying the CAP?
a) Do you consult much with your colleagues about the CAP?
i) Do you also implement colleagues' success measures in your operations?
6) How does time affect whether or not you apply the CAP?
a) What do you expect from the CAP in the future?
b) How is your farm dealing with this?

Level of engagement

1) What classification does your company fall into?
a) Where do you want to go?
2) How many points do you score?
3) What is the impact of the ANLB collective?

In-depth questions

1) How much of an impact does the CAP have on your farm?
a) What are the most important reasons for applying or not applying the CAP and why?
b) Which activity do you apply the most and why?
c) Which activity do you apply least and why?
2) What changes will you like to see in the policy and why?
a) How will the policy be improved?

3) Are you yourself taking measures outside the CAP to increase biodiversity?
4) To what extent do you think the measures will help achieve the goal of the CAP?
5) What will arable farming look like in the future?

Interview guide for arable farmers in the Betuwe in Dutch
Naam:

Introductie
Kunt u uw bedrijf omschrijven?
Hoe groot is het bedrijf?
Gaat het om een pacht bedrijf? Zo ja,
Wat is de invloed van de eigenaar op de bedrijfsvoering?
Wat is de geschiedenis van het bedrijf?
Is het een familie bedrijf?
Heeft u het GLB zien veranderen in de loop der jaren? Zo ja,
Waar ziet u dat aan?

Bereidheid toepassing GLB
Wat is uw mening over de biodiversiteit herstel op basis van het GLB?
Ziet u hier een bijdrage van in?
Ervaart u sociale druk om bij te dragen aan de biodiversiteit?
Waaraan ervaart u dat wel of niet?
In hoeverre zijn de maatregelen doeltreffend voor de biodiversiteitsherstel?
Waaraan herkent u dat?
In welke mate denkt u dat de maatregelen bijdrage aan het herstel van de biodiversiteit als gemeenschappelijk doel?
Bent u zelf intrinsiek gemotiveerd om bij te dragen aan de biodiversiteitsherstel?
Waaraan herkent u dat?
Welke waarde hecht u aan het verhogen van de biodiversiteit?
Welke persoonlijke verantwoordelijkheid neemt u hierbij?

Mogelijkheid toepassing GLB
Wat de condities van uw bedrijf?
Op welke type grond teelt u de gewassen?
Welk gewassen teelt u?
In welke mate is de financiële steun vanuit het GLB bepalend voor het toepassen van de maatregelen?
Hoe groot is de invloed van kennis over het GLB en de biodiversiteit op het toepassen van de maatregelen voor u?
Heeft u hier adviseurs voor of zoekt u dit zelf uit?
Wat is de invloed van de extra werkzaamheden op het toepassen van de maatregelen?
Wat is de invloed van collega's boeren voor het toepassen van het GLB?
Overlegt u veel met uw collega's boeren over het GLB?
Voert u de succes maatregelen van collega's ook in uw bedrijfsvoering toe?
Wat is de invloed van tijd voor het wel of niet toepassen van het GLB?
Wat verwacht u in de toekomst van het GLB?

Classificatie GLB
In welke classificatie verwacht uw bedrijf te vallen?
Waar wilt u naar toe?
Hoeveel punten verwacht u te scoren?
Wat is de invloed van het Agrarisch Natuur- en Landschapsbeheer (ANLB)?

Overige vragen
Hoe groot is de invloed van het GLB op uw bedrijf?
Welke redenen zijn het belangrijkst voor het wel of niet toepassen van het GLB en waarom?
Welke activiteit past u het meest toe en waarom?
Welke activiteit past u het minst toe en waarom?
Welke wijzigingen zal u graag zien in het beleid en waarom?
Hoe zal het beleid verbeterd kunnen worden?
Neemt u zelf maatregelen buiten het GLB om de biodiversiteit te verhogen?
Heeft u hier voorbeelden van?
In welke maatregelen zal u zich verder willen uitbreiden?
In hoeverre denkt u dat de maatregelen helpen om het doel van het GLB te bereiken?
Hoe ziet de akkerbouw in de toekomst eruit volgens u?