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A way to green pastures: factors contributing to farmers' public goods behaviour

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Hij laat me rusten in groene weiden
en voert me naar vredig water,
hij geeft me nieuwe kracht
en leidt me langs veilige paden
tot eer van zijn naam. - Psalm 23:2-3 (NBV)

He makes me lie down in green pastures,
he leads me beside quiet waters,
he refreshes my soul.
He guides me along the right paths
for his name's sake. – Psalm 23:2-3 (NIV)

A way to green pastures:

factors contributing to farmers' public goods behaviour

MSc Minor Thesis
Animal Sciences

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Preface

Preface

The thesis in front of you has been written as final part of my Master in Animal Sciences at Wageningen University. Since I wrote already another master thesis last year, I wanted to write the second one on behalf of a company or organization. This, I thought, would give a different dimension to the writing and would also be a nice challenge. It was during the agro-economists debate, organised by Wageningen Economic Research (dated 11 January 2018 in Rotterdam), that I got into conversation with mr. Aldrik Gierveld, Director of European Agriculture and Fisheries Policy and Food Security and also deputy director general of the Ministry of Agriculture, Nature and Food Quality. He did see opportunities for me at the ministry for a thesis assignment. Therefore, a few week later, I was working at the Bezuidenhoutseweg on a research proposal and I also had a unique insight into the official world of the Ministry of Agriculture, Nature and Food Quality. I am very grateful for this experience, which has given me new insights with regard to my personal career path. That is very valuable.

In this thesis, I explored which factors influence the behaviour of farmers and specifically the behaviour of farmers with regard to public goods (such as biodiversity, landscape, soil functionality and water quality). This is relevant because research has shown that the amount of public goods provided by agriculture is lower than the amount that is desired by society (Cooper et al., 2009). Therefore, governmental intervention is needed to ensure a sufficient provision of public goods. In recent years, various instruments within the Common Agricultural Policy (CAP) have tried to increase the provision of public goods, but with insufficient results. The debate on the reform of the CAP is currently taking place, which is why it is now the right time to reflect on which type of policy instruments work best to motivate farmers to provide (more) public goods. In order to answer this question, it is important to understand how the target group of the policy (farmers) behaves and by which factors this behaviour is influenced. Only in this way effective policies can be developed that will lead to an increased provision of public goods by agriculture.

I wish you a pleasant reading

Kees van Vuuren

MSc student Animal Sciences
Global and Sustainable Production
Public Administration and Policy in Agriculture

Nederlandse samenvatting

Naast de productie van voedsel, vezels en grondstoffen voor energie en industriële producten, heeft de landbouw ook de potentie om publieke goederen te produceren, zoals biodiversiteit, schoon water en agrarische cultuurlandschappen. De door de maatschappij gewenste hoeveelheid van deze publieke goederen is echter vaak hoger dan de feitelijke voorziening. Daarom is publieke interventie legitiem om te zorgen voor een betere voorziening van publieke goederen, in overeenstemming met de maatschappelijke vraag. Het ontwikkelen van agro-milieubeleid is echter complex en om beleidsmakers te helpen effectief beleid voor publieke goederen te ontwikkelen, is een beter begrip van het gedrag van boeren nodig. Het doel van deze thesis was om key factoren te identificeren die het gedrag met betrekking tot publieke goederen beïnvloeden. Daarnaast was het doel om de perspectieven van boeren te verkennen met betrekking tot mogelijke beleidsinstrumenten om boeren te stimuleren meer publieke goederen te produceren. In totaal zijn twintig diepte-interviews afgenomen met verschillende boeren uit heel Nederland vanuit verschillende grondgebonden sectoren, zoals melkveehouders, akkerbouwers, vleesveehouders en schapenboeren. De analyse van de interviewdata resulteerde in drie key factoren die boeren ertoe brengen om publieke goederen te produceren: (1) de mogelijkheid hebben om maatregelen voor publieke goederen te nemen (locatie van het bedrijf, beschikbaarheid van tijd en arbeid), (2) de bereidheid om maatregelen voor publieke goederen te nemen (intrinsieke motivatie van de boer), en (3) economische overwegingen (is het financieel interessant om publieke goederen te produceren). De overheid zou gebruik kunnen maken van informatie en communicatie instrumenten om de bereidheid van boeren om publieke goederen te produceren te vergroten. Daarnaast zou ze economische en fiscale instrumenten kunnen gebruiken om de economische overwegingen te beïnvloeden. Op dit moment worden er binnen het landbouwbeleid voornamelijk economische instrumenten gebruikt, terwijl de resultaten van deze thesis laten zien dat het voor boeren niet alleen economische overwegingen zijn die een rol spelen als het gaat om publieke goederen. Beleidsmakers zouden daarom een mix van instrumenten moeten kiezen die enerzijds ervoor zorgen dat het financieel aantrekkelijk is voor boeren om maatregelen voor publieke goederen te nemen en die er anderzijds voor zorgen dat de bereidheid (intrinsieke motivatie) van boeren ook op de langere termijn wordt vergroot. Deze thesis is een eerste stap in het onderzoeken van factoren die het gedrag van boeren omtrent publieke goederen beïnvloeden. Verder onderzoek dat zich richt op de verschillende publieke goederen afzonderlijk is noodzakelijk.

Abstract

Besides the production of food, fibre and raw materials for energy and industrial products, farms also provide public goods, such as biodiversity, clean water and agricultural landscapes. The by society desired level of provision of these public goods is however higher than the actual provisioning. Therefore, public intervention is legitimate to ensure a better provision of public goods, according to societal demands. The design of agri-enviromental policy is, however complex and in order to help policy-makers to develop effective policies for public goods, a better understanding of farmers behaviour is needed. The aim of this thesis was to identify key factors that influence farmers behaviour in relation to public goods and to explore farmers perspectives with regard to possible policy instruments to incentivise farmers to provide more public goods. In total twenty in-depth interviews have been conducted with different farmers across the Netherlands from different land-based sectors, such as dairy farmers, arable farmers, beef farmers and sheep farmers. The analysis of the interview data resulted in three key factors that make farmers provide public goods: (1) ability to adopt (location of the farm, availability of time and labour), (2) willingness to adopt (intrinsic motivation of the farmer), (3) economic considerations. The government could make use of information and communication instruments to increase the willingness to adopt among farmers, and use economic and fiscal instruments to affect the economic considerations. At present, economic instruments are mainly used within agricultural policy, while the results of this thesis show that for farmers it is not only economic considerations that play a role when it comes to the decision to take measures for public goods. Policy-makers should therefore select a mix of instruments that on the one hand ensure that it is financially attractive for farmers to take measures for public goods, but that also contribute to increase the willingness to adopt among farmers on the longer term. This thesis is an initial step in exploring factors that influence farmers (public goods) behavior. Further research focusing on the different public goods separately is necessary.

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1 Introduction

Farmers are mainly recognised for their production of food, and partly for their production of fibre and raw materials for energy and industrial products. Farms, however, also provide public goods, such as biodiversity, clean water and stable climate (Cooper et al., 2009). The level of provision of these public goods might however widely differ between farms and regions. Furthermore, the by society desired level of provision might be higher than the actual provisioning. One characteristic of public goods is that they are often not provided by market mechanisms. This phenomenon is referred to as market failure: the failure of a more or less idealised system of price-market institutions to sustain "desirable" activities or to estop "undesirable" activities (Bator, 1958). Most public goods have no market price, leading to little or no incentive for farmers to produce them. It is argued that in times of a market failure, public intervention is legitimate to ensure a better provision according to societal demands (Cooper et al., 2009; Westhoek et al., 2013).

Both on European Union (EU) and national level there is increasing attention to the provision of pubic goods by farmers (Westhoek et al., 2013). Since the 1992 McSharry reform, public goods have increasingly become part of the Common Agricultural Policy (CAP) of the EU. In 2013 the European Commission (EC) introduced as part of this CAP a mandatory "greening" component of direct payments that will support agricultural practices beneficial for climate and environment. However, a recent report of the European Court of Auditors shows that those greening measures have little or no effect. The court of auditors assumes that a large proportion of the greening measures would also have been applied by farmers if they were not financially compensated for this (European Court of Auditors, 2017). Currently, negotiations are taking place in Brussels on the future of the CAP, for the period 2021-2027. This reform offers space for the design of new policy instruments or recalibration of existing instruments that are more effective in the provisioning of public goods by agriculture.

The design of agri-environmental policy is complex and in order to help policy-makers to develop effective policies, instruments and support programmes for public goods, a good understanding of farmers' behaviour is needed (Mills et al., 2017). Literature recognises that farmers do not always make decisions based purely on an economically rational basis but instead may optimise social and intrinsic goals (Gasson, 1973; Mills et al., 2017). This is something that can be recognized in practice as well. There are examples of farmers that take measures for public goods (e.g. meadow bird management) without being incentivised by a market that is paying for such measures. This raises the question what influences farmers to take such measures and how this kind of behaviour could be incentivised by policy.

This thesis aims to provide recommendations how the future CAP could better contribute to the provision of public goods by farmers. Therefore, two aspects have been studied. Firstly, farmers behaviour has been studied in order to identify and understand what factors influence farmers behaviour in relation to public goods. Because the CAP is currently assigned to land-based farmers and payments are based on hectares the focus of this thesis was on farmers that have in their daily management incorporated land related practices that provide public goods. In total 20 in-depth interviews have been conducted with different farmers across the Netherlands from different land-based sectors, such as dairy farmers, arable farmers, beef farmers and sheep farmers.

Secondly, farmers perspectives with regard to ways to incentivise farmers' public goods behaviour has been studied. Farmers were asked to share their ideas on what the government should do to influence farmers and to motivate them to incorporate public goods measures in their farm management. In order to influence behaviour, governments can choose from a wide pallet of policy instruments and it was explored what kind of policy instruments the farmers consider most effective with regard to the provisioning of public goods.

A better understanding of factors that influence farmers' public goods behaviour in combination with an increased knowledge about what farmers consider effective policy instruments to incentivise public goods behaviour, can help policy makers to design more effective policies with regard to the provisioning of public goods by agriculture. In that way, this thesis could contribute to the debate about the future CAP.

In order to give more structure to the explorations of this thesis the following research questions have been formulated that will be answered during this thesis.

1. *What are key factors that influence farmers' behaviour in relation to public goods?*
2. *What kind of policy instruments consider farmers effective to incentivise public goods behaviour?*

The following chapter describes the theoretical framework that has been used to understand farmers behaviour and what different types of policy instruments governments can use to influence behaviour. The third chapter explains the methodological approach of this thesis. Both methods for data collection and data analysis are described. In the fourth chapter the results of the analysis of the data are given. This chapter is followed by the discussion, conclusions and recommendations.

2 Theoretical framework

The introduction and the research questions contain several concepts, like public goods, policy instruments and farmers' behaviour. In this chapter is explained what is actually meant by these concepts and how they relate to each other.

2.1 Public goods

The concept of public goods is extensively described in scientific literature. Samuelson conceptualised the distinction between private and public goods and defined to specific characteristics to public goods (Samuelson, 1954; Samuelson, 1995). First, public goods are non-rival, meaning that the consumption of a good by one individual does not lead to a subtraction of the availability of this good for others. A second characteristic of public goods is that they are non-excludable, meaning that individuals cannot effectively be excluded from the benefits it confers (Cooper et al., 2009; Cornes & Sandler, 1996; Samuelson, 1954; Samuelson, 1995).

As mentioned earlier, agriculture provides certain public goods. The public goods that are provided by agriculture can take different forms. In general, the most important public goods can be subdivided into two themes. The first are the public goods that deal with the **environment** (such as agricultural landscapes, water quality, biodiversity and soil functionality) (Baldock et al., 2010; Cooper et al., 2009). These public goods depend to a certain extent on the interaction between agriculture and natural processes. In this context, often the term ecosystem or green services is used. In literature, these services are described as: "the benefits people obtain from ecosystems" (Millennium Ecosystem Assessment, 2005). The second type of public goods are those that deal with the **social aspect** (such as rural vitality and food security) (Baldock et al., 2010; Cooper et al., 2009). For the provision of the latter, the continued existence of agricultural activities in rural areas is important. However, delivering environmental-related public goods requires an effort from the farmer. The provision of this type of public goods depends on how a farmer deals with his production factors and his farm management (Cooper et al., 2009). In other words, farmers must take measures for (environmental) public goods to be able to produce them. In terms of day-to-day farm management activities, there is a whole range of measures that can help provide public goods. These can be divided into two broad types. First, the practices that are expected to be good for the environment overall. Consider practices that ensure a low level of inputs or new technologies that improve the efficient use of resources, such as precision farming. Second, that is to say specific environmental interest, for example buffer strips of natural vegetation or semi-natural habitats to provide habitat for wildlife to meadow (e.g. meadow bird management). Most public goods measures provide several public goods simultaneously. See Cooper et al. (2009) and Baldock et al. (2010) for an overview of measures that can be applied to public goods measures.

In this thesis, the focus is on environmental related public goods, because this are the public goods that need conscious decisions by the farmer to take measures for public goods and ask for a behavioural change, which could be incentivised by public policy (Cooper et al., 2009). Therefore, this thesis focusses on the environmental public goods that are for the Dutch situation most relevant: farmland biodiversity, water quality, soil functionality, climate stability, and agricultural landscapes (Baldock et al., 2010). Baldock et al. (2010) do also speak of resilience to flooding and fire, but that is a public good that is specifically relevant in central and south Europe.

One problematic characteristic of public goods is that they are often not provided by a market mechanism. This phenomenon is referred to as a market failure (Bator, 1958). People can therefore

enjoy a public good without having to contribute to its formation or preservation, what can lead to the so-called free-rider problem (Marwell & Ames, 1979). This problem arises when those who benefit from a certain service or good, do not have to pay for it, which subsequently leads to an under provisioning of these services or goods. To keep the provisioning of public goods at a desired level, policy instruments are needed to incentivize farmers to incorporate measures on their farm that contribute to the provisioning of public goods.

2.2 Policy instruments

A basic assumption is that public policy almost always attempts to get people to do things that they might not otherwise do, or it enables people to do things that they might not have done otherwise (Schneider & Ingram, 1990). Policy instruments are described as: "interventions made by governments/public authorities in local, national or international economies which are intended to achieve outcomes which conform the objectives of public policy" (Saublens, n.d.). This thesis focuses on policy instruments aimed at interventions to incentivise farmers in the provisioning of public goods.

Currently the CAP offers a range of instruments to support farmers in the provision of public goods, mainly by the Rural Development Policy (Pillar II). However, the Direct payments to farmers under Pillar I have also received an increased focus on public goods in recent years (e.g. greening measures). Farmers receiving these payments have to meet requirements in order to ensure a basic level of environmental management on farms, what forms the foundation on which more targeted incentives and other instruments (Pillar II) can build. The instruments of the Rural Development Policy to incentivize the provision of public goods can be categorized in three categories:

- Area-based payments; incentivising land management practices that benefit soils, water quality, habitats and species as well as the maintenance of the landscape
- Capital investments that can be used, for example, to provide assistance with the cost of introducing environmentally sustainable technologies and infrastructure on farmers as well as to support the creation of new business opportunities, services and other activities in rural areas more generally, such as maintaining and promoting the natural heritage, supporting farm diversification, or tourism activities
- Investments in advice and training for land managers, as well as capacity building for people in rural communities.

In theory, many more different policy instruments are available. As this thesis explores what policy instruments are most effective in order to incentivise farmers to incorporate public goods measures in their farm management it is good to understand what different types of instruments are possible. In literature, many different classifications of policy tools or instruments exist (Bemelmans-Videc et al., 2011; Eliadis et al., 2005; Goetz, 2008; Holzinger et al., 2006; Hood, 1986; Hood & Margetts, 2007; Knill & Lenschow, 2000; Peters, 2000; Salomon, 2002). The typology of Hood (1986, see also Hood & Margetts, 2007) represents the most widely used policy classification and is based on four central resources governments have: Nodality, Authority, Treasure and Organization (NATO). In recent years some authors made some refinements to the NATO-scheme (e.g. (Howlett, 2009a 2015; Lascoumes & Le Galès, 2007). Below a description of the different policy instruments is given.

Nodality – Information and communication instruments

In the typology of Hood (1986) Nodality refers to policy instruments that are based on the share of knowledge and information by governments. It is assumed that governments have more expertise and information than most other societal actors (O'Toole, 2007), and by sharing this information governments attempt to indirectly influence behaviour of a target group. With these instruments try governments to change the beliefs and perceptions of public and private actors in order to achieve policy objectives (Knill & Tosun, 2012). Typical examples of information and communication instruments are the publication of data and information, education, advice, recommendation and persuasion (Vedung, 2017). Another well-known example is providing product specific information

through certification or labelling on food or other consumer products (Howlett, 2009b), in order to inform consumers about for example environmental concerns so they can make deliberate choices during food shopping. A corresponding feature of all communication instruments is that they are all voluntary, because the target group can simply decide to ignore the information. This is seen as the biggest disadvantage of these type of instruments (Knill & Tosun, 2012). They do not directly influence behaviour, only indirectly and on the longer term (Rose, 1993). Moreover, it can be difficult to reach an audience that is not interested in the information because they are simply not searching for this information (Howlett, 2009b). Therefore, nodality instruments are often combined with other tools (Knill & Tosun, 2012).

Authority – Legislative and regulatory instruments

Legislative and regulatory instruments include the wide variety of laws and regulations. An important characteristic of this type of instruments is that a government imposes binding requirements that a specific target group has to meet. When the target group fails to meet the requirements, sanctions can be imposed. In this type of instruments the government applies the 'command-and-control' principle to influence the behaviour people (Goulder & Parry, 2008; Holling & Meffe, 1996). The requirements that are imposed can be of a prohibited nature, in which certain behaviour is prohibited or can have a prescriptive character, whereby certain behaviour is obligatory. Examples of this type of instruments within the agri-environmental domain are the habitats directive and the water directive of the European Union (Bouwma et al., 2015).

There are several reasons for choosing this type of instruments. Firstly, they have the advantage of being mandatory and thus forcing actors into a certain action, even if they do not agree (Keohane et al., 1998), and are therefore not dependent on the willingness of the actors to participate (Bouwma et al., 2015). Moreover, in principle the requirements are the same for the entire target group what makes these instruments clear and the policy effects predictable. On the other hand, there are also a number of disadvantages to this type of instruments. One of the disadvantages is for example, that the costs for meeting specific requirements are fully paid by the actors (externalization of costs) (Knill & Tosun, 2012). Furthermore, costs for controlling and monitoring are high and these instruments are unable to deal with dynamic situations. Moreover, instruments based on authority do not encourage actors to commit themselves to achieve the policy objectives.

Treasure – Economic and fiscal instruments

With Treasure refers Hood (1986) in his typology to instruments that lean on the financial resources that governments can use to influence behaviour of individuals or a target group. Economic and fiscal instruments aim to offer incentives to citizens and organizations in society. They assume that these actors are 'utility maximisers'[1] and will adjust their behaviour for their own sake if they are induced financially or through other transaction mechanisms. Economic and fiscal instruments are often used by governments to influence market mechanisms with for example subsidies, loans or taxes (Lascoumes & Le Galès, 2007). In contrast to the previous type of instruments, these instruments have a somewhat more voluntary character by financially encouraging or discouraging certain behaviour (Knill & Tosun, 2012). Most of the policy instruments within the CAP (e.g. direct payments, agri-environment schemes) could be classified as Treasure, because they are based on money, as they involve payments for specific land management practices and (investment) subsidies.

One advantage of economic and fiscal instruments is that they have the potential to correct for a market failure, such is the case is for example with public goods, for which no good functioning market exists (Panaiotov, 1994). Managing such a market failure with financial instruments is, however,

[1] Utility is an economic concept, used to analyse consumer preferences and choices (Arrow, 1958). It refers to the degree of 'happiness' (pleasure, satisfaction) in the consumer when purchasing goods and assumes that consumers choose that what gives them the highest 'utility'.

difficult. Furthermore, the budgetary costs for subsidies are often high and loans and taxes need much coordination to collect and distribute money (Knill & Tosun, 2012).

Organization - Provision of public goods by the state

In this last part of the NATO-scheme, Hood (1986) refers to the possibilities that governments have from their organisational strength to produce public goods 'themselves'. This thesis, however, especially focuses on the provision of public goods by farmers, and not on the provision of public goods by the government (or the state). For that reason, this type of instruments is left out of consideration.

The categorization of policy instruments (Information and communication instruments, Legislative and regulatory instruments and Economic and fiscal instruments) functions as a point of departure for answering the second research question. The farmers have been asked how they perceive the different types of instruments and what they consider as effective in order to incentivise public goods behaviour.

2.3 Farmers behaviour

In addition to the exploration of policy instruments, this thesis studies farmers behaviour and in particular factors that influence public goods behaviour. An increased insight in the factors that are influencing farmers' public goods behaviour can help to understand which type of policy instruments is most accurate. Because, when factors that influence public good behaviour have mostly a financial character, economic instruments (Treasure) might be most accurate to incentivise the provision of public goods. However, it might be that factors have a more intrinsic nature and relate to farmers' norms and values. Then might other types of instruments be more accurate, for example legislative (Authority) or information instruments (Nodality). Therefore, this thesis studies what key factors are that influence farmers' public goods behaviour.

According to the Oxford Living Dictionaries (n.d.) behaviour means; 'the way in which one acts or conducts oneself, especially towards others'. With farmers behaviour is thus meant; the way in which a farmer acts or conducts his/herself. In the context of this thesis, farmers behaviour relates to public goods, what can be referred to as farmers' public goods behaviour. Meaning that a farmer who is showing public goods behaviour has incorporated measures that contribute to the provision of public goods in his or hers farm management. There are several factors that can influence (farmers) behaviour and with a factor is meant: 'a circumstance, fact or influence that contributes to a result. In this thesis with a factor is meant; something that influences farmers to incorporate public goods measures on their farms. Therefore, in order to understand farmers public goods behaviour we need to focus on the factors that influence this behaviour (Mills et al., 2017). In literature, many authors have tried to understand and unravel differences between farmers with regard to environmental behaviour. To explain this environmental behaviour, researchers have in the past decades focused on the relationship between the willingness to adopt (attitude, beliefs, values and norms, etc.), and the ability to adopt (farm size, financial status of the farm, etc.) (Brotherton, 1991; Dwyer et al., 2007; Gasson, 1973; Potter & Gasson, 1988). Both will be briefly explained below.

Ability to adopt

There is a large body of literature showing that farm characteristics influence farmers behaviour with regard to their environmental management and their ability to apply sustainability practices on their farm (see for example Mills et al. (2017) and Dwyer et al. (2007). Authors argue that for example the size of working capital and the availability of time and labour determine to a large extent whether farmers can or cannot take environmental measures on their farms (Dwyer et al., 2007). Other aspects such as farm size (Ahnström et al., 2009; Vanslembrouck et al., 2002; Wilson & Hart, 2000),

farm type (Wilson & Hart, 2000), dependence on farm income (Kabii & Horwitz, 2006), amount of non-intensively used farmland (Wynn et al., 2001), and the bio-geographical conditions of the farmland (Wilson & Hart, 2000), are all factors that determine the capacity of farmers to adopt other or new farming practices that might be positive for the environment. Furthermore, farm household characteristics such as training and education (Dwyer et al., 2007). Other aspects such as farm size (Ahnström et al., 2009; Vanslembrouck et al., 2002; Wilson & Hart, 2000), farm type (Wilson & Hart, 2000), dependence on farm income (Kabii & Horwitz, 2006), amount of non-intensively used farmland (Wynn et al., 2001), and the bio-geographical conditions of the farmland (Wilson & Hart, 2000), are all factors that determine the capacity of farmers to adopt other or new farming practices that might be positive for the environment. Furthermore, farm household characteristics such as training and education (Filson, 1993; McDowell & Sparks, 1989; Wilson, 1996, 1997), succession status (Potter & Lobley, 1992), age and length of residency (Wilson, 1996) are factors that are considered as playing a role in the opportunities that farmers have to exhibit environmental behaviour.

Willingness to adopt

Research focussing on the willingness of farmers (intrinsic factors) to adopt environmental management practices on their farm is often making use of two theories: the Theory of Planned Behaviour (TPB) and the Value-Belief-Norm theory (VBN). The TPB and VBN are both psycho-social models that have origins in the fields of Psychology and Sociology, they have different approaches in order to analyse behaviour and the integration of the motivations of an individual (López-Mosquera & Sánchez, 2012). The TPB assumes that the behavioural intensions of an individual are directly related to his or her attitude, that people make choices based on their beliefs and that someone's behaviour is the consequence of the information or beliefs this person has (which may be based on experiences or facts). The VBN focusses more on the values and moral norms, and reflect the general environmental values, beliefs and norms which determine specific environmental behaviour. Within this theory, one's core values are central and it assumes that personal norms are activated by people who are aware of the necessity (e.g. a concern about the decrease in number of meadow birds), awareness of the consequences (effects of actions on meadow bird population), and their responsibilities (believe that one's own actions can lead to more meadow birds) (Schwartz, 1977; Schwartz & Howard, 1981). The theory assumes that personal standards can influence behaviour change because people want to be morally responsible and want to maintain a positive self-image (Mills et al., 2017).

Because someone's behaviour cannot only be explained based on a person's attitude (e.g. a positive attitude does not always lead to action), the TPB also contains additional factors such as social influences (Ajzen & Fishbein, 1980). In other words, the TPB tries to predict and understand behaviour based on the underlying factors of that behaviour, such as personal attitudes, subjective norms (social influences), and perceived behavioural control (perception about the convenience or difficulty of a particular action) (Mills et al., 2017). In recent years, additional dimensions have been added to the theory, such as a response efficiency, assuming that it is more likely that someone will maintain new behaviour when someone experiences that his or her actions make a difference and really matter (Homburg & Stolberg, 2006). Furthermore, self-identity is mentioned as important to understand motivation of farmers (Burton, 2004; Lokhorst et al., 2011). Self-identity is the extent to which behaviour is regarded as own (Terry et al., 1999), and can also relate to the social group with which the farmer identifies himself (Mills et al., 2017). It reflects the personal values of the farmer and his or her world view, based on their own experiences and moral values and functions as an internal frame of reference that determines their perception of external factors and their own preferences. It has been suggested that behaviour associated with self-identity will continue to exist more likely over time, because the more behaviour is repeated, the more important it becomes for the self-concept of the individual (Charng et al., 1988).

Both the TPB and the VBN can help to identify factors and can help to understand the nature of these factors. This thesis explores what factors influence public goods behaviour among farmers. This

theory, the combination of ability and willingness to adopt environmental behaviour functions as a point of departure for this thesis. This thesis explores whether the same factors apply to public goods behaviour as to environmental behaviour or if there are other factors that might play a role.

2.4 Relations between the concepts

In order to clarify the relationship between the different concepts that have been explained in this chapter a graphical overview of the relations was made and is presented in Figure 1. Central in this thesis is farmers (public goods) behaviour. When farmers take public goods measures on their farm, their behaviour might result in the increased provision of public goods. The focus of this thesis is on environmental related public goods (agricultural landscapes, biodiversity, water quality, soil functionality). Public goods that act around the social aspect are not included in the analysis (e.g. rural vitality, and food security). This thesis assumes that farmers public goods behaviour is influenced by several factors, which could be categorized by the ability to adopt and the willingness to adopt. In order to incentivise farmers behaviour, governments can use different resources resulting in different types of instruments. This thesis takes three types of policy instruments into account: information and communication instruments (i.e. Nodality), legislative and regulatory instruments (i.e. Authority), and economic and fiscal instruments (i.e. Treasure) (Hood, 1986). The literature also considers a fourth category of instruments (Organization), but as was explained those are not concluded in the analysis. This thesis studies farmers public goods behaviour and aims to identify factors that contribute to this behaviour. Furthermore, this thesis studies what kind of policy instruments farmers consider effective in order to incentivise public goods behaviour. An increased understanding of farmers behaviour can help to understand which type of policy instruments are most accurate to incentivise farmers to take public goods measures, what might lead to an increased provision of public goods.

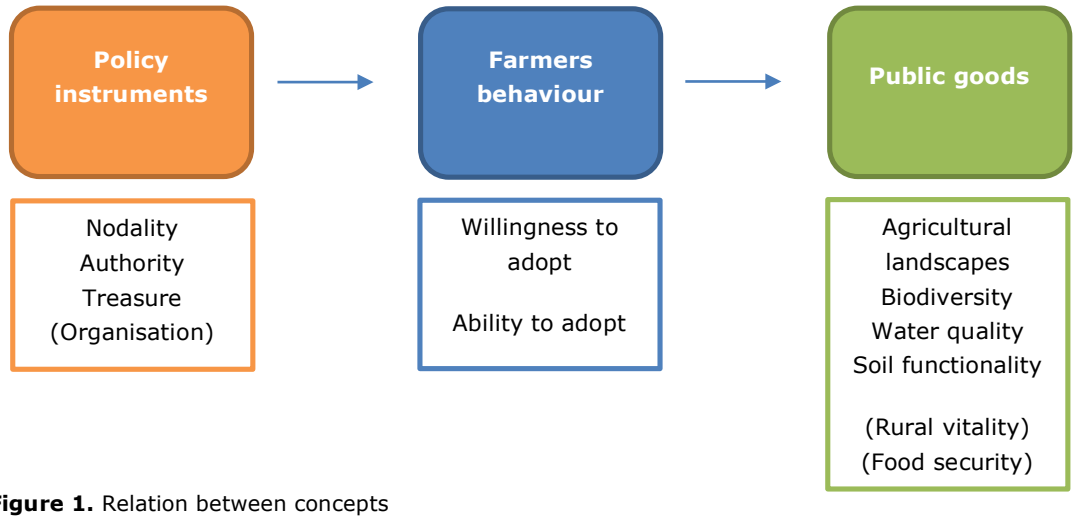

Figure 1. Relation between concepts

3 Methodological approach

This chapter explains how the research has been conducted. A qualitative study design was considered to be most appropriate for this study in order to find answers for the research questions. Qualitative research tries to find answers on 'what' and/or 'how' questions of a specific phenomenon, rather than answering 'how much' or 'how many' questions as in quantitative research. As this thesis aims to find answers on what factors are influencing farmers public goods behaviour and what kind of policy instruments farmers consider to be effective to incentivise such public goods behaviour, and not to find answers on how many farmers are showing public goods behaviour, or how many factors are influencing them a qualitative research design was considered most logical. It needs to be acknowledged that this thesis does not aim to provide statistically significant qualitative data and does not aim to generalise its findings for the wider farming community. It aims to provide a more in-depth understanding of farmers public goods behaviour and what types of policy instruments are considered most effective to incentivise public goods behaviour among farmers. Therefore, farmers that are currently active with public goods practices on their farm have been interviewed to identify which factors have been decisive and have influenced them to take public goods measures on their farm and how according to them the Dutch government should motivate farmers (through policy instruments) to take more action on the provision of public goods. These findings will be translated to the CAP and lead to policy recommendations for the Dutch government.

3.1 Data collection

This thesis aims to identify what factors incentivise farmers to incorporate public goods measures on their farms and how public goods measures could be incentivised by public policy. The concept *public goods* is a broad concept and many public goods can be associated with agriculture. As was explained in the theoretical framework, the emphasis of this thesis is on the most important public goods that act around the environment and that are relevant for the Dutch situation. Those are: farmland biodiversity, water quality, soil functionality, climate stability and agricultural landscapes (Baldock et al., 2010). To gain insight into the factors influencing the farmers public goods behaviour, twenty farmers were selected to be interviewed. Farmers were selected that currently already contribute to one (or more) of the above mentioned public goods (see Table 1). See Appendix I for more additional background information of the farmers. The farmers in Table 1 were selected in three different ways. First, farmers were selected from different networks in which farmers are active that contribute to one of these public goods, such as *Netwerk Natuurinclusieve Landbouw*, *BoerenNatuur*, *NAJK* and *LTO Nederland*. Those organisations were chosen, because they are prominent organizations with many farmers members. They all have a different target group and it was therefore assumed that they together form a good representation of the entire farmers population in the Netherlands. Second, besides those farmers organisations, farmers were selected from former research projects related to public goods in which farmers were involved (e.g. Westerink et al. (2018)) and from the relations of the Dutch Ministry of Agriculture, Nature and Food Quality. Third, the list of farmers was supplemented with farmers found online using search terms such as *natuurinclusieve landbouw*, *weidevogelbeheer*, and *agrarisch natuurbeheer*. The objective of the selection process was to achieve a good spread across the various regions in the Netherlands, with farmers from different sectors, farm sizes, and different ages.

Table 1 Selected farmers for interviews

Respondent	Location	Highest education level[a]	Age group	Public goods
Dairy farmer 1	Groningen	2	Senior	Farmland biodiversity, agricultural landscapes
Sheep farmer 1	Noord-Holland	4	Senior	Farmland biodiversity, agricultural landscapes
Arable farmer 1	Friesland	3	Young	Soil functionality
Dairy farmer 2	Friesland	2	Middle	Farmland biodiversity, agricultural landscapes, soil functionality, water quality
Dairy farmer 3	Overijssel	2	Middle	Farmland biodiversity, agricultural landscapes
Dairy farmer 4	Noord-Holland	2	Young	Soil functionality
Beef farmer 1	Utrecht	2	Middle	Farmland biodiversity, agricultural landscapes, soil functionality, water quality
Arable farmer 2	Brabant	3	Middle	Farmland biodiversity, soil functionality
Dairy farmer 5	Gelderland	2	Middle	Farmland biodiversity, soil functionality, water quality
Beef farmer 2	Utrecht	3	Middle	Farmland biodiversity, agricultural landscapes, soil functionality, water quality
Dairy farmer 6	Zuid-Holland	2	Senior	Farmland biodiversity, agricultural landscapes, soil functionality, water quality
Dairy farmer 7	Overijssel	n/a	Senior	Farmland biodiversity, soil functionality
Dairy farmer 8	Friesland	3	Young	Agricultural landscapes, farmland biodiversity, soil functionality, water quality
Arable farmer 3	Overijssel	3	Young	Soil functionality
Dairy farmer 9	Groningen	n/a	Senior	Agricultural landscapes, farmland biodiversity, soil functionality
Dairy farmer 10	Groningen	3	Senior	Agricultural landscapes, farmland biodiversity
Dairy farmer 11	Friesland	3	Middle	Agricultural landscapes, farmland biodiversity
Arable farmer 4	Drenthe	3	Young	Farmland biodiversity, soil functionality, water quality
Dairy farmer 12	Drenthe	4	Young	Farmland biodiversity, soil functionality, water quality
Dairy farmer 13	Zuid-Holland	4	Young	Farmland biodiversity, agricultural landscapes

[a)] 1=lower, 2=middle, 3=bachelor, 4=master

The method that was used to collect data was a semi-structured interview. This is an interview method that follows an interview protocol that contains a clear set of questions and topics that need to be covered during the interview (see Appendix II), but the interviewer might follow a different trajectory during the interview that may vary from the protocol and between interviews. In this way, a semi-structured interview can provide reliable, comparable data without being stuck to a fixed structure (Russel Bernard, 1988). Moreover, this interview method allows for a two-way conversation between the interviewer and the farmer (Case, 1990), what makes it easier to explore what the farmer really means or really believes, because the interviewer can adapt or change his questions and dig deeper in a specific subject if this is considered relevant.

The objective was to conduct all interviews face-to-face, because this can build trust and the interviewer is able to identify any non-verbal cues that warrant further questioning. However, due to time limitations and the availability of the farmers, six interviews were taken over the phone. The face-to-face interviews were taken at the farmers place, at the kitchen table (9) or in the farmers office (3). At request of the farmers, two interviews took place at another location than the farm, so they were able to combine the appointment with other meetings. A number of farmers (2) took the interviewer to the field to show their experiences in practice.

The interviews lasted between 30 minutes to 1.5 hours. In general, the phone interviews were shorter than the face-to-face interviews, because the telephone interviews were more to the point and during the face-to-face interviews there was a risk of devoting too much time on certain (sometimes irrelevant) topics. During the interviews, the interviewer made use of an interview protocol (Appendix

II). The first 5 to 10 minutes of the interview were spent to discuss the background of the interviewer, reasons for conducting this research and to explain what was hoped to achieve by the interview and the research. Furthermore, the objectives of the thesis were discussed and things such as confidentiality and anonymity were mentioned. In order to break the ice, the first question for the farmer was to tell something about his or her farm, such as farm size, land type, type of farming, etc. The farmer is used to talk about these things, what makes it a good way to start the conversation and it can also give information about the ability or capacity to adopt public goods measures.

Then the interviewer tried to move the conversation towards public goods, but usually the farmers started telling about this themselves. The interviewer tried to find out what the reasons were for the farmer to take public goods measures at his or her farm, what factors had influenced this and how thoughts have changes over time. In order to check if the farmer speaks the truth and to avoid socially desirable answers as much as possible, the same questions were sometimes asked in different ways with different formulations. If the interviewer got the feeling that no new factors emerged from the answers the interviewer moved to the next topic that needed to be addressed; how the government could encourage farmers to incorporate more public goods measures. It differed per farmer on which was the emphasis during the interview. Some farmers could tell more about factors influencing their behaviour, why they do what they do, while others were more able to elaborate on policy instruments, what they think that the government should do to encourage farmers to take public goods measures. The interviews were fully recorded with permission from the farmers and then accurately transcribed

3.2 Data analysis

The data analysis can be divided into two subsections. The first section to answer the first research question and the second section to answer the second research question.

First research question

To answer the first research question the analysis consisted out of two steps. In the first step the factors that influenced the farmers in order to incorporate public goods measures on their farms were identified. In the second step, it was analysed how these factors relate to each other and which factors could be considered as key. By taking these steps this thesis is able to give answer to the first research question and is explaining what are key factors that influence farmers' public goods behaviour.

Step 1. Identification of factors

The transcriptions of the interviews were analysed following an iterative process, for which the computer software Atlas.ti has been used. While keeping the theory of farmers behaviour (as elaborated in the theoretical framework) in mind and using priori deductive codes (ability to adopt and willingness to adopt) the data was analysed to identify factors that influence farmers public goods behaviour. The data was first coded into broad categories of factors, in the categories *ability to adopt* and *willingness to adopt*. During the analysis, it turned out that the categories suggested by the theory were not sufficient to capture all different factors. Therefore, following an inductive approach two more categories were added: *economic considerations* and *social influences*. Then the analysis took again an inductive approach to further coding, capturing different patterns and themes within the broad categories. At the same time the former coding was sometimes adapted and changed, for example some additional codes were assigned to extra factors that were not yet identified or codes were changed to another broad category. In order to ensure a consequent and consistent coding process a codebook (see Appendix III) was used. This process eventually resulted in a long list of different (sub)factors that were mentioned by the farmers as having an influence on their public goods behaviour, categorized by four categories: ability to adopt, willingness to adopt, economic considerations and social influences.

Step 2. Determine which factors are key

This list of factors was then thoroughly analysed. This analysis started with considering how the four factor categories relate to each other. Have all the factors a direct influence on the behaviour of farmers, or do they have an indirect effect and do they influence farmers' public goods behaviour through other factors? This question was answered by intensively studying the list of factors and by drawing lines to identify interrelations. During an iterative process, findings were regularly tested on the theoretical framework and additional (scientific) literature in order to check how findings and interpretations relate to existing literature. The factor categories that were considered to have a direct effect on the farmers' behaviour were identified as key factors.

Second research question

To answer the second research question the interview transcriptions were analysed for another time, again by using the computer software Atlas.ti. The theoretical framework was used to formulate priori deductive codes: LEG (Legislative and regulatory instruments), ECO (Economic and fiscal instruments), and INFO (Information and Communication instruments) (see Appendix III). Subsequently, the fragments with the same code were put together to see if it was possible to discover a certain line in it and whether several farmers had the same ideas and perceptions, or that there were big differences between the farmers. This resulted in an overview of farmers' preferences on policy instruments that the government should use to incentivise farmers' public goods behaviour.

4 Results

In this chapter, the results of this study are presented. After the interviews were taken they were analysed and this analysis gave answer to the research questions that were formulated in the introduction. This chapter is structured as follows. First, the results with regard to the first research question are formulated. The identified factors are presented and the key factors that influence farmers' public goods behaviour are explained. Second, the results with regard to the second research question are formulated and is presented how farmers perceive the different policy instruments and what they consider effective in order to encourage farmers to take public goods measures.

4.1 Key factors

The analysis of the interviews resulted in a long list of factors that were mentioned by the farmers as factors that had influenced their public goods behaviour. Those factors are given in Table 2. The table shows all different kind of factors that were mentioned by the farmers during the interviews (column 2). In the first column is presented to which factor category the factors were considered to belong to. In the third column is presented by which farmers the factors were mentioned.

Table 2 Interview data analysis results and identified key factors that influence farmers' public goods behaviour

Factor category	Identified factor	Farmer
Ability to adopt	The location of the farm	Dairy farmer 9, Dairy farmer 3, Arable farmer 2, Dairy farmer 6
	Operational management is now fully equipped	Dairy farmer 1, Dairy farmer 10
	Availability of time	Arable farmer 1, Arable farmer 2
	Availability of labour	Dairy farmer 7
	Cooperation with nature organization	Dairy farmer 3, Dairy farmer 7
Willingness to adopt	Job satisfaction	Dairy farmer 9, Dairy farmer 1, Dairy farmer 3, Dairy farmer 12
	It's a challenge	Dairy farmer 9, Dairy farmer 2, Arable farmer 2, Dairy farmer 1, Beef farmer 2
	Awareness that another farm management is necessary	Beef farmer 1, Arable farmer 2, Beef farmer 2, Dairy farmer 2, Dairy farmer 13, Dairy farmer 12
	Willing to be different	Dairy farmer 1, Dairy farmer 8, Dairy farmer 5
	Willing to contribute to objectives - biodiversity	Dairy farmer 5, Dairy farmer 10
	Willing to contribute to objectives – soil	Dairy farmer 1, Arable farmer 1, Arable farmer 2, Dairy farmer 5, Dairy farmer 4
	Willing to contribute to objectives – water quality	Dairy farmer 5
	Willing to contribute to objectives - climate	Arable farmer 2,
	Willing to contribute to objectives – animal welfare	Dairy farmer 9, Dairy farmer 8, Beef farmer 2, Dairy farmer 4
	Willing to contribute to objectives - landscape	Dairy farmer 7, Dairy farmer 4, Dairy farmer 10, Dairy farmer 11
	Love for nature	Dairy farmer 1, Dairy farmer 3, Beef farmer 1, Dairy farmer 7, Dairy farmer 4
	Thinking out of the box	Dairy farmer 1, Dairy farmer 2
	It is a part of a certain persuasion or belief	Dairy farmer 8, Beef farmer 1, Beef farmer 2, Arable farmer 3, Dairy farmer 9, Dairy farmer 4, Arable farmer 2

	Awareness that society wants it, willing to do something positive for society	Dairy farmer 1, Dairy farmer 3, Arable farmer 2, Beef farmer 2, Dairy farmer 6, Dairy farmer 7, Arable farmer 3, Dairy farmer 4, Dairy farmer 13
Economic considerations	Because of the compensations you get	Dairy farmer 9, Dairy farmer 2, Arable farmer 2, Dairy farmer 1, Beef farmer 2
	A (cheap) way to incorporate land with the farm	Sheep farmer 1, Dairy farmer 3, Beef farmer 2, Dairy farmer 6
	It is difficult to achieve good returns in the conventional way of farming.	Dairy farmer 8, Arable farmer 3
	Heavy financing	Dairy farmer 6, Dairy farmer 2, Beef farmer 2
	Demand of the customer	Arable farmer 2, Beef farmer 2, Dairy farmer 9
	It's a way to make money	Sheep farmer 1, Arable farmer 1, Dairy farmer 2, Dairy farmer 3, Dairy farmer 5, Dairy farmer 6, Dairy farmer 7, Arable farmer 3
Social influences	Got a different view of the world, influenced by: board memberships, foreign experiences, off-farm jobs	Dairy farmer 9, Dairy farmer 1, Sheep farmer 1, Arable farmer 1, Dairy farmer 2, Beef farmer 1, Dairy farmer 5, Beef farmer 2, Dairy farmer 7, Dairy farmer 10, Dairy farmer 11
	Learned it from parents	Dairy farmer 1, Arable farmer 1, Dairy farmer 3, Beef farmer 1, Dairy farmer 13
	Learned from other farmers	Arable farmer 2, Arable farmer 1, Beef farmer 2
	Hikers, citizens want it	Beef farmer 2, Dairy farmer 4
	The municipality wants it	Dairy farmer 7

The farmers mention four different types of factors. With other words, the factors that are mentioned by the farmers could be categorised into four different broad categories: ability to adopt, willingness to adopt, economic considerations and social influences. The ability to adopt relates to farm characteristics that allow farmers to take public goods measures. The willingness to adopt is about the intrinsic motivations of the farmer(s). Economic considerations are about economic or financial motives for farmers to incorporate public goods measures, and the social influences are the external influences that affect the motivations of farmers. Those will be explained later in more detail, but in order to fully understand the different factor categories it is first necessary to elaborate on how the factors relate to each other and to determine which factors could be considered as key. Although farmers indicate that it is often a combination of factors that lead to the uptake of public goods measures, the factor categories ability to adopt, willingness to adopt and economic considerations were considered as key factors and the social influences is not considered to be a key factor, but as having an indirect effect on farmers behaviour by affecting the willingness to adopt. The results of this part of the analysis are presented in Figure 2.

Figure 2 shows how the different factor categories relate to each other and how they influence farmers' public goods behaviour. The categories ability to adopt, willingness to adopt and economic considerations were considered to be key factors, meaning that when one of these factors is present at the farm (it is often a combination of two or three) this might result in the uptake of public goods measures and result in the provision of public goods. The ability to adopt is considered as a key factor, because this factor category is about the initial status of the farm. If the farm characteristics are in such a way that it is hard for a farmer to incorporate public goods measures (for example because of a lack of labour), then the chance that farmers will produce public goods is smaller. The willingness to adopt is also considered as a key factor, because the intrinsic motivation of a farmer is important when it comes to public goods measures. If the farmer is not motivated to incorporate public goods measures the chance is small that he will do this, even if the ability to adopt is optimal. The willingness to adopt can influence the ability to adopt, because when the willingness to produce public goods is big enough, a farmer will be motivated to ensure that the farm is set up in such a way, it is possible to incorporate public goods measures. The third key factor are the economic considerations. Other authors often include the economic considerations in the ability to adopt. One good argument for this is that in particular the financial status of the farm can ensure that it is hard (or easier) to incorporate public goods measures. Though, during the interviews it turned out that farmers often give an economic or financial reason, besides the other factors, as reason why they take measures for public

goods. Therefore, this thesis argues that economic considerations should be considered as a different key factor, when it comes to public goods behaviour. Furthermore, considerations such as: *"I can make money with it"* (i.e. economic considerations) are from a different order than *"I do this, because I love nature"* (i.e. willingness to adopt) or *"It is because of the area in which we live"* (i.e. ability to adopt).

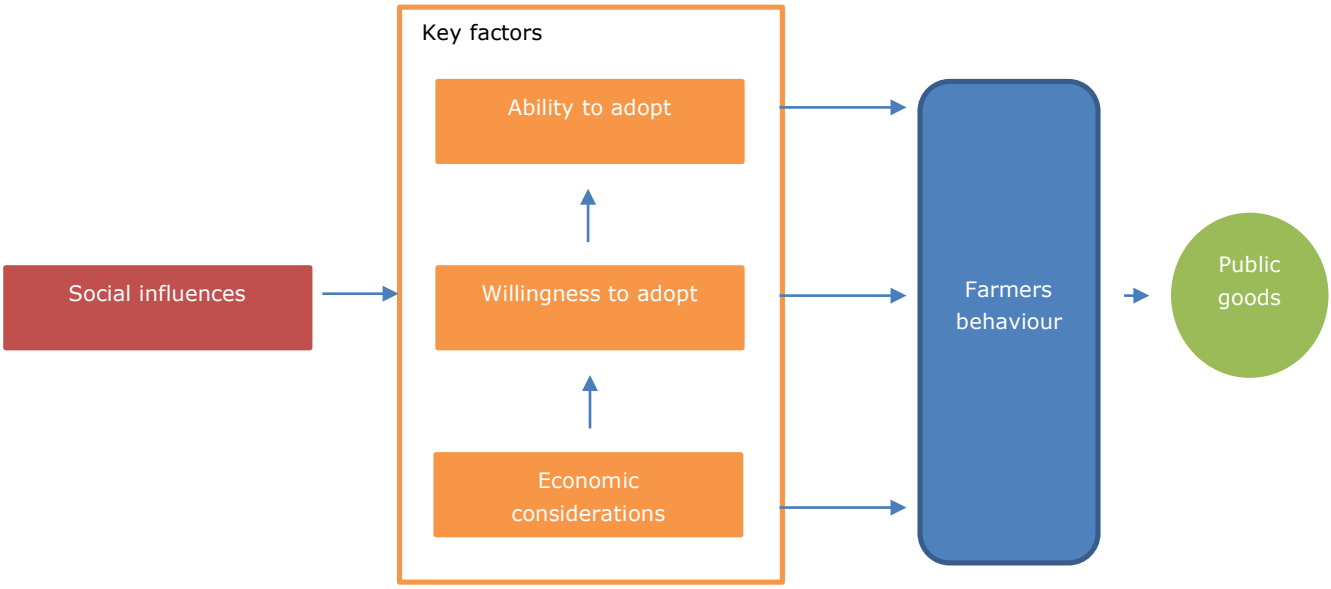

Figure 2. Results of analysis showing three key factors influencing farmers behaviour what might result in public goods.

To clarify the above, the three key factors will be explained in more detail below, with the social influences being discussed as part of the willingness to adopt. In the explanation of the key factors several statements from farmers are cited that clearly indicate what the factor is about. Because the various factors that were mentioned by the farmers, often have a certain degree of overlap, it was sometimes possible to describe various identified factors together.

4.1.1 Ability to adopt

The first key factor that will be discussed is the ability to adopt. As was suggested by the theory this factor refers to matters related to the farm that have influenced the farmers of this thesis to incorporate public goods measures on their farms.

Farm characteristics

The characteristics of a farm play a role when it comes to whether a farmer takes public goods measures or not. This involves matters such as the location of the farm, but also how the farm is organized and whether the right equipment is available. Farmers adjust their farming management and strategy to this, which then has consequences for the extent to which public goods are produced. For example, several farmers indicate that the location of their farm has led to measures for public goods. Some farmers were located in or near a nature area, making measures such as agricultural nature conservation logical steps to take (Dairy farmer 10, Dairy farmer 3, Dairy farmer 9, Arable farmer 2, Beef farmer 2, Dairy farmer 13). In addition, the location of the farm in or near a nature reserve can lead to cooperation with nature organizations, which makes it easier for farmers to take measures (Dairy farmer 3, Dairy farmer 7).

Two farmers argue that if their farm was located in another area, in an area that is not asking for public goods measures (e.g. Flevoland), they would farm in a different way and take no or less measures for public goods, see for example these quotations: *"If I had been a farmer in the Flevopolder[2], I might have been an intensive farmer"* (Dairy farmer 7) and *"If we had lived in the Noordoostpolder[2], we would have been a very intensive farmer and we would not have thought of nature conservation"* (Dairy farmer 3). These quotes suggest that for these farmers the location of their farm has been fairly decisive for the extent to which they provide public goods.

> *"If we had lived in the Noordoostpolder, we would have been a very intensive farmer and we would not have thought of nature conservation"*

Availability of time and labour

Besides the farm characteristics also the availability of time and labour on the farm determines if farmers are able to take public goods measures on their farms. Farmers argue that it takes time to take public goods measures and this time and labour is often not available. The moment a son or daughter joined the partnership has therefore in a number of cases (2) been the reason to take (more) measures for public goods, because more labour was available at that time (Arable farmer 1, Dairy farmer 8).

4.1.2 Willingness to adopt

The second key factor that will be discussed is the willingness to adopt. The willingness to adopt is about someone's personal convictions and norms and values and how they influence certain behaviour. By asking for this during an interview, an interviewer comes close to someone's personality. It turned out that some farmers could handle this better than others. For example, there were two farmers who had a fairly clear conviction, a clear picture of how they want to manage their farm, but when they were asked *why* they farm in this way, they did not have an answer or did not know how to put it into words, see for example this quote: *"Yes why, I don't know. I just want it in this way. I find that important"* (Beef farmer 2). Yet the majority of farmers (sometimes after repeated questions) were able to speak about this.

Personality: willing to be different and love for nature

As mentioned earlier, the willingness to adopt is about the personality of farmers. Several factors that were mentioned by the farmers are related to personality. This involves factors such as: willing to be different, thinking out of the box, love for nature and job satisfaction. There are for example two farmers who like to think out of the box (Dairy farmer 1, Dairy farmer 2). Three farmers also indicated that they like to be different from the rest, as can be seen from this quote: *"I like that, I do not want to be a standard farmer who follows everyone"* (Dairy farmer 1). These farmers like to behave different than the standard, this gives them pleasure and work satisfaction. Work satisfaction is often mentioned by farmers as a reason why they do things. Some of the farmer really enjoy farming in such a way that it contributes to public goods: *"I believe that you as a farmer can get much more pleasure form working with nature"* (Beef farmer 1).

This brings us to another personal character that many farmers that participated in this thesis have in common; their love for nature. They really like to work with nature and farm in a natural way (Dairy farmer 1, Dairy farmer 3, Beef farmer 1, Dairy farmer 8, Dairy farmer 4), as can be seen in the

[2] Flevopolder and Noordoostpolder are two regions in the province Flevoland in the Netherlands.

following quotations: *"I just really love nature"* (Beef farmer 2) and *"I am a real nature farmer. I love to be in the field, together with the meadow birds and to enjoy real nature"* (Dairy farmer 10).

It satisfies the farmers thus to behave different than the standard and/or to work with nature. This satisfaction can be increased by achieving results. A visible result, such as the return of a meadow bird that had been leaving the area for a long time, is seen as a reward for the work that was done by the farmer (Dairy farmer 3, Dairy farmer 10). Achieving results and being satisfied by the work makes that farmers really like it to take public goods measures. It is therefore that someone's personality, what a farmer likes to do could be considered as a decisive factor with regard to public goods measures. If the farmer likes to take public goods measures, the chance is bigger that the farmer will take these measures.

Personal beliefs or convictions

What relates to someone's personality, are someone's personal beliefs and these beliefs are often a motive for farmers to do things. Many farmers in this study have their own personal beliefs, which in their view is the right way of farming (Dairy farmer 9, Beef farmer 1, Beef farmer 2, Arable farmer 3, Dairy farmer 10, Dairy farmer 4, Arable farmer 2). Some farmers go a bit further in that than others. Far-reaching beliefs include for example the complete closure of nutrient cycles (Dairy farmer 9), nature inclusive farming (without pesticides) (Beef farmer 1), and biodynamic farming (Dairy farmer 10). What is less far-reaching are for example the convictions of the negative effects of artificial fertilizer and pesticides (Dairy farmer 4, Arable farmer 2). Farmers seem to align their farm management with their beliefs. So, they incorporate measures that correspond to their personal beliefs. In case of this thesis the beliefs and convictions were often related to public goods and therefore personal beliefs are considered as decisive for farmers to take public goods measures.

Feeling responsible

Another thing that drives farmers to incorporate measures for public goods is because they feel responsible. They feel responsible for the little piece of earth they have to take care of and want to do that in the best possible way. This probably relates to the intergenerational character of agriculture. Farmers often have taken over the farm from their parents and the farm is already for many generations in the family. That makes that they feel responsible for the farm. Furthermore, they indicate that they hope their children will be able to take over the farm from them and therefore they feel responsible to leave the farm in a better condition than they received it from their parents (Dairy farmer 10, Dairy farmer 1, Dairy farmer 2, Dairy farmer 5, Arable farmer 3, Beef farmer 1). The next quote is a good illustration of this: *"I am the sixth generation and I want to leave what we have received in good condition for the next generation. I find it fantastic that I could become a farmer, but I want to leave the farm better than I received it."* (Dairy farmer 2).

"I am the sixth generation and I want to leave what we have received in good condition for the next generation. I find it fantastic that I could become a farmer, but I want to leave the farm better than I received it."

Other farmers, that do not specifically indicate that they feel responsible because they want to pass the farm in a better state to their successors, indicate that they feel responsible for several objectives. During the interviews, the farmers mentioned a wide range of objectives they feel responsible for to take care off. These are: biodiversity (Dairy farmer 5, Dairy farmer 9, Arable farmer 4), soil functionality (Dairy farmer 1, Arable farmer 1, Arable farmer 2, Dairy farmer 5, Dairy farmer 4), animal health and welfare (Dairy farmer 10, Dairy farmer 9, Beef farmer 2, Dairy farmer 4), climate (Arable farmer 2, Dairy farmer 13), and landscapes (Dairy farmer 8). Because they feel responsible for those objectives the farmers take often measures in order to contribute to them. Most of those

objectives correspond to public goods, it is therefore that a sense of responsibility is considered as decisive for farmers to take public goods measures.

Social influences

How farmers come to their personalities, personal beliefs and sense of responsibility can be influenced in different ways. What farmers distinguishes from other population groups or other sectors is again the intergenerational character. Before a farmer takes over the farm from his parents, he (or she) joins first a partnership with his parents and they work together for many years. Work routines or habits of the parents, but also moral norms and values parents have, can influence the way farmers use to farm nowadays. The upbringing by parents seems to have a big influence, see for example the following quotes: *"We have always had a heart for nature, my parents gave me that."* (Dairy farmer 1) and *"My father always had a lot of attention to the soil. So, I do not really know better than that it is a point of attention to us."* (Arable farmer 1). Due to the scope and the focus of this thesis, examples come up of farmers that were influenced in such a way by their parents that they exhibit behaviour that is positive for public goods. It might be that if parents had another attitude or other habits that are less favourable for public goods they might have been of *bad* influence with regard to the uptake of public goods measures, as one of the farmers said: *"Many farmers continue to do the same as their father did, because they are convinced that this is the right way."* (Dairy farmer 3).

Someone's personality, personal beliefs and sense of responsibility are not only influenced by his or her parents. Farmers are also influenced in other ways. One of the factors that is often mentioned by the farmers in this thesis is that they have been working 'outside-the-door' in an off-farm job, before they took over the farm (Dairy farmer 10, Sheep farmer 1, Beef farmer 1, Dairy farmer 5, Beef farmer 2 and Dairy farmer 8). This gave them a different (or renewed) view on the world, what has influenced their farming strategies and they have therefore incorporated public goods measures in their farm management. *"The fact that I have been trading for ten years has certainly helped for a large part that I have now set up my farm in this way"* (Dairy farmer 8). It is therefore that farmers argue that it is better for young farmers to first find a job elsewhere, preferably in another sector (Dairy farmer 10, Dairy farmer 5), as appears from the quote: *"Something that is not good at all, but that often happens, is that sons step into the farm with their father directly after school. That is often from a labour point of view. But it is far better to start working elsewhere, perhaps outside the agricultural sector, so that you find out how society functions and that you get a different view on the world."* (Dairy farmer 5).

"Something that is not good at all, but that often happens, is that sons step into the farm with their father directly after school. That is often from a labour point of view. But it is far better to start working elsewhere, perhaps outside the agricultural sector, so that you find out how society functions and that you get a different view on the world."

Another factor that is often mentioned by the farmers is that they are board member of a collective for agricultural nature conservation (Dairy farmer 2, Dairy farmer 10), an agricultural nature association (Dairy farmer 1), or an interest organization (Arable farmer 4, Dairy farmer 12, Sheep farmer 1, Dairy farmer 11, Dairy farmer 5). Due to this work the farmers say that they are better informed about certain topics, such as for example the size of the meadow bird population, and they dive deeper into the subject, what makes them realize that action is needed and that they have to incorporate measures in order to increase this population size. Another consequence of being a board member of such an organization is that the farmers come into contact with many diverse people, including people with another background and another opinion. Getting into contact with such people and involving in debates and discussions influences someone's own opinions, attitudes and perspectives. This could lead to a better uptake of public goods measures by farmers, as can be

concluded from the next two citations: *"I am in the board of a collective that regulates the meadow bird management, and since then I am much more involved and know a lot more about the birds, what made me realize that it is very important to do something about it in this area."* (Dairy farmer 10) and *"From that position, you come into contact with a whole pallet of diverse people. So that influences your vision towards the future as well."* (Dairy farmer 2).

4.1.3 Economic considerations

The last key factor that will be discussed are the economic considerations. In contrary to the theory, the economic considerations were considered as a distinctive key factor. Some authors include economic considerations in the ability to adopt (examples), for which arguments could be found. For example, the financial situation of the farm is often considered as part of the ability to adopt, because when the farm is in a bad financial situation it is hard for farmers to incorporate sustainability measures (or they are not able to do so). However, this thesis argues that when it comes to public goods behaviour the economic considerations are a separate key factor besides the ability to adopt. The farmers that have been interviewed for this thesis indicate that they are economically driven. They consider themselves as entrepreneurs who have to earn money (Arable farmer 1, Dairy farmer 2). However, they understand that some measures for public goods do not immediately pay back, but that some measures such as soil measures are investments that are paid back on the longer term. The economic considerations that might lead to public goods could be divided into two types of factors: compensations / payments and entrepreneurship.

Compensations / payments

For some of the public goods measures farmers can get a compensation (for income foregone and labour) mainly financed by the second pillar of the CAP. It can be interesting for farmers to apply for such payments, especially when they are dealing with a heavy funding. In such a situation, these compensations can be a welcoming additional income (Arable farmer 4, Dairy farmer 10, Dairy farmer2, Beef farmer 2), and thus function as a motive to incorporate public goods measures: *"In 1993 we built this farm with a very heavy funding. That [the heavy funding] is also one of the reasons why we are doing this [nature inclusive farming]"* (Dairy farmer 7).

> *"In 1993, we built this farm with a very heavy funding. That [the heavy funding] is also one of the reasons why we are doing this [nature inclusive farming]"*

In addition, it can be financially attractive for farmers to lease land with natural handicaps. Since the landowners can receive a subsidy for these natural handicaps, when the farmers meet the conditions set for the subsidy (and therefore take public goods measures), these farmers can integrate this land to their farms at a very low lease price. This is particularly interesting for farmers who are heavily funded (for example, just after farm takeover), and still want to expand their business.

Entrepreneurship

Another economic consideration is attesting to a certain degree of entrepreneurship. There are farmers who realize that money can be made by producing public goods. In a number of cases, for example meadow bird management or agricultural nature management was part of a broader farming strategy, in which connection was sought with society, through various broadening activities such as a farm shop, meeting room or care farm. In order to be able to tell there a *good* story to customers, it is necessary to take such measures and produce public goods.

4.2 Effective policy instruments

Besides the identification of key factors that influence the behaviour of farmers with regard to public goods, this thesis makes the step towards policy instruments. Therefore, during the interviews the farmers were asked to share their ideas with regard to what the government should do to encourage farmers to engage in public goods practices. This section describes their views and considerations. As was elaborated in the theoretical framework it is possible to distinguish policy instrument into four different categories following the NATO-scheme of Hood (1986). This study focused on the first three categories: Information and communication instruments (Nodality), Legislative and regulatory instruments (Authority), Economic and fiscal instruments (Treasure). These three types of policy instruments could be used by the government to motivate farmers to incorporate public goods measures in their farm management. All three are discussed in more detail below.

Information and communication instruments

Farmers participating in this research foresee a role for information and communication instruments. According to the farmers interviewed the willingness to adopt can be increased by raising awareness and knowledge amongst farmers with regard to public goods measures (Dairy farmer 10, Dairy farmer 3, Dairy farmer 8, Arable farmer 11, Arable farmer 3). To increase the awareness and the willingness of farmers to adopt public goods measures the government could share information about for example meadow bird management, biodiversity or soil quality. So that farmers learn about the necessity of action, what possible measures are, and which measures are most desirable in which situation (Dairy farmer 9, Sheep farmer 1, Arable farmer 1). The government could also promote courses in which famers are taught about public goods objectives, with what kind of measures these objectives could be achieved and how results could be measured: *"There are now more and more courses for farmers so that they know what are the best measures for their soil type and what the reasoning is behind these measures. Currently farmers only know that they are not allowed to cut the grass until June 15, but they don't know what the reason is."* (Dairy farmer 7). It is important that farmers learn from each other, for example through study groups or other forms of cooperation (Arable farmer 1, Dairy farmer 2, Dairy farmer 3, Arable farmer 2, Dairy farmer 5, Dairy farmer 8). *"What I see often is that farmers learn from each other and that they start to try out practices of which they have seen positive results from other farmers".* (Arable farmer 1). Therefore, it is good to support farmers that are currently active with public goods, to show and share their experiences and results with other farmers (Dairy farmer 8). Several farmers feel responsible to show other farmers that it is possible to have an economically well-functioning farm and at the same time providing public goods (Dairy farmer 9, Dairy farmer 3, Dairy farmer 2).

> *"What I see often is that farmers learn from each other and that they start to try out practices of which they have seen positive results from other farmers"*

Furthermore, many farmers argue that the willingness to adopt could be increased by agricultural education. Therefore, many farmers argue that agricultural education has to change. They have the idea that the focus of agricultural educations is often too focused on production and efficiency and that there is too little attention for topics such as biodiversity, climate or other socially demanded topics (Dairy farmer 1, Arable farmer 1, Sheep farmer 1, Dairy farmer 3, Dairy farmer 9, Dairy farmer 5, Dairy farmer 7, Dairy farmer 8). This quote clearly shows how farmers in general thought about this point: *"There are many young farmers who say, 'I will continue to work in the same way as my father always did', instead of having looked a bit further. I therefore foresee an important role for agricultural schools. That young farmers gain a broader view on the world and on agriculture, for example through excursions and guest lectures, so they see what the different options for the future are"* (Arable farmer 1).

Another point that a number of farmers suggest is that the government should focus on consumer awareness. Consumers should be made more conscious of their choices while doing grocery shopping, so they may more often opt for products produced by farmers who also take measures for public goods (Dairy farmer 9, Dairy farmer 1, Dairy farmer 2, Dairy farmer 3). In that way farmers will be indirectly stimulated to produce more public goods (through the market). Two farmers indicate that a part of the CAP budget could be used for raising awareness among consumers (Dairy farmer 1, Sheep farmer 1), while other farmers think that this is something that should be done by cooperatives, for example through open farm days (Dairy farmer 9, Dairy farmer 1). However, it is questionable how effective this will be and whether this will work in practice, because one reason to write this thesis was that public goods are not provided through a market mechanism (market failure), so probably by better informing consumers we do not solve the problem of the low public goods provision by farmers.

> *"There are many young farmers who say, 'I will continue working in the same way as my father always did'. Instead of having looked a bit further, I therefore foresee an important role for agricultural schools. That young farmers gain a broader view on the world and on agriculture, for example through excursions and guest lectures, so they see what the different options for the future are"*

Economic and fiscal instruments

The second key factor that influence farmers to incorporate public goods measures are economic considerations. This is apparent from the fact that different farmers stated that money is a driver for farmers and that thus behaviour can be influenced with money (Sheep farmer 1, Dairy farmer 8, Dairy farmer 5, Dairy farmer 12): *"I see one big driver and that is money"* (Sheep farmer 1). The farmers of this thesis have, however, different views on how the government should use financial resources to incentivise farmers public goods behaviour. A number of the farmers believe that subsidies are market-distorting and do not help the sector any further (Dairy farmer 9, Beef farmer 1, Dairy farmer 7). Furthermore, some farmers have the feeling that several subsidies (such as subsidies for sustainability investments) often have a wrong focus and are outdated (Dairy farmer 8, Arable farmer 2). A farmer gave the example that there is currently a subsidy available for GPS systems: *"Well those GPS systems are already very common in arable farming, almost everyone has already such a system. Let's say, the farmers that currently not have a GPS system, are the farmers that will stop farming within 10 years"* (Arable farmer 2). Another farmer indicated that he cannot understand that there is a subsidy available for a manure separator. *"We always have our cows outside, on pasture, so we don't need to separate the manure at all. Currently there are subsidies available for technical novelties, but it is questionable whether those novelties make the sector more sustainable. That is unfortunate"* (Dairy farmer 8). For a well-functioning subsidy system, it is therefore important that it is first defined what is considered as sustainable and what contributes to this. Perhaps the recently published vision of the Dutch Ministry of Agriculture, Nature and Food Quality can contribute to this (Ministerie van Landbouw Natuur en Voedselkwaliteit, 2018).

Furthermore, some farmers believe more in options such as green financing, or that financiers give a discount on paid interest when farmers incorporate public goods measures in their farm management (Dairy farmer 1, Arable farmer 3, Dairy farmer 5), e.g.: *"Perhaps the government can give a guarantee, so that if you meet several [public goods] objectives as a farmer, you will get financing more easily".* (Arable farmer 3). Others point out the possibility to give tax benefits to farmers that show public goods behaviour (Dairy farmer 2, Dairy farmer 3). Although the farmers do not prefer subsidy instruments, they seem to be positive about the payments that farmers currently can receive for the provision of environmental services. They argue that the government could motivate farmers to provide public goods, by making public goods measures financially attractive. The farmers are

positive about the idea of introducing payments for public goods similar to the payments for environmental services (Dairy farmer 9, Dairy farmer 1, Dairy farmer 2, Dairy farmer 7).

A few farmers put the question as a side note for payments for public goods; What happens if this financial incentive is stopped for any reason? (Dairy farmer 9, Sheep farmer 1, Beef farmer 1). This is probably highly dependent on the type of public good and the extent of the effort that farmers must make to take measures for that specific public good. For example, one farmer said: *"If the subsidy was not there, I would still take care of the nests of the meadow birds"* (Beef farmer 1), but this farmer considered taking care for the nests as a small effort. Other farmers might perceive that differently: *"If the compensation for meadow bird management would disappear, then some of the farmers will stop taking the measure, but some will not"* (Sheep farmer 1).

> *"If the compensation for meadow bird management would disappear, then some of the farmers will stop taking the measure, but some will not"*

Legislative and regulatory instruments

Next to the willingness to adopt and economic considerations is the ability to adopt a factor that influences the decision of farmers to incorporate public goods measures in their farm management. It is due to the nature of the ability to adopt that the government is not able to do much to increase or improve this ability, because the ability to adopt is about internal factors of the farm, such as the location of the farm and the availability of time and labour. What the government could however do is using legislative and regulatory instruments to make public goods measures mandatory. The interview data gives the impression that farmers do not find this a desirable instrument to motivate them to do more for public goods. This kind of instruments do not promote the willingness to adopt, have no impact on the economic considerations and do not influence the ability to adopt. Therefore, farmers do not expect legislative and regulatory instruments to have a desired outcome. The farmers expect that legislative and regulatory instruments are not motivating for farmers and that farmers therefore will only do the minimum to comply with the policy objectives*: "Making it mandatory does not work. Because if you are not really believing in it yourself, then you actually only do the things to meet the policy conditions"* (Arable farmer 1). Whereas if instruments focus on increasing the willingness to adopt, it is more likely that farmers are motivated to show public goods behaviour what ultimately will lead to an increased provision of public goods.

> *"Making it mandatory does not work. Because if you are not really believing in it yourself, then you actually only do the things to meet the policy conditions"*

Nevertheless, farmers believe that the government should give clear frameworks and guidelines in which farmers can operate. Although one farmer argues for very strict standards, because this would guarantee a strong competitive position for Dutch agribusiness (Dairy farmer 7), most farmers argue for more freedom and flexibility in rules and regulation (Dairy farmer 13, Dairy farmer 5, Dairy farmer 1). *"We need frameworks in which we have to act, but some flexibility would also be useful. I want to keep the freedom to be able to make my own choices"* (Dairy farmer 5). This is related to the point that farmers feel that rules and regulations are currently too focused on measures and too little on objectives. Farmers are currently rewarded for the measures they take, while in their specific situation a bit different way of acting might be desirable. That is why farmers ask for more freedom for their own interpretation of the regulations and a policy that focuses more on objectives instead of on measures. *"My grassland needs to be mowed now, and that is possible because all the meadow birds are already gone, but I am not yet allowed to cut the grass until June 15. […] I think that we should*

get a somewhat greater amount of freedom, and that we should be rewarded for the nature objectives that we achieved" (Dairy farmer 1).

5 Discussion, conclusions and recommendations

This thesis aimed to identify key factors that influence farmers behaviour with regard to public goods. Furthermore, this thesis aimed to increase the knowledge about what farmers consider effective policy instruments to incentivise public goods behaviour. Therefore, twenty in-depth interviews were conducted with farmers that are currently actively providing environmental and land-based public goods, such as: biodiversity, landscapes, and soil- and water quality. The findings of this thesis could support policy makers to design more effective policy with regard to the provisioning of public goods by agriculture.

This chapter is structured as follows. First, the major findings of the study are discussed. Than the results are compared with similar research and a reflection is given on the results and the study limitations. As this thesis aims to contribute to the debate about the reform of the CAP, the thesis ends with the meaning of the results for the CAP.

5.1 Major findings of the study

This thesis is built on two research questions. For both questions, a concise answer is formulated below. The first research question of this thesis was: ***What are key factors that influence farmers' behaviour in relation to public goods?***

Scientific literature suggests that with regard to environmental behaviour amongst farmers, two categories exist that influence that behaviour: ability to adopt and willingness to adopt (Brotherton, 1991; Dwyer et al., 2007; Gasson, 1973; Potter & Gasson, 1988). During the interviews, it turned out that farmers consider economic considerations as a separate factor, besides the willingness to adopt and the ability to adopt. This thesis therefore, concludes that with regard to public goods behaviour an additional factor category exists: economic considerations. Arguments in favour of adopting public goods such as: *"I can make money with it"* (i.e. economic considerations), are of a different order than: *"I do this because I love nature"* (i.e. willingness to adopt) or *"It is because of the area in which we live"* (i.e. ability to adopt). That is why this thesis argues that there are three key factors influencing the behaviour of farmers with regard to the provision of public goods: (1) Ability to adopt, (2) Willingness to adopt, and (3) Economic considerations.

The ability to adopt is related to the characteristics of the farm, such as the location and the presence of sufficient time and labour. Farmers indicate that they are taking measures for public goods because their location requires it, for example when they are located in or around a nature reserve or in a densely populated region. Moreover, farmers are able to take more measures for public goods if more labour comes available on the farm, for example when a son or daughter joins the partnership.

The willingness to adopt it about the personality of the farmer. Meaning that farmers take measures for public goods, based on an intrinsic motivation. For example, there were some farmers who take measures for meadow birds or nature conservation, because they love nature and taking care of nature satisfies them. Other farmers show public goods behaviour based on certain convictions or from their sense of responsibility. They are convinced that a specific farm strategy (e.g. organic farming, or nature inclusive farming) is the best way to manage a farm, and by doing so they contribute to public goods. A number of farmers indicate that they show public goods behaviour, because they feel responsible for the little piece of earth they have to take care of. In addition, the

willingness to adopt is sensitive to social influences, for example from parents, other farmers or other social networks.

With regard to the economic considerations farmers often mentioned that taking public goods measures is financially attractive, due to the compensations that farmers can get for those measures. In particular for farmers that face a high financing it can be interesting to find other sources of income and for example agri-environmental nature conservation is than a possible step to take. Furthermore, there are farmers who earn money with multi-functional farming (e.g. care farming or farm shop). In such a farming strategy it fits well to take measures for public goods.

There are three types of factors that influence farmers' public goods behaviour: the ability to adopt, willingness to adopt, and economic considerations. Those factors can affect the farmers individually, and for one farmer, one factor can be more decisive than the other, but often it is a combination of two or three factors that lead to farmers taking measures for public goods.

Besides identifying what are key factors that influence public goods behaviour amongst farmers, this thesis explored what kind of policy instruments farmers consider most appropriate to incentivise public goods behaviour. Therefore, the second research question of this thesis was: ***What kind of policy instruments consider farmers effective to incentivise public goods behaviour?***

A widely used typology to differentiate between different policy instruments is that of Hood (1986), where policy instruments are divided into four different categories based on the resource used by the government. This thesis uses the first three types of policy instruments: Information and communication (Nodality), Legislative and regulatory instruments (Authority), and Economic and fiscal instruments (Treasure).

The analysis of the interview data showed that farmers prefer information and communication instruments to incentivise public goods behaviour. They believe that those instruments can increase the awareness and knowledge level with regard to public goods among farmers. Furthermore, the farmers stated that they are not in favour of making public goods measures mandatory (legislative and regulatory instruments), because farmers themselves need to understand the necessity of public goods measures. According to the farmers, the risk of making it obligatory is that farmers will only do the minimum to meet the policy conditions, while if they are intrinsically motivated, they will actually take a step extra. Furthermore, the interviewees believe that farmers currently have insufficient knowledge about what measures can be taken for public goods, and why these measures should be taken. That is why they call for a change in agricultural education, which in their opinion currently is still too focused on production efficiency. Study programmes should pay more attention to themes such as biodiversity, soil and water. In addition, the government could focus on increasing the willingness to adopt by stimulating training and coaching programs or various initiatives and projects that increase the knowledge level of farmers, and in which farmers work together so that they can learn from each other and the common knowledge level increases. Another option is that the government supports the knowledge level at farm level. There are large differences between farms (farm type, soil type, region), so it also differs per farmer which public goods measures are most appropriate. The government could for example introduce an online application tool in which farmers can see what option are in their specific situation to produce (more) public goods and in which also results can be made visible[3]. Making results transparent can contribute to increasing the willingness to adopt.

Furthermore, according to farmers, the government could make use of the fact that economic considerations are also a factor that leads farmers to take measures for public goods. The government

[3] Experiments are currently being conducted with a biodiversity monitor and a soil quality app, which is are both not yet ready for practice, but it is advisable to continue to follow, stimulate or initiate such initiatives in the future. For more information about the biodiversity monitor and the soil quality app see: http://biodiversiteitsmonitormelkveehouderij.nl/ and https://resource.wur.nl/nl/wetenschap/show/Boer-kan-bodemkwaliteit-verbeteren-met-app-.htm

could therefore use economic and fiscal instruments to make the production of public goods financially attractive to farmers. The farmers themselves prefer targeted payments for public goods. This means that the government pays for the measures that farmers take, for example on the basis of income-foregone and labour. It is worth considering to pay farmers a little extra than the costs they make, so it becomes financially more attractive for farmers to provide public goods.

5.2 Comparison of the results with similar research

This section will discuss how the findings of this thesis relate to results from previous research. First the results of the research question with regard to the factors contributing to farmers' public goods behaviour are discussed, and second the results with regard to the policy instruments are discussed.

Several studies have studied the factors contributing to farmers' public goods behaviour (Brotherton, 1991; Defrancesco et al., 2008; Dwyer et al., 2007; Hijbeek et al., 2018; Siebert et al., 2006; Skerratt, 1994; Wilson, 1997). In line with this study, Siebert et al. (2006) and (Brotherton, 1991) found that economic considerations are decisive for farmers, but not the only determining factors. There are also issues such as intrinsic motivation and subjective norms. Moreover, Hijbeek et al. (2018) argues that farmers attitudes, subjective norms and awareness that action is needed are of influence for farmers.

Other studies have, however, often a more specific focus wat leads to other more specific results. For example Wilson (1997) and Skerratt (1994) found that farm characteristics and specifically farm size were having the biggest influence on farmers (participating in biodiversity policy). By Wilson (1997) this is explained by the fact that the concerning policy (that was under study) was mainly aimed at large farms and that it for smaller farms was not financially attractive to participate in the policy. What also insinuates that economic considerations are decisive for farmers. The same study found that factors such as higher education level, younger age and length of residency can increase the willingness to adopt. These are things that have not been recognized by this thesis, which may be the result of the chosen research design with a sample of only twenty farmers. Two other studies, found in agreement with this thesis that the availability of labour is a determining factor (Defrancesco et al., 2008; Dwyer et al., 2007). In this thesis this was less pronounced than in the article by Defrancesco et al. (2008), which is probably due to the fact that in this thesis farmers were involved that are already actively involved in public goods, so for them labour was not really an issue (anymore). Furthermore, Dwyer et al. (2007) and Defrancesco et al. (2008) found that finance is also important and that when farmers are heavily dependent on farm income, it is less likely that they will take part in agri-environmental measures. Within this thesis were a number of farmers who were an example of farmers for whom a poor financial situation was one of the reasons why they engaged in public goods management. However, it should be noted that farmers also indicated during the interviews that for other farmers (probably more intensive farmers), in a bad financial situation it might be more difficult to incorporate public goods measures in their farm management, which in turn corresponds with the findings of Defrancesco et al. (2008).

With regard to the results of the second research question about policy instruments, there was only a limited number of articles found that after identifying factors that influence farmers' behaviour also elaborate on the implications of those finding on policy and policy instruments (Defrancesco et al., 2008; Greiner & Gregg, 2011; Siebert et al., 2006). Where some authors argue that financial instruments would be most effective to motivate farmers to participate in agri-environmental policy (Greiner & Gregg, 2011), do other stress that policy makers should also take famers' attitudes and beliefs (i.e. willingness to adopt) into account when designing agri-environmental policy and foresee therefore a role for information and communication instruments (Defrancesco et al., 2008). Furthermore, Siebert et al. (2006) found that farmers prefer targeted payments and voluntary participation and that flexibility of policy is important.

The above corresponds to the findings of this thesis. In order to incentivise farmers' public goods behaviour a combination between economic instruments and information and communication instruments is needed. Examples of information and communication instruments that are mentioned in literature are: technical journals, advisory services, demonstration and monitor farms, as well as informal advisory networks, established among farmers, or vis-à-vis mentoring instruments (based on the active role played by the individual farmer), and it has been argued that such instruments need further research to find out how they should be organized in order to incentivise farmers' behaviour (Defrancesco et al., 2008).

5.3 Reflection on the findings

This thesis concludes that there are three key factors that influence farmers' behaviour with regard to public goods. Based on this study design it was not possible to determine which of these three is the most decisive for farmers. Yet it is interesting to elaborate about it, for example by looking at how the various factors relate to each other. At first, the willingness to adopt can be increased or influenced by economic considerations. If it becomes economically interesting for a farmer to take public goods measures, it is likely that he or she is also more willing to actually take these measures. The same applies the other way around. If measures are very costly for the farmer, then the farmer's willingness must be very large to implement the measures permanently. In addition, the willingness to adopt and the ability to adopt can also affect each other. If, for example, the starting situation of the farm is such that it is fairly easy for a farmer to take measures for public goods, then the farmer's willingness does not have to be as great as when the initial situation is not so and there have to be (large) investments made to provide more public goods. Those thoughts have been visualized in Figure 3, in which also the economic and fiscal instruments (that can affect the economic considerations), and the information and communication instruments (that can increase the willingness to adopt) are included.

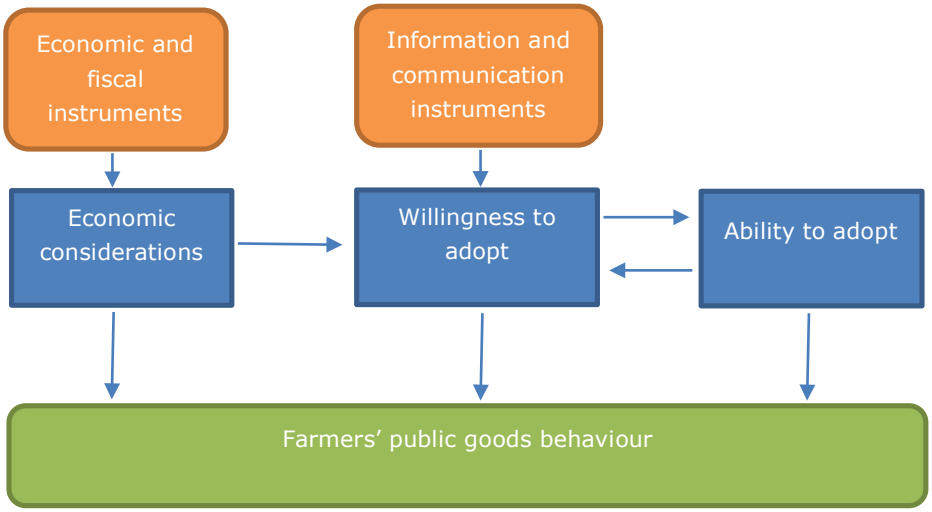

Figure 3. Farmers' public goods behaviour is influenced by three key factors (Economic considerations, Willingness to adopt and Ability to adopt) and can be affected by Economic and fiscal instruments and Information and communication instruments

Based on results of this study, policy makers engaged in the development of agri-environmental policy should choose for a mix of instruments that both include information and communication instruments to increase the willingness to adopt, and also include economic and fiscal instruments to make it financially attractive for farmers to take measures for public goods. Future research should show how

a payment system for public goods should be arranged. How much should be paid for which public goods measure? Do you distinguish between farmers/farm types/soil types and/or regions? Do you only pay for income foregone and labour, or do you also give a premium? This raises again several additional questions such as: Is it fair that a farmer can earn money with public goods? Is it justified that the government pays for public goods? Or can public goods behaviour be considered as *normal* behaviour and can we just demand farmers to show such behaviour. Should public goods behaviour be seen as Corporate Social Responsibility? (Carroll, 1991). Looking at payments for public goods in that way, gives another perspective. After all, the government is for example also not paying for *normal* driving behaviour (e.g. not driving through a red traffic light). Another thing that should be taking into account what happens if for a certain reason less budget becomes available to pay for these measures, and thus the financial incentive falls away. Will the farmers continue to take the measure or stop it? Rode et al. (2015) examined the effects of economic incentives on the intrinsic motivations (i.e. willingness to adopt) of farmers to engage in biodiversity and ecosystem conservation. That study shows that the intrinsic motivation decreases as a result of economic incentives and that the intrinsic motivation after the disappearance of the economic incentive is lower than was the case at the time the economic incentive was implemented. Rode et al. (2015) therefore calls for careful handling of economic incentives (economic and fiscal instruments). Therefore, information and communication instruments seem most appropriate to motivate farmers to provide public goods. The problem with this kind of instruments, is however, that results are hard to measure and will probably only become visible in the longer term (Knill & Tosun, 2012). This is problematic, especially for politicians and policymakers, because it makes it difficult to 'impress' the wider public with this type of instruments. The introduction of economic and fiscal instruments (or legislative and regulatory instruments) is much more measurable and therefore more decisive for public.

Taking all together, this thesis recommends for the longer term, focus on increasing the willingness to adopt among farmers, for which information and communication instruments can be used. For the shorter term this thesis recommends opting for economic and fiscal instruments, but before introducing them it needs to be examined properly what the effects of those instruments are on the willingness of farmers in the longer term.

5.4 Study limitations

Like in all studies, this thesis had some study limitations. The first limitation is that the research question had a very broad focus, as a result of which the findings of the study remained somewhat general. In follow-up research, it is better to examine each public good individually. For example, the factors that influence good soil management can be different from those of measures for agricultural landscapes. After all, soil measures can also be perceived by the farmers as an investment for the longer term. Improving the soil quality can in the longer-term result in higher yields, or yields that require less input. While agricultural landscapes are not a production factor, and farmers can thus have other motivations to take landscape measures. It is advisable to research this further.

Furthermore, many of the arguments made are based on only a small number of statements by a small number of farmers. That is why this research can only be called explorative. Moreover, this thesis is based on reflections of farmers on their own behavior and data is collected through interviews in which there is a risk that farmers answer questions in a 'socially desirable' way (Floress et al., 2018). Further research among a larger group of respondents is necessary. For more in-depth insights a larger study design is needed, with a larger group of farmers.

Another limitation is that in the group of farmers that were selected to be interviewed, were relatively many (organic) dairy farmers. Beforehand, the intention was to get a better spread across the different sectors. It turned out, however, to be difficult to find conventional arable farmers who are known to consciously take measures for public goods. The fact that more (organic) dairy farmers were

involved in this research, could be because it might be easier for dairy farmers to include public goods measures than it is for arable farmers. The geographical distribution of the farmers was also not optimal. The vast majority of the farmers were located in the northern parts of the Netherlands. It was hard to find farmers in the southern regions, what could be due the fact that there are more intensive farms in the Netherlands that have less land in use. For these farming systems, it can be more difficult to take measures for public goods. Furthermore, there were currently only farmers involved who are already taking measures for public goods at the moment. This has obviously had an effect on the results. Another option was to (also) include farmers who are currently not active with public goods. In that case, however, it might have been difficult to identify factors, because there is a chance that no factors can be identified because those farmers have not included public goods measures in their farm management (yet). It is possible then to look at obstacles or reasons why farmers *do not* contribute to public goods. That is also an interesting question for future research, a lot can be learned from this and it can be helpful in (re-)forming agri-environmental policy.

With regard to the data analysis it should be taken in mind that the coding and clustering of the results was based on an interpretation of the results by the researcher. For example, whether or not to consider factors as a key factor is debatable, and another study with another background and focus might come to other conclusions.

Lastly, in this thesis, the suggestion is sometimes done that intensive farming systems would be negative for public goods. Although it seems plausible that certain objectives within an extensive farm system are easier to achieve, it is far beyond the scope of this thesis to draw such conclusions. This thesis does not aim to make statements about which form of agriculture is best for public goods. This thesis aimed to find out what factors influence farmers behaviour and which policy instruments fit to these factors. The findings of this thesis are however based on the experiences and opinions of a select group of farmers and this has obviously influenced the results of this research.

5.5 Meaning of the results for the CAP

At present, the CAP consists mainly of economic instruments. Almost half the budget of the rural development policy (Pillar II) is used for three instruments (agri-environment, natural handicaps, and farm modernization), only a small percentage of the CAP budget is used for advice and training measures (i.e. information and communication instruments) (Baldock et al., 2010). The debate on the reform of the CAP for the period after 2020 is currently taking place. The Dutch government's commitment is to shift from direct payment per hectare to more targeted payments for public goods and other social objectives (Schouten, 2018). The results of this thesis show that economic instruments can be effective for the shorter term. Furthermore, the farmers who were interviewed seem to be positive about such a system.

Yet the results of this thesis also give a different perspective. If the CAP wants to focus more on public goods, it is important to take into account that besides economic factors also the willingness to adopt and the ability to adopt influence the behaviour of farmers. Therefore, it may be worth considering giving information and communication tools a more prominent place in the CAP so that the level of knowledge and awareness of farmers around the importance of public goods increases.

This thesis therefore recommends combining targeted payments for public goods with trajectories in which farmers work together and learn from each other. In addition, the government could, for example, launch an online application tool in which various data are collected (with regard to soil quality, biodiversity, water quality and landscape) and made clear to farmers. The idea is that farmers can easily see which measures can be used to achieve the most or best results for which public good. In the same application, it could also be processed how high the compensation (or payment/subsidy) is for the specific measure (or objective). Furthermore, farmers could also use this application tool to

provide evidence that they have taken the measure, or they can use several indicators to measure the achieved results, and on that basis the amount to be paid can be determined.

There are many different options within the CAP to encourage farmers to deliver more public goods. Both the Dutch government and the European Commission should seize these opportunities in order to guarantee a sufficient provision of public goods by agriculture for the short and longer term.

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Bibliography

Ahnström, J., Höckert, J., Bergeå, H. L., Francis, C. A., Skelton, P., & Hallgren, L. (2009). Farmers and nature conservation: what is known about attitudes, context factors and actions affecting conservation? *Renewable agriculture and food systems, 24*(1), 38-47.

Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*.

Arrow, K. J. (1958). Utilities, attitudes, choices: A review note. *Econometrica: Journal of the Econometric Society*, 1-23.

Baldock, D., Hart, K., & Scheele, M. (2010). Public goods and public intervention in agriculture. *Directorate-General for Agriculture and Rural Development: Brussels, Belgium*.

Bator, F. M. (1958). The Anatomy of Market Failure. *The Quarterly Journal of Economics, 72*(3), 351-379. doi:10.2307/1882231

Behaviour. (n.d.). *Oxford Living Dictionaries.* Retrieved from https://en.oxforddictionaries.com/definition/behaviour

Bemelmans-Videc, M.-L., Rist, R. C., & Vedung, E. O. (2011). *Carrots, sticks, and sermons: Policy instruments and their evaluation* (Vol. 1): Transaction Publishers.

Bouwma, I., Gerritsen, A., Kamphorst, D. A., & Kistenkas, F. H. (2015). *Policy instruments and modes of governance in environmental policies of the European Union* (2352-2739). Retrieved from

Brotherton, I. (1991). What limits participation in ESAs? *Journal of Environmental Management, 32*(3), 241-249. doi:10.1016/S0301-4797(05)80055-6

Burton, R. J. F. (2004). Reconceptualising the 'behavioural approach' in agricultural studies: A socio-psychological perspective. *Journal of Rural Studies, 20*(3), 359-371. doi:10.1016/j.jrurstud.2003.12.001

Carroll, A. B. (1991). The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. *Business horizons, 34*(4), 39-48.

Case, D. A. (1990). The community's toolbox: the idea, methods and tools for participatory assessment, monitoring and evaluation in community forestry. *The community's toolbox: the idea, methods and tools for participatory assessment, monitoring and evaluation in community forestry.*

Charng, H. W., Piliavin, J. A., & Callero, P. L. (1988). Role identity and reasoned action in the prediction of repeated behavior. *Social Psychology Quarterly, 51*(4), 303-317.

Cooper, T., Hart, K., & Baldock, D. (2009). *Provision of public goods through agriculture in the European Union*: Institute for European Environmental Policy London.

Cornes, R., & Sandler, T. (1996). *The theory of externalities, public goods, and club goods*: Cambridge University Press.

Defrancesco, E., Gatto, P., Runge, F., & Trestini, S. (2008). Factors affecting farmers' participation in agri-environmental measures: A Northern Italian perspective. *Journal of Agricultural Economics, 59*(1), 114-131.

Dwyer, J., Mills, J., Ingram, J., Taylor, J., Burton, R., Blackstock, K. L., . . . Dilley, R. (2007). Understanding and Influencing Positive Behaviour Change in Farmers and Land Managers – A Project for Defra. Final Report. *Understanding and influencing positive behaviour change in farmers and land managers*.

Eliadis, P., Hill, M. M., & Howlett, M. (2005). *Designing government: from instruments to governance*: McGill-Queen's Press-MQUP.

European Court of Auditors. (2017). *Greening: a more complex income support scheme, not yet environmentally effective*. Retrieved from Luxembourg: https://www.eca.europa.eu/Lists/ECADocuments/SR17_21/SR_GREENING_EN.pdf

Filson, G. C. (1993). Comparative differences in Ontario farmers' environmental attitudes. *Journal of Agricultural and Environmental Ethics, 6*(2), 165-184. doi:10.1007/BF01965482

Floress, K., Reimer, A., Thompson, A., Burbach, M., Knutson, C., Prokopy, L., . . . Ulrich-Schad, J. (2018). Measuring farmer conservation behaviors: Challenges and best practices. *Land Use Policy, 70*, 414-418. doi:https://doi.org/10.1016/j.landusepol.2017.11.030

Gasson, R. (1973). GOALS AND VALUES OF FARMERS. *Journal of Agricultural Economics, 24*(3), 521-542. doi:10.1111/j.1477-9552.1973.tb00952.x

Goetz, K. H. (2008). Governance as a Path to Government. *West European Politics, 31*(1-2), 258-279.

Goulder, L. H., & Parry, I. W. H. (2008). Instrument Choice in Environmental Policy. *Review of Environmental Economics and Policy, 2*(2), 152-174. doi:10.1093/reep/ren005

Greiner, R., & Gregg, D. (2011). Farmers' intrinsic motivations, barriers to the adoption of conservation practices and effectiveness of policy instruments: Empirical evidence from northern Australia. *Land Use Policy, 28*(1), 257-265. doi:https://doi.org/10.1016/j.landusepol.2010.06.006

Hijbeek, R., Pronk, A., van Ittersum, M., ten Berge, H., Bijttebier, J., & Verhagen, A. (2018). What drives farmers to increase soil organic matter? Insights from the Netherlands. *Soil Use and Management, 34*(1), 85-100.
Holling, C. S., & Meffe, G. K. (1996). Command and control and the pathology of natural resource management. *Conservation biology, 10*(2), 328-337.
Holzinger, K., Knill, C., & Schäfer, A. (2006). Rhetoric or reality?'New governance'in EU environmental policy. *European Law Journal, 12*(3), 403-420.
Homburg, A., & Stolberg, A. (2006). Explaining pro-environmental behavior with a cognitive theory of stress. *Journal of Environmental Psychology, 26*(1), 1-14. doi:10.1016/j.jenvp.2006.03.003
Hood, C. (1986). The tools of government. Chatham. *NJ: Chatham House*.
Hood, C. C., & Margetts, H. Z. (2007). *The tools of government in the digital age*: Macmillan International Higher Education.
Howlett, M. (2009a). Governance modes, policy regimes and operational plans: A multi-level nested model of policy instrument choice and policy design. *Policy Sciences, 42*(1), 73-89.
Howlett, M. (2009b). Government communication as a policy tool: A framework for analysis. *Canadian Political Science Review, 3*(2), 23-37.
Kabii, T., & Horwitz, P. (2006). A review of landholder motivations and determinants for participation in conservation covenanting programmes. *Environmental Conservation, 33*(1), 11-20. doi:10.1017/S0376892906002761
Keohane, N. O., Revesz, R. L., & Stavins, R. N. (1998). The choice of regulatory instruments in environmental policy. *Harv. Envtl. L. Rev., 22*, 313.
Knill, C., & Lenschow, A. (2000). *Implementing EU environmental policy: New directions and old problems*: Manchester University Press.
Knill, C., & Tosun, J. (2012). *Public policy: A new introduction*: Macmillan International Higher Education.
Lascoumes, P., & Le Galès, P. (2007). Introduction: understanding public policy through its instruments—from the nature of instruments to the sociology of public policy instrumentation. *Governance, 20*(1), 1-21.
Lokhorst, A. M., Staats, H., Van Dijk, J., Van Dijk, E., & De Snoo, G. (2011). What's in it for Me? motivational differences between farmers' subsidised and non-subsidised conservation practices. *Applied Psychology, 60*(3), 337-353. doi:10.1111/j.1464-0597.2011.00438.x
López-Mosquera, N., & Sánchez, M. (2012). Theory of Planned Behavior and the Value-Belief-Norm Theory explaining willingness to pay for a suburban park. *Journal of Environmental Management, 113*, 251-262. doi:https://doi.org/10.1016/j.jenvman.2012.08.029
Marwell, G., & Ames, R. E. (1979). Experiments on the Provision of Public Goods. I. Resources, Interest, Group Size, and the Free-Rider Problem. *American Journal of Sociology, 84*(6), 1335-1360.
McDowell, C., & Sparks, R. (1989). The multivariate modelling and prediction of farmers' conservation behaviour towards natural ecosystems. *Journal of Environmental Management, 28*(3), 185-210.
Mills, J., Gaskell, P., Ingram, J., Dwyer, J., Reed, M., & Short, C. (2017). Engaging farmers in environmental management through a better understanding of behaviour. *Agriculture and Human Values, 34*(2), 283-299. doi:10.1007/s10460-016-9705-4
Ministerie van Landbouw Natuur en Voedselkwaliteit. (2018). Visie Landbouw, Natuur en Voedsel: Waardevol en Verbonden. Retrieved from https://www.rijksoverheid.nl/ministeries/ministerie-van-landbouw-natuur-en-voedselkwaliteit/documenten/beleidsnota-s/2018/09/08/visie-landbouw-natuur-en-voedsel-waardevol-en-verbonden
O'Toole, L. J. (2007). Governing outputs and outcomes of governance networks. In *Theories of democratic network governance* (pp. 215-230): Springer.
Panaiotov, T. (1994). *Economic instruments for environmental management and sustainable development*: UNEP Nairobi.
Peters, B. G. (2000). Globalization, institutions and governance. *Governance in the Twenty-First Century: revitalizing the public service*, 29-57.
Potter, C., & Gasson, R. (1988). Farmer participation in voluntary land diversion schemes: Some predictions from a survey. *Journal of Rural Studies, 4*(4), 365-375. doi:10.1016/0743-0167(88)90005-8
Potter, C., & Lobley, M. (1992). The conservation status and potential of elderly farmers: Results from a survey in England and Wales. *Journal of Rural Studies, 8*(2), 133-143. doi:10.1016/0743-0167(92)90072-E
Rode, J., Gómez-Baggethun, E., & Krause, T. (2015). Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence. *Ecological Economics, 117*, 270-282.
Rose, J. (1993). Government advertising in a crisis: the Quebec referendum precedent. *Canadian Journal of Communication, 18*(2).
Russel Bernard, H. (1988). Research methods in cultural anthropology. *Qualitative and*.

Salomon, L. M. e. (2002). *The tools of government: A guide to the new governance*: Oxford University Press.
Samuelson, P. A. (1954). The pure theory of public expenditure. *The review of economics and statistics*, 387-389.
Samuelson, P. A. (1995). Diagrammatic Exposition of a Theory of Public Expenditure. In S. Estrin & A. Marin (Eds.), *Essential Readings in Economics* (pp. 159-171). London: Macmillan Education UK.
Saublens, C. (n.d.). Policy instruments. Retrieved from http://www.know-hub.eu/knowledge-base/videos/policy-instruments.html
Schneider, A., & Ingram, H. (1990). Behavioral Assumptions of Policy Tools. *The Journal of Politics, 52*(2), 510-529. doi:10.2307/2131904
Schouten, C. (2018). Beantwoording inbreng Schriftelijk Overleg EU-voorstellen Gemeenschappelijk Landbouwbeleid COM (2018) 392, 393 en 394 [Letter of government]. Retrieved from https://www.rijksoverheid.nl/documenten/kamerstukken/2018/08/30/beantwoording-vragen-vaste-commissie-lnv-over-eu-voorstellen-gemeenschappelijk-landbouwbeleid
Schwartz, S. H. (1977) Normative influences on altruism. In*: Vol. 10. Advances in Experimental Social Psychology* (pp. 221-279).
Schwartz, S. H., & Howard, J. A. (1981). A normative decision-making model of altruism. *Altruism and Helping Behavior: Social, Personality, and Developmental Perspectives*, 189-211.
Siebert, R., Toogood, M., & Knierim, A. (2006). Factors affecting european farmers' participation in biodiversity policies. *Sociologia ruralis, 46*(4), 318-340. doi:10.1111/j.1467-9523.2006.00420.x
Skerratt, S. (1994). Itemized payment systems within a scheme: the case of Breadalbane.
Terry, D. J., Hogg, M. A., & White, K. M. (1999). The theory of planned behaviour : Self- Identity, social identity and group norms. *British Journal of Social Psychology, 38*(3), 225-244. doi:10.1348/014466699164149
Vanslembrouck, I., Van Huylenbroeck, G., & Verbeke, W. (2002). Determinants of the willingness of Belgian farmers to participate in agri-environmental measures. *Journal of Agricultural Economics, 53*(3), 489-511.
Vedung, E. (2017). Policy instruments: typologies and theories. In *Carrots, sticks and sermons* (pp. 21-58): Routledge.
Westerink, J., Plomp, M., Ottburg, F., Zanen, M., & Schrijver, R. (2018). *Boeren voor Natuur: de ultieme natuurinclusieve landbouw?* (1566-7197). Retrieved from
Westhoek, H. J., Overmars, K. P., & van Zeijts, H. (2013). The provision of public goods by agriculture: Critical questions for effective and efficient policy making. *Environmental Science & Policy, 32*, 5-13. doi:https://doi.org/10.1016/j.envsci.2012.06.015
Wilson, G. A. (1996). Farmer environmental attitudes and ESA participation. *Geoforum, 27*(2), 115-131.
Wilson, G. A. (1997). Factors influencing farmer participation in the environmentally sensitive areas scheme. *Journal of Environmental Management, 50*(1), 67-93.
Wilson, G. A., & Hart, K. (2000). Financial imperative or conservation concern? EU farmers' motivations for participation in voluntary agri-environmental schemes. *Environment and planning A, 32*(12), 2161-2185.
Wynn, G., Crabtree, B., & Potts, J. (2001). Modelling farmer entry into the environmentally sensitive area schemes in Scotland. *Journal of Agricultural Economics, 52*(1), 65-82.

Appendix I – Background information selected farmers

Respondent	Location	Person interviewed	Role in farm management	Highest education level	Age group	Public goods
Dairy farmer 1	Groningen	Man	Co-manager	2	Senior	Farmland biodiversity, agricultural landscapes
Sheep farmer 1	Noord-Holland	Man	Co-manager	4	Senior	Farmland biodiversity, agricultural landscapes
Arable farmer 1	Friesland	Man	Co-manager	3	Young	Soil functionality
Dairy farmer 2	Friesland	Man	Co-manager	2	Middle	Farmland biodiversity, agricultural landscapes, soil functionality, water quality
Dairy farmer 3	Overijssel	Woman	Co-manager	2	Middle	Farmland biodiversity, agricultural landscapes
Dairy farmer 4	Noord-Holland	Man	Co-manager	2	Young	Soil functionality
Beef farmer 1	Utrecht	Man	Co-manager	2	Middle	Farmland biodiversity, agricultural landscapes, soil functionality, water quality
Arable farmer 2	Brabant	Woman	Manager	3	Middle	Farmland biodiversity, soil functionality
Dairy farmer 5	Gelderland	Man + woman	Co-manager	2	Middle	Farmland biodiversity, soil functionality, water quality
Beef farmer 2	Utrecht	Man	Co-manager	3	Middle	Farmland biodiversity, agricultural landscapes, soil functionality, water quality
Dairy farmer 6	Zuid-Holland	Man	Co-manager	2	Senior	Farmland biodiversity, agricultural landscapes, soil functionality, water quality
Dairy farmer 7	Overijssel	Man	Co-manager	n/a	Senior	Farmland biodiversity, soil functionality
Dairy farmer 8	Friesland	Man	Co-manager	3	Young	Agricultural landscapes, farmland biodiversity, soil functionality, water quality
Arable farmer 3	Overijssel	Woman	Co-manager	3	Young	Soil functionality
Dairy farmer 9	Groningen	Man + trainee	Co-manager	n/a	Senior	Agricultural landscapes, farmland biodiversity, soil functionality
Dairy farmer 10	Groningen	Man	Co-manager	3	Senior	Agricultural landscapes, farmland biodiversity
Dairy farmer 11	Friesland	Woman	Co-manager	3	Middle	Agricultural landscapes, farmland biodiversity
Arable farmer 4	Drenthe	Woman	Co-manager	3	Young	Farmland biodiversity, soil functionality, water quality
Dairy farmer 12	Drenthe	Man	Co-manager	4	Young	Farmland biodiversity, agricultural landscapes
Dairy farmer 13	Zuid-Holland	Woman	Co-manager	4	Young	Farmland biodiversity, agricultural landscapes

Appendix II – Interview protocol

1. **Introduction**

2. **Overview of the farm**

   Example questions:

   a. Farm size?
   b. Land type?
   c. Type of farming?
   d. Who is involved in the farm – family, number of employees?
   e. Which aspect of the farm makes you most proud?

3. **Public goods / public good measures / factors influencing public good behaviour**

   Example questions:

   a. Are you participating in any initiative that contributes to the provisioning of public goods (e.g. nature inclusive agriculture, meadow bird management, agri-environment scheme)?
   b. Could you explain your reasons for joining? What has affected your decision to join?
   c. What were the consequences for your farm management?
   d. Does this initiative involve the whole farm? Can you explain your considerations for different parts of the farm?
   e. Have you made any changes to the way you farm throughout the years?
   f. Can you explain what factors caused or influenced these changes?
   g. What positive outcomes have you observed?
   h. What factors are most likely to affect your decision to maintain public good practices on your farm on the longer term?

4. **Policy instruments / incentivising public good behaviour**

   Example questions:

   a. Would you be happy to do more on public goods on your farm? What could function as an incentive?
   b. How do you think the Dutch government could incentivise farmers to incorporate public good measures on their farms?
   c. Do you see a role for the CAP? How?

5. **Closure**

   Thank for participation

Appendix III - Codebook

First round		Second round	
Code	Description	Code	Examples
1ATO	Ability to adopt		
		Location	En dat komt ook een beetje door het gebied waarin je boert.
		Equipment available	Omdat het mooi is, maar ik wil ze nu ook hier houden omdat de bedrijfsvoering er inmiddels helemaal op ingericht is, er geschikt voor gemaakt is.
		Cooperation	Want een deel van het weidevogelbeheer licht in het particulier natuurbeheer, dus dat is gewoon een stukje natuur dat we in beheer hebben en dat valt onder een contract en een deel licht op 20 hectare dat ik samen met de Vogelbescherming verworven heb dus daar licht ook een apart deel op
		Farm characteristics	Zit je toevallig tegen een bos aan, hierachter heb je nog een bosje van Staatsbosbeheer, dat vinden zij ook leuk. In feite heeft dat niet zoveel met mijn bedrijfsvoering te maken. En ik heb dan zelf nog een stukje dat is van oorsprong afkomstig van dijk van een landschap daar hebben we nog wat oude boomsoorten aangeplant op een stukje langs de dijk en dat is nog steeds. En daarmee kan ik een stuk van mijn natuur eis van bioswiss afdekken
		Time and labour	Je bent er dus wel intensiever mee aan de slag gegaan? Ja, ook omdat we er meer tijd voor hebben. En we dus proberen nog weer een slag te maken
1WTO	Willingness to adopt		
		Willing to be different	Dat vind ik leuk, ik wil geen standaard boer zijn die achter iedereen aan loopt. Maar ja, ik bedoel, hebben we het nu met elkaar allemaal zo slecht? Nee. We hebben het hartstikke goed, alleen soms dan past het niet en dan moeten we even een stapje terug doen en slaan we even weer een andere weg in en gaat het weer goed
		Objectives	Ik heb geïnvesteerd naar de toekomst toe ik en ik wil met biodiversiteit aan de slag en zelfvoorzienende akkerbouw.
		Society	Maar de omgeving wil daar gewoon naartoe. Ik denk altijd de omgeving is jouw consument dus wil je dat er elke ochtend melk gedronken of pap gegeten wordt dan moet je toch wat gaan doen.
		Out of the box	Ik mag wel graag out of the box denken
		Don’t know why	Ja. Waarom wil je het niet. Waarom zou je dat niet willen
		Personal beliefs	We proberen alles wat de mens tussen de koe en gras bedacht heeft in ieder geval ter discussie te stellen en ook daadwerkelijk uit te proberen of dat wel nut heeft om uit te voeren in een heel gezond product.
		Personality	Nouja ik ben een doorzetter. En nogmaals ik ben een pragmaticus
		Entrepreneurship	Dus toen hebben wij gezegd, we willen eigenlijk met dit bedrijf laten zien je binnen een natuurgebied nog prima een goed renderend economisch bedrijf kan neerzetten. Daar zijn we mee bezig gegaan

		Challenge	Omdat het ook zonder kan. Dat is gewoon de uitdaging. Als het vanuit de bodem kan, met minder kunstmest. Dan is dat een uitdaging voor ons
		Sense of responsibility	Je voelt je verantwoordelijk,
		Next generation	Maar ook omdat je ook nog iets over wilt dragen aan de volgende generatie. Dat is wel een beetje waar ik naar kijk
		Job satisfaction	Maar ik merk ook gewoon sinds de omschakeling dat je er gewoon enorm veel plezier in hebt. Dus ik zou niet meer terug willen naar gangbaar. Dus als dat de enige optie was, dan zou ik eerder stoppen.
1SOC	Social factors		
		Jobs	Ik heb er zelf altijd een baan bij gehad
		Internships	Ik heb deels van mijn vader en deels van mijn stage
		Study clubs	Via de studiegroep met biologische akkerbouwers
		Board member	Het is wel zo, want ik zit ook in het bestuur van een collectief die het weidevogelbeheer regelt, ja dan ben je er wel zo bij betrokken en dan weet je ook wel zoveel over de vogelstand dat het belagrijk is in dit gebied en alles
		Customers	Wij hebben hier een boerderij winkel en wordt vrij veel rauwe melk verkocht. 100 tot 120 liter in de week. Toen ik een keer of drie de vraag had gehad van een klant had gehad, voer jij ook mais bij, ik wist toen ook wel dat geeft de melk een hele andere vetzuursamenstelling geeft bij de melk. Toen dacht ik van ja, als ik daar een beetje eerlijk op wil antwoorden dat ik dat niet doe, dan moet dat dus ook uit het krachtvoer en dat is inmiddels ook gebeurd. En dat is niet een of andere minister die dat zegt, maar puur het verhaal van de klant. Dat valt wel op.
		Neighbourhood	En ook vanuit mijn omgeving werd hier altijd positief op gereageerd
		Society	
		Parents	Ik ben geboren in de Friese Wouden. We hadden een klein bedrijf met 20 ha en 20 melkkoeien en we hebben altijd een hart voor de natuur gehad, dat heb ik in mijn opvoeding meegekregen
1FIN	Financial considerations		Nou we doen nu dus die randen. Omdat we dat financieel nog nodig hebben
2LEG	Legislative and regulatory instruments		En biologische boeren in de hele wetgeving toch een uitzonderingspositie geven. We zijn al gelimiteerd, we mogen maar 170kg stikstof produceren bij hectare.
2ECO	Economic and fiscal instruments		Het is voor ons gewoon een combinatie van je hebt er plezier in en helemaal met die deal die we gemaakt hebben met de vogelbescherming met die 20 hectare, heb je er ook gewoon economisch wat aan. En dat moet ook eigenlijk wel gewoon, want van een grap kun je niet leven.
2INFO	Information and communication instruments		Ik denk dat de sleutel ervan de kennis is. Kennis over je grasland, kennis over wat je koeien voert, wat daarvan de invloed is op de kwaliteit van je product