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Master Thesis

# Exploring farmers' motivation for collective action: A Q study on collaboration in Dutch agri-environment schemes

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ECO SYSTEM SERVICES

# Abstract

Within the European Union's Common Agricultural Policy, agri-environment schemes (AES) have been designed to address the degradation of the natural environment caused by agriculture. To improve the schemes' ecological effectiveness, a collective approach focusing on a landscape instead of a single farm level is recommended. This approach is rarely applied across Europe except for the Netherlands, where all AES have to be realised collectively since 2016. As participation in the schemes is voluntary, understanding farmers' motivation to join is crucial since the uptake and implementation of measures is prerequisite for achieving any effects. Hence, the aim of this study is to explore Dutch farmers' motivation to participate in collective AES and to find out about the scheme's main advantages and disadvantages perceived by the farmers. A Q study with 15 farmers from six provinces shows three dominant motivational views: a collective-oriented, a business-oriented and an environment-oriented perspective. All farmers unites their affection and care for nature, which is accompanied by different levels of problem awareness and affiliation to the collective. Financial compensation is deemed important by all, yet rather as necessary mean to enable required changes in farming practices than as additional source of revenue. While the Dutch schemes can still be further improved to allow for more flexibility, a better integration of the farmers' knowledge and enhanced communication, all farmers dismiss many caveats related to collective action, indicating a potential to promote the Dutch approach beyond national borders.

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# List of Abbreviations

| | |
|---|---|
| AECM | Agri-environment-climate measures |
| AES | Agri-environment scheme |
| cAES | Collective agri-environment scheme |
| CAP | Common Agricultural Policy |
| CFA | Centroid factor analysis |
| EC | European Commission |
| ES | Ecosystem services |
| EU | European Union |
| FAO | Food and Agriculture Organization of the United Nations |
| IPBES | Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services |
| LEC | Local environmental cooperative |
| MEA | Millennium Ecosystem Assessment |
| NVWA | Netherlands Food and Consumer Product Safety Authority |
| OECD | Organisation for Economic Co-operation and Development |
| PCA | Principal component analysis |
| RVO | Netherlands Enterprise Agency |
| SED | Standard error of difference |

# 1 Introduction

## 1.1 Agri-environment schemes and the need for collective action

Agriculture constitutes a main driver for the deterioration of the natural environment leading to a severe loss of biodiversity and ecosystem degradation, also reinforcing climate change (IPBES, 2019). Current agricultural practices are often linked to the emission of pesticides, nutrient surpluses or adverse management practices such as untimely soil tillage or draining peatlands, all negatively affecting biodiversity and ecosystems (Albert et al., 2017). The agricultural intensification during the past decades in western Europe has resulted in detrimental consequences for the diversity and abundance of species (Runhaar et al., 2017) and most ecosystem services (ES)[1], in particular regulating and non-material services (Albert et al., 2017). At the same time, the need of society for climate regulation, clean drinking water, recreational space and other ecosystem services is growing (Reed et al., 2014).

In the European Union (EU), agricultural policies are designed in the context of the Common Agricultural Policy (CAP). To reduce environmental degradation and meet societal demands for ES provided by agriculture, agri-environment schemes (AES) were introduced to the CAP in the 1980s and became obligatory for all member states in 1992 (Council Regulation (EEC) No 2078/92). AES are payment schemes for voluntary agri-environmental commitments, compensating land managers for additional costs or income forgone due to applying certain environmentally-friendly farming practices (European Commission, 2005). Member states or regions are responsible for developing the schemes, which each consist of a series of measures (agri-environment-climate measures, AECM[2]). Designed at national, regional or local level, AECM aim to address environment-related challenges like enhancing biodiversity, soil quality and water quality or quantity by, for instance, extensive farming and reducing fertiliser and pesticide inputs.

Although halting the loss of biodiversity is a main objective of AES, the ecological effects achieved are mixed, with measures not yet being able to halt the decline of biodiversity (Kleijn & Sutherland,

[1] Ecosystem services (ES) are direct and indirect contributions of ecosystems to human well-being, i.e. goods and services from which people derive direct or indirect benefits (Naturkapital Deutschland - TEEB DE, 2012). They can be classified as *provisioning service*s (provided or produced goods like raw materials or food), *regulating services* (derived from regulating ecosystem processes like climate regulation or carbon sequestration), *cultural services* (intangible services that provide, for instance, spiritual or educational benefits) and *supporting services* (underlying all other ES, such a photosynthesis or nutrient cycling) (MEA, 2005).

[2] Until the rural development regulation of 2013 (EU) No 1305/2013 called agri-environment measures (AEM).

2003; Whittingham, 2006, 2011). Multiple reasons for these results have been explored (Ahnström et al., 2008; Burton & Paragahawewa, 2011; Uthes & Matzdorf, 2012), identifying the spatial scale as one key factor (McKenzie et al., 2013). Certain environmental goals addressed by AES, like biodiversity conservation including habitat connectivity, improving water management, or the sustained provision of many ES can only be effectively addressed at landscape level (Prager et al., 2012; Vanni, 2013), because in these cases environmental benefits do not increase linearly, but entail thresholds and discontinuities (Kuhfuss, Coent, et al., 2015). Landscape is understood as an area characterised by (inter)action of natural and/or human factors (Prager et al., 2012). Landscape level refers to a spatial level above a field- or farm-level, for instance an area with coherent landscape character, a catchment or a sub-unit of a natural region.

Many species require landscape-level diversity offering different habitats for different functions, like foraging, roosting or nesting (Emery & Franks, 2012). A network of (semi-) natural areas (green-blue infrastructure) is necessary to allow for the migration of species between the different areas (Westerink et al., 2014). Hence, the impacts of fragmented land on which AECM are implemented depend not only on size and quality, but also distance and connectivity between them and further habitats (McKenzie et al., 2013). To overcome this spatial mismatch between administrative land management and ecological processes (Cumming et al., 2006), and to surpass the threshold of achieving benefits (OECD, 2013), many studies recommend to (collaboratively) apply AECM on a landscape level. This implies the spatial coordination of individual measures on farms to meet ecological targets at the landscape level (c.f. (Emery & Franks, 2012; Franks & McGloin, 2007a; Mills et al., 2011; Prager et al., 2012; Whittingham, 2006).

In particular considering the increasing environmental challenges related to climate change, a landscape-level approach yields the potential to overcome problems of spatially diffuse ecological degradation such as diffuse pollution or soil erosion (Mills et al., 2011). Additionally, it reduces habitat fragmentation, maintains ecological networks and promotes pollination services and other regulating ES, thus enhancing the resilience of species and ecosystems (Emery & Franks, 2012; Jones et al., 2020; McKenzie et al., 2013; Sutherland et al., 2012). To create land stewardship and sustainable rural systems, Prager et al. (2012) emphasise the need for a participatory approach, involving not only experts, but including local stakeholder knowledge, seeking joint learning opportunities and developing schemes in a collective manner.

Despite vast scientific evidence emphasising the need for collective action at landscape level, the CAP focuses on individual farmers and does not explicitly support collaboration (Leventon et al., 2017). Only since 2014, compensation payments are allowed to be paid to “farmers, groups of farmers, or groups of farmers and other land-managers” (Regulation (EU) No 1305/2013, article

28, sub-clause 2), opening up the possibility for a collective delivery of AECM. This processes was promoted by the Netherlands, where since 2016 all AES have to be realised collectively (Terwan et al., 2016). Also in other countries, models of collaboration have been developing, often as bottom-up movements, for example in Belgium, the UK or Germany (Westerink et al., 2017).

## 1.2 Forms of cooperative agri-environmental management

Collective action refers to (voluntary) action taken by a group to achieve a (perceived) shared interest (Uetake, 2012). In the context of agri-environmental management it is defined as "set of actions taken by a group of farmers, often in conjunction with other people and organisations, acting together in order to tackle local agri-environmental issues" (OECD, 2013, p. 58).

Existing landscape approaches can refer to numerous types of activities, which all include a form of spatial coordination, but vary widely regarding actors, their roles and responsibilities (Westerink et al., 2017). Approaches range from local farmer-led initiatives to broad arrangements including non-governmental organisations, governments, researchers and other stakeholders in varying institutional constellations (OECD, 2013). While farmers are the core group, providing labour and equipment and implementing agri-environmental agreements on their farm, non-farmers are often involved to provide knowledge and expertise or to function as coordinators to assist with organisation, planning, administration and communication. Governments may support collective action via policy measures and regulations, technical assistance or funding programmes. Due to its complexity, spatial coordination is often undertaken by professional organisations (governmental agency, farmers' organisation or other), but different stakeholders are constructively engaged in processes of decision making and management (Westerink et al., 2017).

Initiatives can be established bottom-up (farmer-led) or top-down (often agency-led) (Uetake, 2012) and take on many different forms, from informal to formal constellations (Wynne-Jones, 2017). The process of working together can refer to *collective management* based on property rights, *cooperation* where social or economic benefits are expected by participants and *collaboration* to achieve one or more specific aims together (Emery & Franks, 2012).

According to Prager (2015), the spectrum of working together ranges from coordination to collaboration without clear barriers. Coordination is a rather top-down and straightforward approach, which involves working towards the same objective in isolation (for example for managing protected areas) and is relatively easier to establish and less costly. Collaboration is more often initiated bottom-up, includes meetings and working together while maintaining a dialogue and is more dif-

ficult due to diverging interests and objectives as well as the necessity of building trust and establishing social networks and relationships. While traditionally AES have been coordinated top-down, collaboration might be necessary for achieving sustainable management of wider landscapes.

## 1.3 Advantages and challenges of collective agri-environment schemes

Collective AES (cAES) integrate a range of environmental, social and economic benefits (Wynne-Jones, 2017). Greater ecological effectiveness is achieved by covering larger areas and addressing problems at appropriate scales (OECD, 2013). This enables, for example, the creation of habitat mosaics, improving freshwater quality, providing a recreational infrastructure (Prager, 2015) or dealing with issues of diffuse pollution or flooding (Franks, 2011). Also, increasing participation rates and the adaptation of schemes to local circumstances are contributing to increased environmental benefits ( Franks, 2011; OECD, 2013). Further, if implemented in a participatory approach, cAES integrate a variety of sectors and stakeholders, who contribute with different kinds of knowledge, offering more adaptive and robust solutions (Dedeurwaerdere et al., 2016; Emery & Franks, 2012).

Individual AECM have been criticised to have limited, if any long-term impact on environmental attitudes of participating farmers (Burton & Paragahawewa, 2011). In contrast, cAES can promote a cultural embeddedness of pro-environmental practices, since social learning and increased confidence facilitated through communication and exchange between farmers and other stakeholders (including nature conservationists) lead to changing attitudes and behaviour (Emery & Franks, 2012; Mills et al., 2011; van Dijk et al., 2016). Moreover, in participatory approaches farmers tend to stay longer in schemes, as they develop a sense of ownership and feel proud of their actions (Emery & Franks, 2012; Prager & Freese, 2009; Prager & Nagel, 2008). Hence, the facilitation of collaboration enables not only the exchange of knowledge and information, but also offers the opportunity to create *cultural capital*, describing expertise, skills and abilities related to the (changing) management and common actions, as well as *social capital*, defined as the "soft qualities of networks and relationships that enable groups to accomplish things together, including trust, access to knowledge and support, shared values and the capacity to learn and innovate as a group" (Westerink et al., 2020, p. 391). [3] Both can result in pride and prestige, making the schemes culturally sustainable (van Dijk et al., 2015).

[3] For a more detailed definition of social and cultural capital as well as a discussion on their importance for a sustainable implementation of AES see Burton & Paragahawewa (2011).

Yet, the organisation and implementation of collective schemes also entail a range of challenges. To achieve desired ecological outcomes, areas and activities need to be well targeted (Reed et al., 2014). Moreover, strategies which are adapted to local and changing circumstances as well as clear and demonstrable aims should be defined (Emery & Franks, 2012; Mills et al., 2011). Another challenge is that farmers may be reluctant to join collective schemes if requirements contradict local farming standards, because they do not want to become vulnerable to defaulting by others (Sutherland et al., 2012), or if they fear that others will act as free riders (Mills et al., 2011). The value of independence and the fear of exposure to others, individualism, and a lack of common understanding, communication and trust constitute main barriers to collective action (Emery & Franks, 2012; Riley et al., 2018). Further, a lack of support, ecological knowledge and misperceptions about how others think and act hinder collaboration (Franks et al., 2016). Hence, social capital including social networks, reciprocity and trust are the basis for collective action (OECD, 2013; Prager, 2015). As it takes time to establish collaborative groups and achieve changes in land management, it can be an advantage if existing groups take over this role (Prager, 2015). For successful collaboration, good communication, feedback and knowledge exchange which contribute to trust and social relationships are key (Jones et al., 2020; OECD, 2013; Prager et al., 2012). Also, the group should share norms, aims (Mills et al., 2011), values and beliefs (Franks, 2011) as well as a common understanding of given resources and issues (Uetake, 2015). Further, a willingness to learn and accept advice (Mills et al., 2011) as well as to cooperate and change (Franks, 2011) is crucial. Rules have to be adjusted to local circumstances (Uetake, 2015), and monitoring and sanction systems established to prevent rule breaking and free riding (OECD, 2013).

Moreover, groups depend on skilled and determined leadership (Mills et al., 2011; Prager, 2015), as well as financial and non-financial support (OECD, 2013). Funding should cover all transaction costs (Jones et al., 2020; Prager, 2015). Support with coordination and administration (Hodge & Adams, 2013), access to information and knowledge, legal assistance, education or training (Mills et al., 2011; OECD, 2013) and advice on funding and management (Prager, 2015) positively influence the success of collective action. Groups should be small enough to allow for good personal connections and effective communication (Mills et al., 2011; Prager, 2015), yet at the same time be large enough to spread costs among members and reach an economic viability and influence (Franks, 2011).

An aspect of ambiguity are the economic implications of collective schemes. Mills et al. (2011) suggest that collective contracts imply higher initial transaction costs, which can later be compensated by lower costs due to fewer negotiations of individual agreements, as well as lower advice and monitoring costs. For the Netherlands, where also in the cAES individual contracts are signed

with the farmers (cf. chapter 3.3), Westerink et al. (2017) argue that costs increase due to governance efforts at landscape level, which however can be justified by an increase of the schemes' ecological effectiveness. Yet another perspective is that cAES are more cost-effective, by saving costs through economies of scale and scope, sharing resources and cost reductions through coordinated provision of multiple public goods (OECD, 2013; Prager, 2015). Costs can further be reduced through the use of existing social networks and the presence of trust and shared norms including reciprocity (OECD, 2013).

## 1.4 Research objectives

The participation in (c)AES is voluntarily, hence understanding farmers' motivation to join the schemes is crucial, as the uptake and implementation of measures is prerequisite for achieving any effect at all (Prager & Nagel, 2008). While many studies exist on the motivation to participate in individual AES (Lastra-Bravo et al., 2015; Siebert et al., 2006), as well as in other agricultural conservation measures (Ahnström et al., 2008), little is known about farmers' motivation for cAES. This master thesis, therefore, aims to

1) contribute to the discourse by exploring the motivation of Dutch farmers to participate in cAES via Q methodology, and to
2) find out about the main advantages and disadvantages of Dutch cAES compared to the previous individual AES perceived by participating farmers via open questions.

Q has been selected as main methodology, as it enables to find out about study participants' – in this case farmers' – subjective viewpoints, which are basis for understanding their decision to (not) participate in cAES. Gaining knowledge on what motivates farmers to join cAES can serve as basis for creating more attractive schemes by considering motivational aspects in scheme designs, hence promoting participation and enhancing effectiveness through increased participation. Also, findings from the Dutch case may support the introduction of collective schemes in further regions of Europe.

The literature review on which this thesis is based includes studies of agri-environmental cooperation and the uptake of voluntary agri-environment or conservation schemes published since 2000 in the European Union and Switzerland. It is supplemented with studies from Australia, the United States, New Zeeland and Canada, to gain a comprehensive overview but not neglect the context, i.e. studies which refer to a similar biophysical and/or socio-cultural context. Also, recent evaluation reports of existing collective schemes in the EU have been included (Jones et al., 2020; Wanner et al., 2020).

In the following, a conceptual framework will be introduced to elucidate how motivation to join cAES can be approached and analysed. Afterwards, Q methodology will be explained and the Dutch approach of cAES will be described in more detail. Subsequently, the research design and data collection will be outlined, followed by the analysis and results of the study to then discuss its key findings and implications as well as the methodological approach before drawing conclusions.

The thesis is embedded into the EU-funded Horizon2020 research project *Contracts2.0*. Contracts2.0 aims to develop novel contractual solutions to enhance land managers' motivation for the increased provision of public goods, while allowing them to reconcile the profitability of their farm with given sustainability objectives (Contracts2.0, 2020).

# 2 Conceptual framework

This chapter will introduce the main motivational influences for farmers to participate in cAES as presented in a framework by Bargusen et al. (under review) who reviewed studies on cAES and tested the relevance of the resulting framework in a study with representatives of the Dutch collectives. For the study at hand, the main motivational influences by Bargusen et al. (under review) were complemented by insights on farmers' motivation in individual AES and literature on farm characteristics to include further potentially relevant aspects for this study.

## 2.1 Motivation for collective agri-environmental engagement

As the implementation of (c)AES depends on the voluntary participation of farmers, understanding their motivation is crucial for a scheme's success (Prager & Nagel, 2008). Even though much related research exists, few if any universal variables have been found explaining the (non)adoption of conservation measures in agriculture, as the local context strongly influences participation decisions (Knowler & Bradshaw, 2007). Often, farmers have to make decisions under great external pressures from markets, laws, regulations and subsidies they depend upon, trying to balance public demands for cheap food with an environmentally friendly production (Ahnström et al., 2008). While economic aspects are confirmed to play an important role, many further aspects cannot be neglected to comprehend the motivation to participate, such as social, political, household and individual characteristics or concern for the environment (Karali et al., 2014). Yet, farmers are heterogenous and their willingness and ability to join nature conservation schemes cannot be reduced neither to attitudes or values, nor to economic, agronomic, cultural, social or psychological factors (Siebert et al., 2006). Their decisions can rather be understood as a process marked by complex interactions and various influences, for which to understand a dynamic analysis is required (Ingram et al., 2013). While the current state of research primarily offers insights in the motivation to participate in individual AES, the motivation to participate in collective schemes is expected to be even broader (Barghusen et al., under review; Mills et al., 2011). Also, by addressing key concerns of individual schemes, cAES may appeal to farmers who did not take part in individual schemes (Emery & Franks, 2012; McKenzie et al., 2013).

The framework used by Bargusen et al. (under review) was adapted from a framework originating in environmental psychology by Hamann et al. (2016), based on a model of pro-environmental behaviour by Matthies (2005). It combines economic, psychological and sociological factors, integrating sources of extrinsic motivation (actions undertaken for their instrumental value) and intrinsic motivation (actions undertaken for their inherent satisfaction) (Barghusen et al., under review).

It differentiates between (a) costs and benefits, (b) personal norms and (c) social norms (cf. Hamann et al., 2016). Costs and benefits are clustered into monetary rewards (e.g. compensation payments), indirect rewards (e.g. provision of extension services or ecological benefits) and cost savings (e.g. through sharing labour or resources). By making decisions, individuals try to avoid or reduce costs (monetary or behavioural, like stress), while trying to increase benefits. The personal norms refer to the perceived obligation to behave environmentally friendly, which is based on (i) problem awareness, (ii) the perceived responsibility and (iii) group-efficacy, which is the trust in the group's ability to reach a goal. Social norms guide individual behaviour. They are rules and standards of a group or society an individual feels attached to. They comprise (i) injunctive norms, which are moral guidelines or beliefs on how to act and (ii) descriptive norms, describing the (perceived) actual and popular behaviour of people. The different (sub)categories influence each other and are part of a cognitive weighting process which leads to a decision. An overview of the different aspects is shown in Figure 1.

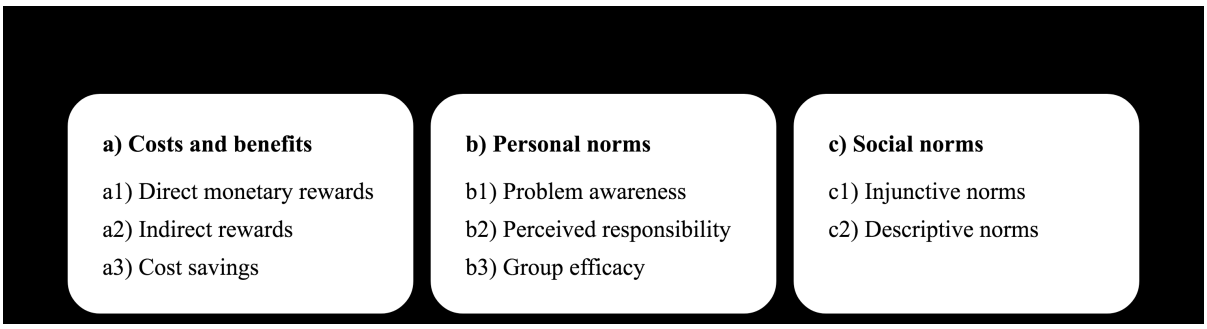


Figure 1: Conceptual framework (Barghusen et al., under review)

### 2.1.1 Costs and benefits

#### a1) Direct monetary rewards

Compensation payments as source of income have found to be an important or the most important reason to participate in AES (Barghusen et al., under review; Dedeurwaerdere et al., 2016; Franks & McGloin, 2007b; Wilson & Hart, 2000). As farmers operate in tight financial situations, many depend on subsidies or additional non-farming income (Ahnström et al., 2008; Karali et al., 2014). Often, financial support is needed to implement sustainable farming practices (Mills et al., 2011). The lack of an adequate compensation poses a barrier to participation (Defrancesco et al., 2008; Wilson & Hart, 2000). To reach objectives in collective schemes it is crucial that the funding also covers coordination, facilitation and advice costs (Prager et al., 2012).

To incentivise collective action, different forms of payment conditions and bonuses are discussed in the literature. Payments could be linked to pre-determined environmental thresholds or participation rates to reach a critical mass of participants for sufficient land coverage (Kuhfuss, Coent, et

al., 2015; Westerink et al., 2017). Alternatively, a collective bonus could be paid if a given number of farmers participating in a region, or catchment of interest is reached, or a bonus could be paid per hectare involved to increase the share of farmland which farmers include in a scheme (Kuhfuss, Coent, et al., 2015). Also, an agglomeration bonus is recommended to be paid for each plot enrolled which borders another plot to boost coordinated participation (Kuhfuss, Préget, et al., 2015) and incentivise cooperation across property boundaries for the management of certain ES (Reed et al., 2014). To be effective, such payments need to distinguish between co-operators and free-riders and include a minimum participation rule (Zavalloni et al., 2018).

The focus on financial incentives may shift motivation from intrinsic to extrinsic motivation (van Dijk et al., 2016), implying that once money is offered for certain tasks, people are not willing anymore to perform them without receiving payments – even if they did so before (Kerr et al., 2014). Yet, no conclusive evidence exists that this effect of 'crowding out' is a systematically occurring phenomenon (Dedeurwaerdere et al., 2016).

Finally, even though direct monetary rewards are often mentioned as most important reason for participation, farmers are dealing with a complex set of priorities which can make them disregard economic incentives in some instances (Wynne-Jones, 2013). Economic motivation is part of a holistic decision-making process and cannot be conceptualised in isolated terms (Wynne-Jones, 2017). For instance, more complex measures may offer better opportunities for maximising financial benefits, but are also associated with higher concerns for nature (van Herzele et al., 2013; Wilson & Hart, 2000). Generally, conservation and financial objectives are not mutually exclusive. Moreover, in one study van Dijk et al. (2015) even found that perceived profitability had no significant influence on participation.

**a2) Indirect rewards**

Free technical advice, administrative assistance and extension service positively influence the uptake of schemes (Kuhfuss, Préget, et al., 2015; Lastra-Bravo et al., 2015). Often, collective schemes enable the access to such infrastructure and services, also supporting farmers with applications, communication and financial management (Dedeurwaerdere et al., 2016). Also, better access to, and the exchange of (free) knowledge and information is valued by participants in cooperative settings (Franks & McGloin, 2007b).

As a group, farmers strengthen their stakeholder position and hence have more influence on policy making and scheme design, enabling more suitable options of measures (Mills et al., 2011; Westerink et al., 2017). Also, the facilitation within a collective offers opportunities to get together and learn from each other (Lastra-Bravo et al., 2015). This promotes trust, the building of networks, sharing of ideas and generating knowledge, all contributing to the formation of social capital and a

shared values and identity (Westerink et al., 2017). The formation of a group can also lead to new access to funding additional projects (Mills et al., 2011; Wynne-Jones, 2017).

Moreover, participating in schemes is expected to improve the farmers' image (Sulemana & James, 2014; van Herzele et al., 2013; Wilson & Hart, 2000). It enables new business strategies, for example through appealing to niche markets or improving the quality of products (Wynne-Jones, 2013). In the Netherlands, joining certain collectives is also associated with support within the value chain through joint labelling or marketing activities (Barghusen et al., under review).

Farmers may also be motivated to participate in cAES as the schemes promote maintenance of agricultural land in accordance with biodiversity and ES, enabling positive effects such as a more resilient production system (Wynne-Jones, 2017), soil enrichment, improved nutrient cycling (van Herzele et al., 2013) and further benefits from the protection of regulating ES (Barghusen et al., under review). While collective schemes are perceived to yield higher ecological benefits than individual actions (McKenzie et al., 2013), farmers prefer higher shares of private to public benefits, with low ratios of private benefits leading to more resistance towards the schemes (Prager, 2015; Villamayor-Tomas et al., 2019).

**a3) Cost savings**

Some farmers may also join collective schemes to save costs (Barghusen et al., under review). Cost savings in cAES can be realised by sharing and mobilising costs and resources, for instance through joint investments and experimenting, exchanging or sharing machinery or labour, or bulk purchases (Mills et al., 2011; Westerink et al., 2017; Wynne-Jones, 2017). Furthermore, transaction costs are expected to be reduced through support in administrative and application procedures and access to advisory services (Westerink et al., 2017).

While cost savings was not found to be influential for the motivation in collective schemes by Barghusen et al. (under review), it will be included in this study for further testing, as suggested by the authors.[4] Cost savings in the Dutch cAES is communicated as a major advantage on state level (cf. Terwan et al., 2016), yet it might not be important for the farmers, as costs saved though provision of information and support with the application and administrative issues might be seen as part of the deal or rather perceived as indirect rewards (Barghusen et al., under review).

[4] While Barghusen et al (under review) suggest to verify the influence of cost savings in a direct study with farmers, this is not within the scope of this thesis, as Q methodology is not meant to verify existing hypotheses, but rather explore the existence of viewpoints without the aim (or possibility) to generalise findings to a whole population (Watts & Stenner, 2012). Nevertheless, the results will show how much importance participants allocate to the aspect of cost savings.

### 2.1.2 Personal norms

Personal norms are standards or expectations for conduct based on an individual's internalised values which are enforced through anticipation of self-enhancement or self-deprecation (Cialdini et al., 1991). In the context of (c)AES, personal norms refer to the perceived obligation to behave in an environmentally-friendly manner (Barghusen et al., under review). This is based on problem awareness, perceived responsibility and group efficacy. Norms are influenced by values and attitudes, all of which determine how people interpret and react to specific situations (Maybery et al., 2005). Values are universal beliefs referring to goals that provide standards for an individual's assessment of actions, people, policies or events and as such serve as guiding principles (Baur et al., 2016). Attitudes (similar to norms) usually relate to specific actions, objects or situations, and hence more directly indicate motivational properties concerning – for instance – likely behaviour related to unfamiliar practices (Emtage et al., 2007). They are neither permanent nor static and adjusted through experiences (Ahnström et al., 2008). As such, an individual's attitudes can be a barrier to participation in cAES, for example, due to individualistic behaviour and people preferring to work alone, or avoiding risks and resisting change (Cullen et al., 2020; Howley et al., 2015; OECD, 2013), while farmers who are more open to innovation and change are more willing to adopt new measures (Lastra-Bravo et al., 2015).

**b1) Problem awareness**

Problem awareness encompasses problem knowledge and action knowledge (Hamann et al., 2016). The awareness of a problem (or opportunity) is the first step of a change process (Panell et al., 2006). Environmental awareness supports motivation and positively influences scheme uptake (Franks et al., 2016; Lastra-Bravo et al., 2015). Yet, many farmers are aware of environmental problems, but may not see their farm operation as part of the problem (Ahnström et al., 2008). Often, farmers lack a clear understanding of their farm management's impacts on biodiversity and the wider landscape (Greiner, 2015; Riley et al., 2018) as well as of the scheme aims related to ES and underlying processes (Wynne-Jones, 2013). Even when farmers are aware of problems stemming from their farm practices like soil erosion or deteriorating water quality, a tendency prevails to not act proactively but wait until damages become visible (OECD, 2013). Hence, an awareness for the need to (commonly) solve existing problems is crucial (Prager, 2015).

Sometimes, farmers participate in the scheme to protect certain species they personally value, such as meadow birds (van Dijk et al., 2016).The likelihood of acknowledging environmental benefits of AES increases with familiarity (Cullen et al., 2020), while the lack of information is a main reason for non-participation (Wilson & Hart, 2000). Extension services offering advice are important for raising awareness (Daxini et al., 2018; Wilson & Hart, 2000), and farmers who accept

advise are more likely to participate in schemes (Franks, 2011). Social capital in collective schemes can further facilitate awareness, expertise and confidence in the ability to deliver appropriate management (Jones et al., 2020; Krom, 2017).

**b2) Perceived responsibility**

Perceived responsibility is based on problem awareness and an individual's valuation of biodiversity and ecosystems (Barghusen et al., under review). In individual AES, the wish to contribute to conservation is one of the most important reasons for participation (Maybery et al., 2005; Siebert et al., 2006; Wilson & Hart, 2000), and the most important reason for implementing complex measures (van Herzele et al., 2013). Also in collective schemes the personal valuation of biodiversity is crucial for ensuring participation and long-term commitment (Hardy et al., 2020). In Dutch cAES it was found to be among the strongest influence factors (Barghusen et al., under review). This kind of intrinsic motivation is often embedded in the farmers' lifestyle (Greiner et al., 2009; Maybery et al., 2005). Many see themselves as steward of land and resources, are concerned about having a healthy farm and soil (Ahnström et al., 2008) or feel a sense of responsibility towards their community (Wynne-Jones, 2017).

Farmers' perception of responsibility depends on their self-identity (Barghusen et al., under review), which in unsubsidised agri-environmental measures was found the most important uptake factor (van Dijk et al., 2016). However, cultural capital is traditionally linked to the farmers' role as food producer, which conflicts with conservation objectives (Burton et al., 2008). A perceived imbalance towards conservation goals exists, contradicting the farmers' aim of food security and making those schemes more attractive that are embedded into the food production system instead of requiring the removal of land from production (Wynne-Jones, 2013). Further, many farmers perceive themselves in a defensive position due to a negative public image and link conservation policies to restrictions, bans and limitations (Siebert et al., 2006). Resistance may also occur if farmers do not feel properly informed about programmes and consequences.

As farmers are proud of their skills, required changes in farming practices need to be supported by strong evidence and incentives (OECD, 2013). Involving farmers into scheme design, incorporating their knowledge and experiences and granting flexibility on how to carry out the measures promotes a sense of ownership (Emery & Franks, 2012; Prager et al., 2012; Riley, 2016). For this, an early integration of various interests into decision-making processes (Prager & Nagel, 2008) in a bottom-up approach involving anybody interested and affected (Prager & Freese, 2009) is necessary. When farmers feel that they have been adequately involved in the procedures, perceived legitimacy of institutional rules as well as motivation increase (Dedeurwaerdere et al., 2016).

**b3) Group efficacy**

Group efficacy is the perceived ability to collectively reach a target, which is based on (the perception of) skills and influenced by the level of trust in the behaviour of others (Barghusen et al., under review). The perceived behavioural control as well as perceived resources influence the intention to participate in AES (Daxini et al., 2018; van Dijk et al., 2015). The perception is impacted by how the farm and the farmer will be affected by the changes, for instance related to effects on farm economy, relations with neighbours or the family, access to knowledge and technology, or the possibilities to act according to policies, laws and regulations (Ahnström et al., 2008).

Collective schemes may foster feelings of collective efficacy (Mills et al., 2008; Price & Leviston, 2014), which requires shared aims and a common understanding of the situation (OECD, 2013). Social learning and the exchange of knowledge and information establish a supportive culture which enhances the confidence of its members (Mills et al., 2011). Seeing what other farmers achieved on their farm further inspires to take actions on the own farm (Riley, 2016). Hence, working in a collective stimulates motivation and engagement, decreases concerns, widens social networks and also tackles isolation of farmers (Wanner et al., 2020).

Trust and reciprocity are basis for the feeling of collective efficacy (Wynne-Jones, 2017). In cAES, scepticism about the willingness of other farmers to participate, the correctness of their actions (Prager, 2015; Villamayor-Tomas et al., 2019) or a fair exchange of time and resources may occur (Wynne-Jones, 2017). Such caveats can be overcome by farmers' reputation as 'good farmer', which traditionally is related to productivity and tidiness of land (Riley et al., 2018; Sutherland et al., 2012), or pre-existing social networks (Mills et al., 2011).

External support, such as by the Dutch collectives, may also foster trust (de Vries et al., 2019; Wanner et al., 2020) and lead to increased behavioural control (van Dijk et al., 2015). The collectives are important for bringing farmers together, to provide training, to facilitate knowledge exchange and to provide guidance, structure, coordination and mediation (Wanner et al., 2020). They influence and change farmers' attitudes through trusted and clear information about choices, careful explanations of scheme options and their implications and support in the application and implementation (Franks & McGloin, 2007a). Through their actions they support a lasting shift of attitudes towards pro-environmental management, which becomes embedded at a cultural level and has been found to be a significant reason for participation (Franks, 2011).

An increase in flexibility and sensitivity to local conditions is also likely to increase the schemes' ecological effectiveness and visibility of farmers' efforts, which in turn supports farmers' confidence in participation (Emery & Franks, 2012; McKenzie et al., 2013; Westerink et al., 2017). As farmers due to societal pressure may fear for losing their 'license to produce', public appreciation

by the local community can positively impact the willingness to participate in schemes (de Vries et al., 2019; Hardy et al., 2020; Krom, 2017). Customer preferences for sustainably produced goods and the social image of farmers within society may also promote more engagement in pro-environmental behaviour (Karali et al., 2014). Positive feedback by the public for the work achieved together further fosters a sense of camaraderie and pride and promotes a new group identity (Wynne-Jones, 2017).

As a group, farmers are able to pursue different schemes and overcome inflexibilities through group autonomy (Wynne-Jones, 2017). In the UK, facilitated schemes showed a higher richness of scheme options and more complex agreements were applied than without facilitation (Jones et al., 2020). Collectives increase empowerment of individuals, enable to communicate more united, show achieved success more widely and make farmers perceive themselves as more powerful partners (Wanner et al., 2020).

### 2.1.3 Social norms

Social norms are standards of behaviour that are based on shared beliefs on how individuals should act (Ahnström et al., 2008). They are constituted when expectations exist of how others within a group think, act, or believe. They comprise descriptive norms (what is) and injunctive norms (what ought to be) (Cialdini et al., 1990). In collective schemes, social norms have been found to be an important influence factor for participation (Barghusen et al., under review).

While injunctive norms and descriptive norms often overlap, both forms need to be distinguished as they entail different motivational functions (Cialdini et al., 1990). Descriptive norms inform behaviour – injunctive norms enjoin them (Cialdini et al., 1991). The influence of the particular norm in a certain situation depends on whether a person's attention is focused on that norm, as norms only motivate and guide behaviour when they are activated. Hence, even dominant norms only sometimes predict action. Finally, descriptive norms refer to the adaptive or effective conduct in a certain situation, while injunctive norms are based on the general (dis)approval of behaviour, which is similar for different situations, enabling to impact an individual's behaviour in a wider variety of circumstances. Whether social or personal norms dominate a person again depends on the focus, in this case if internal or external standards and sanctions for the action are salient.

#### c1) Injunctive norms

Injunctive norms describe rules or beliefs of what constitutes morally (dis)approved behaviour (Cialdini et al., 1990). Peer pressure serves to preserve the reputation among farmer colleagues (Franks, 2011). Depending on prevailing norms, it can encourage or hinder participation in AES (Emery & Franks, 2012). The pressure from a peer group is only relevant if the individual identifies

with this group (van Dijk et al., 2015). The social identity describes which social group an individual identifies with and consequently what norms should be followed (Ahnström et al., 2008). The norms of a group are developed and maintained through interactions between members of the group as well as between the group and outsiders. A group identity can develop through joined experiences and sharing of emotions, such as hope or sorrow, with moments of failure and anger being compensated by moments of pride and excitement (Wynne-Jones, 2017).

Social capital embedded in social networks can promote the adoption of AES (Barreiro-Hurlé et al., 2010; Lastra-Bravo et al., 2015), yet can also inhibit engagement through moral obligations within the network (Mathijs, 2003). Farmers can be motivated to join AES if they feel that their action will be approved by the group they identify with – in the case of farmers often an (in)formal network of peer farmers (Kerr et al., 2014), members of the collective or other people who are important to them (van Dijk et al., 2016). Accordingly, farmers are more likely to change their management due to recommendations by other farmers than by other groups like scientists (Villamayor-Tomas et al., 2019). Trust is crucial for social capital to develop (Riley et al., 2018). For the uptake of AES, trust between actors as well as institutional trust (in the institutional design through which schemes are implemented) is important (de Vries et al., 2019).

In cooperative schemes, farmers participation might also be hindered by values of independence (being one's own boss) and timeliness (being well-organised and able to quickly respond to changing circumstances, like changes in weather) (Emery & Franks, 2012). Farmers do not want to become vulnerable to decisions of their neighbours (Prager, 2015). If social norms are based on autonomy, it might be difficult to establish group norms which support collaboration (Riley et al., 2018). Yet, the possibility exists that farmers gain greater independence by being interdependent and collectively achieving aims through cooperation, which they could not achieve individually (Wynne-Jones, 2017).

Long-term changes in members' environmental conduct can be achieved through social learning processes and the internalisation of normative orientations (Dedeurwaerdere et al., 2016). Collective learning goes beyond changes in behaviour, skills and knowledge, but also promotes changes in relationships, goals, attitudes, values and norms, which can increase pro-environmental behaviour (Price & Leviston, 2014). While opposing perceptions and opinions of farmers and conservationists have been found to be a key obstacle in joining AES (Ahnström et al., 2008), farmers are more likely to join schemes when cooperative traditions with norms of reciprocity exist (Barghusen et al., under review).

**c2) Descriptive norms**

Descriptive norms describe the actual behaviour of other people (Hamann et al., 2016). The perception of what most others are doing influences individuals to behave similarly, even concerning morally neutral behaviours (Cialdini et al., 1990). In AES, a 'neighbourhood effect' has often been observed, showing that the belief about other farmers' behaviour effects the own decision (Defrancesco et al., 2008; Villamayor-Tomas et al., 2019; Wilson & Hart, 2000). Even though farmers tend to think that other farmers would be less willing to participate in AES than themselves (Villamayor-Tomas et al., 2019), the effect is often positive, leading to increased participation (Kuhfuss, Coent, et al., 2015; OECD, 2013). In Ireland, Cullen (2020) found farmers to be (ceteris paribus) ten times more likely to join a scheme if all their neighbours participated, around 50 % more likely if some of the neighbours took part and 90 % more likely if they were involved in discussion groups with other farmers. Yet, as many conservation efforts related to ES and biodiversity have a public goods character, farmers may resist to participate if it is not guaranteed that other farmers will join as well to avoid that their efforts only benefit others – a fear, which can be overcome by collaboration (Villamayor-Tomas et al., 2019). Van Dijk et al. (2016) suggest benchmarking for letting farmers know about others' engagement to encourage scheme uptake.

Traditionally, a good farmer is perceived to be the one keeping his farm tidy through application of fertilisers, pesticides and the right application of machinery in farm operations like ploughing and cultivating (Riley et al., 2018). Moreover, a lack of cultural capital associated with non-food producing activities exist. Payments for AES linked to income forgone due to a loss of production instead of paying for the goods or services delivered within the scheme further suggest that only food or raw material production has a value (Wynne-Jones, 2013). Linking the payments to the delivery of ES better acknowledges the work of the farmers, making them feel valued not only as food producers but also as custodians of their land. Remuneration for producing less is also perceived as demotivating by farmers, who would like to be rewarded for environmental efforts instead (Wanner et al., 2020).

In the Netherlands the collectives promote an integration of farming businesses into the rural economy (Franks & McGloin, 2007b), as farmers may be torn between building bonding social capital with peers by keeping agricultural land tidy and productive, and gaining bridging social capital with other rural stakeholders by integrating environmental concerns into their farm management (Krom, 2017; Westerink et al., 2020). However, the notion of a good farmer and cultural norms can develop over time. In the UK, incorporating environmental concerns and new knowledge into management led to a (re)appreciation of environmental impacts of practices and a reconsideration of good farming, which was widened to keeping a balance and integrating food production and environmental

goals (Riley, 2016). In the Netherlands, farmers within the collectives also confirmed a cultural change of who farmers perceive as a good farmer (Westerink et al., 2017, 2019).

## 2.2 Farm characteristics and participation typologies

Price and Leviston (2014) have found that contextual factors explain a significant variance in complex behaviour of pro-environmental practices. In particular, farm and farmer characteristics have been found to be of great importance.

Mixed results have been found concerning the farm type (Lastra-Bravo et al., 2015). Farmers with extensive farming systems are more likely to participate as less changes to farm management are required (Cullen et al., 2020; Murphy et al., 2014; Wilson & Hart, 2000; Zimmermann & Britz, 2016). Poor soil or land (Howley et al., 2015; Lastra-Bravo et al., 2015) also positively impacts participation, while tenure reduces the probability due to uncertainties about long-term arrangements (Karali et al., 2014; Riley et al., 2018; Wilson & Hart, 2000). There are various and partly ambiguous findings on the impact of farm size on participation (Ahnström et al., 2008; Siebert et al., 2006), with studies, for instance, reporting a positive relation to participation of large farms (Defrancesco et al., 2008; Lastra-Bravo et al., 2015; Wilson & Hart, 2000), large and small farms (Karali et al., 2014) or large farms and those in less favoured areas (Zimmermann & Britz, 2016).

While some studies found that well-educated and/or younger farmers are more likely to participate (Daxini et al., 2018; Defrancesco et al., 2008; Villamayor-Tomas et al., 2019; Wilson & Hart, 2000), other research shows contrasting findings concerning the impact of age and education (Ahnström et al., 2008; Lastra-Bravo et al., 2015). Farmers with higher income (Murphy et al., 2014; Villamayor-Tomas et al., 2019) or for whom farm income constitutes a high proportion of total household income (Lastra-Bravo et al., 2015) are less likely to participate. Finally, several studies point out that no clear correlations exist between the uptake of AES and structural variables such as farm type and size, financial situation, educational background or demographics, but that instead a complex combination of contextual variables, capacity and willingness influence farmers' decision (Emery & Franks, 2012; Wynne-Jones, 2013).

A significant condition for scheme uptake is the *goodness of fit*, i.e. that schemes fit well to the existing farm management and can be well combined with existing farm practices and further regulations (van Herzele et al., 2013; Wilson & Hart, 2000). The amount of investment and work required (van Herzele et al., 2013) and the extent of required change (Karali et al., 2014) should be low. The ability to change progressively rather than facing a direct major change positively influences the decision to participate (Lastra-Bravo et al., 2015). Generally, farmers prefer schemes which are easy to implement (Lastra-Bravo et al., 2015), require to take out only a small area of

land from production (Emery & Franks, 2012) and concentrate measures on one plot rather than on the whole farm – ideally the least productive or least accessible plots to avoid or minimise opportunity costs (Villamayor-Tomas et al., 2019).

Farmers prefer or depend on flexibility – the more constraining the contracts, the less attractive they are (Hardy et al., 2020; Kuhfuss, Préget, et al., 2015; Lastra-Bravo et al., 2015; Mettepenningen et al., 2013; Wilson & Hart, 2000). In comparison to individual schemes, collective schemes are perceived as less restrictive, more flexible and better adapted to local conditions and needs (Franks, 2011; McKenzie et al., 2013) as stakeholders are involved in scheme design and the farmers' local knowledge can be integrated (Prager et al., 2012; Wanner et al., 2020).

Application processes and controls are hindering farmers' participation, yet administrative burdens for individual farmers are found to be less in collective schemes if they are facilitated, as for example in the Netherlands, by the collectives (van Dijk et al., 2015; Wanner et al., 2020). Monitoring and compliance are facilitated if farmers agree with chosen methods and if indicators and evaluation criteria are clear from the start (Prager et al., 2012). While controls are negatively connoted, monitoring linked to results is perceived as more motivating, since it enables a sense of achievement for the farmer (Wanner et al., 2020). The timing and monitoring should not interfere with timing of agricultural practices.

The schemes' goals have to be realistic (Ahnström et al., 2008). Seeing the results and knowing which local species or habitats the work is done for is important to sustain motivation (Emery & Franks, 2012). Yet, obtaining observable results might be difficult or impossible, as conservation practices are complex and often long time lags occur between cause and effects (Panell et al., 2006). While long-term contracts are necessary to achieve and see effects on a landscape level, social and political dynamics are much shorter (Wanner et al., 2020). Generally, long-term contracts are less likely to be agreed with, if a higher proportion of the farm land is rented, and larger farms tend to prefer long contract durations (Lastra-Bravo et al., 2015). Limited durations can be perceived to lack long-term visions and increase legal uncertainty (Wanner et al., 2020).

Finally, the perceived risk influences scheme uptake, for instance concerns that ecologically improved areas will be declared conservation sites with legal obligations without receiving remuneration (Emery & Franks, 2012). In collective schemes, caveats may exist that farmer will be forced to cooperate with people they do not trust (Emery & Franks, 2012) or free riders, who benefit from the groups action but do not contribute themselves (OECD, 2013).

To illustrate the motivation of farmers to participate in voluntary individual AES or other conservation measures, many studies have created typologies, clustering farmers according to their motivation to participate (for example, Cullen et al., 2020; Howley et al., 2015; Maybery et al., 2005;

Sulemana & James, 2014; van Herzele et al., 2013; Wilson & Hart, 2000). Typologies outline characteristics of farmers (sometimes also other land managers or landholders) and occasionally their holdings by detailed information on these characteristics as well as the relationship between them to support the understanding of the complex relationship of multiple factors which affects the farmers' behaviour (Emtage et al., 2007). Most importantly, typologies demonstrate that no single perspective exists, but that groups of farmers can be motivated by varying reasons.

The way stakeholders are approached and the schemes are promoted can explain the success or failure of initiatives (Franks et al., 2016). The application of typologies offers the opportunity to improve the efficiency of schemes by understanding circumstances and underlying motivations and tailor as well as communicate the schemes according to the target groups (Emtage et al., 2007; Maybery et al., 2005). As conditions of the farms, for example, regarding their extent of intensification, are diverse, pathways to conservation also need to vary (Villamayor-Tomas et al., 2019).

Existing typologies mainly differentiate between farmers according to attitudes, values and circumstances. Wilson and Hart (2000) distinguish between scheme enthusiasts (65% of participating farmers), neutral adopters (further participants), uninterested nonadopters and profit maximising nonadopters (non-participants). In a study about participants, Maybery et al. (2005) found differences according to economic, conservation and lifestyle values, with overlaps occurring between the latter two. With more detail, van Herzele et al. (2013) distinguished between participants according to the level of complexity of the measures chosen, differentiating between (i) *opportunistic* participants earning money from already existing practices, (ii) *calculating* participants aiming at a positive accounting balance through positive side effects (monetary and non-monetary), (iii) *compensatory* participants being forced to adapt practices through further regulations, taking the schemes as compensation, (iv) *optimising* participants using the schemes as best option for marginal or fragmented land, (v) *catalysing* participants aiming at positive environmental effects without investing own money and (vi) *engaged* participants with a high problem awareness, who are environmentally committed, feel responsible and are convinced of the measures' benefits. While the groups (i), (ii) and (iii) mostly or only applied simple AECM, (iv) mainly carried out medium complex measures and (vi) exclusively complex measures.

Cullen et al. (2020) found strong influences on participation of attitudes related to the perception of AES distinguishing between *benefits conscious* and *drawbacks-conscious.* Also, self-identity, including groups of *productivist* farmers (producing food and maximising income), *conservative* farmers (avoiding risks and being cautious about new practices), *forward looking* farmers (being innovative to keep the farm running) and *optimistic caretakers* (enjoying farming and taking care of their land) impacted participation. Forward-looking farmers were most likely to join the schemes,

while the other groups were more impacted by their attitudes. Self-identities are not mutually exclusive. The identity was distinguished differently in other studies, for example, Pedersen et al. (2012) found that farmers either tried to maximise profits (the farmer seeing himself as business person) or tried to maximise yields (the farmer perceiving himself as food producer).

While existing typologies consider different attitudes and influences, none is taking into account the collective dimensions of joint schemes, as they focus on individual AES or conservation measures in general. This thesis will also explore different perspectives, yet with the focus on participation in cAES and not by creating a new typology, but by using Q methodology to openly investigate participants' viewpoints.

# 3 Methodology

## 3.1 Method selection

As elaborated in the previous chapter, participants can be motivated to join cAES for a wide variety of reasons. Hence, no concrete hypothesis is to be tested, instead the farmers' subjective viewpoints need to be openly investigated to understand their decision to (not) join the schemes. To explore farmers' motivation, *Q methodology* has been chosen, as it enables to reveal subjective viewpoints of research participants (Watts & Stenner, 2012). As an approach of exploratory research, Q is not meant to test a hypothesis or theory, but to discover the diversity of perspectives regardless of whether they are frequently represented in the population. The perspectives are not necessarily opposing, but rather revealing different ways of doing or seeing things, which can help to find areas of consensus and disagreement around a topic to resolve conflicts, assess management alternatives or facilitate critical reflection (Zabala et al., 2018). Q combines advantages of interviews and surveys, as it provides numerical results supporting perspective interpretation, uncovers interconnections between topics due to considering them simultaneously, allows for nuanced positions through relative choices, and mitigates certain response-biases by requiring respondents to engage with opinions they deem inappropriate or unexpected.

Q methodology was originally developed for psychology research, but is now used in a wide range of disciplines, including environmental and agricultural research (e.g. Frantzi et al., 2009; Webler et al., 2009; Zabala et al., 2018; Zagata, 2009), as understanding perspectives of stakeholders is central to many environmental (conservation) questions. Similar to the typology approach, Q accounts for different perspectives by resulting in a number of distinct viewpoints on the studied topic. To create a typology, quantitative methods are needed to establish an optimal number of types, yet at the same time qualitative input is crucial for understanding the discovered variation, suggesting the use of mixed methods combining both aspects (Emtage et al., 2007). Q integrates quantitative as well as qualitative data, yet clearly differs from a typology approach, as it does not try to find similarities in characteristics of farmers (and their holdings), but focuses solely on similarities in the farmers' subjective viewpoints and beliefs (Watts & Stenner, 2012). While a typology approach uses different characteristics as variables tested among a number of farmers, in Q the subjective viewpoints become the variables of the study, being tested through a number of relatively weighted opinion statements on the discourse.

## 3.2 Q methodology

### 3.2.1 Theoretical construct

Q methodology was developed by William Stephenson as an evolution from *R methodology* (Watts & Stenner, 2012). R methodology refers to methods testing variables by using a sample of persons. The aim is to reveal patterns of association between the measured variables via *factor analysis* – usually either *centroid factor analysis* (CFA) or *principal component analysis* (PCA). In factor analysis, all measured variables are intercorrelated, for which the ordinarily scored variables have to be standardised to make them comparable. The standard score (*z score*) measures the distance between a certain absolute score and the mean average score of the sample and is expressed proportionally as standard deviations. R methodological factor analysis aims to reveal latent variables (factors), identifying a group of variables which have (co)varied proportionally across the sample of persons, to explain the different personal characteristics of individuals. Mathematically distinct but with the same aim, PCA calculates linear combinations to identify variables composites to the observed variables (Grace-Martin, 2020).

Stephenson's aim was to identify similarities in individuals' perceptions, for which he developed an inverted factor analysis, in which people become the variables, and tests or traits its sample or population (Watts & Stenner, 2012). As the variables need to be measured with the same unit, Stephenson introduced the 'psychological significance' as unit of quantification. For the process of standardisation, items need to be measured or scaled relatively by a collection of individuals, which can be achieved through a prearranged frequency distribution called *Q sort*. The Q factor analysis starts with intercorrelating the gathered Q sorts, yielding a person-by-person correlation matrix, which ascertains the degree of (dis)agreement between persons. Hence, Q factor analysis identifies a group of individuals who ranked items in similar ways, i.e. persons who share similar perspectives, attitudes or viewpoints on the topic under consideration.

The name "Q methodology" might have been chosen as Q precedes R in the alphabet, implying that perspectives should be defined before conducting surveys to measure the frequency of occurrence (Webler et al., 2009). Yet, it may also refer to what Stephenson called *quansal* units (from quantification of saliency), integrating ideas from quantum physics to his study of subjectivity, implying that within the sorting of statements, quansal units demarcate the categories, with statements near the middle showing low saliency and those located at extremes being more salient – similar to the potential of electrons.

### 3.2.2 Research process

In Q interviews, research participants are confronted with a set of statements (the *Q set*), each of which represents an individual opinion (Webler et al., 2009). The Q set ideally covers almost the whole discourse of the topic under consideration (the *concourse*)[5], representing all relevant aspects with a respective number of statements (so-called *items*). The Q set should enable participants to model and express their perspective on the topic by sorting the statements relative to each other (Watts & Stenner, 2012).

For the development of items, semi-structured interviews with different stakeholders covering all topics and aspects of interest are recommended (Webler et al., 2009). They can be supplemented by using (popular) media, public hearings or other direct sources to obtain direct, verbatim statements on the discourse. Whether statements are formulated positively or negatively depends on their original framing within the concourse, i.e. does not need to be 1:1. A literature review can serve as basis to identify key issues (Watts & Stenner, 2012). A large number of statements, covering as much of the concourse as possible should be extracted, which are later sorted and reduced to approximately 40 to 80 statements – balancing between inclusiveness and cognitive overload of participants (Zabala et al., 2018). The process of item selection should be systematic, exhaustive and transparent, as it is crucial to determine how respondents understand the statements, whether the whole topic is covered in an unbiased, balanced way by salient statements and if the results will be easily interpretable.

To facilitate the interviews and enhance the participants' understanding, the Q set should avoid complicated terminology, double or unclear meaning, causalities as well as negative statements, since double negation might lead to confusion (Watts & Stenner, 2012). Nevertheless, items should allow for some extent of interpretation, enabling participants to understand terms and issues from their own perspective and encouraging them to actively engage rather than provoking passive responses (Webler et al., 2009). At the same time, too much excess meaning should be avoided to allow for comparison.

Since people act as variables within a Q study, the selection of participants (the *P set*) is crucial (Watts & Stenner, 2012). The P set should represent the breadth of opinions in the target population (not the distribution of beliefs across the population) and consist of participants with different, well-formed opinions (Webler et al., 2009). To obtain such a balanced and unbiased P set, opportunity

[5] The statements can only be a proxy of the concourse, as in theory it is infinite (Zabala et al., 2018).

sampling should be avoided (Watts & Stenner, 2012). Instead, it is helpful for researchers to know (about) study participants in advance, or use approaches like snowball sampling (Webler et al., 2009).

As the aim of a Q study is not to generalise findings to a whole population, but to explore the existence of viewpoints on a topic, a relatively low number of research participants suffices.[6] The number of participants has to be smaller than the number of items (Watts & Stenner, 2012). In R methodology, at least two study respondents are requested per variable, implying that a maximum of two items should be used per participant in a Q study. The result of a Q study usually comprises two to five perspectives, each of which is sufficiently represented by four to six participants, suggesting a range of eight to 30 participants (Webler et al., 2009). Yet, as it is impossible to know in advance how many perspectives exist and how many people contribute to each factor, a ratio of three items per participant is often used.

The *Q sort* describes the sorting of the statements into an ordinal grid, ranking, for example, from high agreement to high disagreement, or respectively importance to unimportance, or covering aspects of acceptability or closeness to respondents' beliefs (Zabala et al., 2018). At the beginning of each Q interview, personal or demographic information likely to influence viewpoints (depending on the topic of study, for example, age or profession) should be obtained (pre-sorting) (Watts & Stenner, 2012). Whenever possible, fixed choices should be avoided, allowing participants to self-categorise. To facilitate the Q sort, the process then starts with sorting the Q set onto three piles – depending on whether the participant agrees, is neutral or disagrees with the item (thinks the statement is important, neutral or unimportant respectively). Afterwards, the statements are sorted into a roughly bell-shaped grid with varying range and slope. If participants are unfamiliar with the topic and/or the topic is very complex, steep distributions allowing for relatively more equally weighted statements in the middle are recommended, while straightforward topics or involving experts requires more nuanced decisions, suggesting a wider grid range.

A fixed (or *forced*) distribution of statements into the grid is recommended, because (i) the distribution tends to fit the normal curve of error, (ii) it supports participants in the sorting process by limiting the number of options for the sorting, (iii) it makes comparison easier for the researcher

[6] While no generalisation towards a population of people takes place, Q implies a 'conceptual generalisation', focusing on concepts, categories or theoretical propositions (Watts & Stenner, 2012, p. 73).

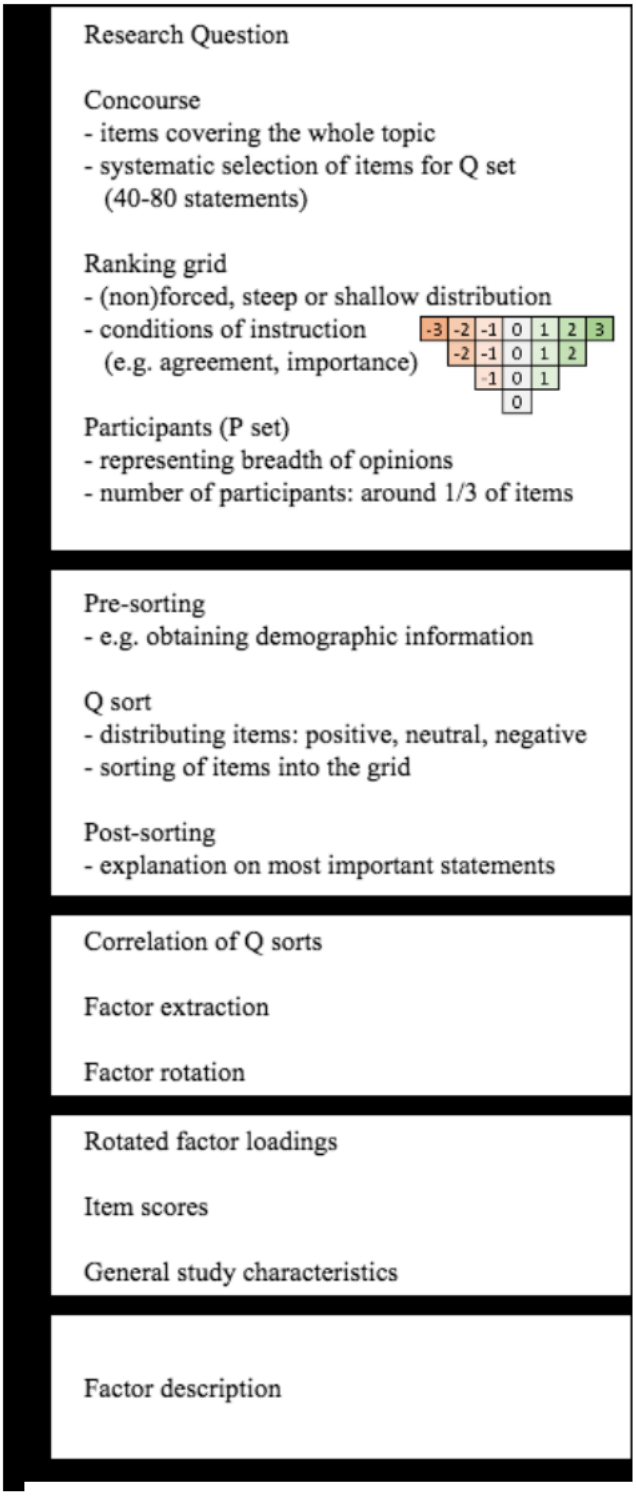


Figure 2: Research process (based on Watts & Stenner, 2012 and Zabala et al., 2018)

and also, because (iv) the choice of distribution is irrelevant for the factors emerging from the study, as only the patterns of items within the distribution count (Watts & Stenner, 2012). In case participants feel restricted by the given ranking options, a free or non-standardised distribution could be used, yet it may easily contain too many options and be overwhelming for participants while not adding to the research purpose. As the items are ranked relatively to each other, zero does not necessarily mirror a neutral statement, but a statement less positive than other positive statements, and less negative than other negative statements.

After the sorting process, participants should explain the most extreme sorting positions (at the sides of the grid), as well as other statements deemed of importance by the researcher or participant, elaborating what the items mean to them (Watts & Stenner, 2012). By sorting all statements relative to each other, the interview results can be compared afterwards, and via factor analysis similar perspectives (factors) can be extracted. The elaboration of the rating choices adds qualitative input, enhancing the understanding of the different emerging factors or viewpoints. The research process is depicted in Figure 2; the process of analysis, results and factor interpretation will be further elaborated on in chapter 3.6 and chapter 4.

## 3.3 Case Study: The Dutch environmental farmer collectives

About 54 % of the total Dutch land area (3,367,000 hectare) are agricultural area (1,823,000 hectare) (FAO, 2016). Of the arable area, 56 % are arable land, 2 % are land under permanent crops and 42 % are land under permanent meadows and pastures (FAO, 2018). The land is managed by over 53.000 farming businesses, of which 28 % are dairy farms, 20.6 % arable farms, 18.9 % other grazing livestock farms, 10.8 % intensive livestock farms, 10.6 % open-air horticulture farms, 5.9 % combined farms, and 5.1 % greenhouse horticulture and mushroom farms (Statista, 2020). 3.7 % of the farms are certified organic farms. The majority of agricultural land is part of highly intensive production systems (Zimmermann & Britz, 2016). The overall trend of intensification is supported by scarce land and high prices for land due to rising competition with urban areas, resulting in ongoing declines in biodiversity (Runhaar et al., 2017; Westerink et al., 2014).

In response to increasing regulatory pressure by agri-environmental policies, first local environmental cooperatives (LECs) were founded in the 1990s to strengthen farmers' autonomy in land use decision-making (Westerink et al., 2020). They were based on voluntary participation of farmers and non-farmers working together with local, regional and national agencies to integrate nature management into farming practices and influence agri-environmental policy making (Franks & McGloin, 2007b). Most were providing advice, training in conservation skills or assistance with application for AES, some carried out further projects or were involved in lobbying or research. Many LECs were also active in broader rural development, such as local tourism (Westerink et al., 2020). By supporting their members' interest, LECs raised participation rates in AES as well as quality and scope of scheme provision, enhancing its effectiveness (Franks & McGloin, 2007a).

With support of the Dutch government, the LECs functioned as intermediary between farmers and authorities between 2000 and 2003 to develop collective management plans for comprehensive areas with meadow bird protection, taking care of recruiting and paying participants (Westerink et al., 2020). The cooperative approach was not pursued, as EU legislation only allowed for subsidies to individual farmers. In 2011, the upcoming CAP reform for the period of 2014 to 2020 was used as a window of opportunity to again design and test an approach using spatial coordination across multiple farms in four pilot regions and promote the approach in the policy making process on EU level (Terwan et al., 2016; Westerink et al., 2020). To enhance ecological effectiveness, the collective scheme tested focused on species and areas with promising enhancement potential, incorporating local knowledge of farmers and reducing transaction costs by increasing self-governance, aiming at a reduction in bureaucracy and higher efficiency (Westerink et al., 2020). When in 2014 as part of the CAP the *EU Rural Development Regulation* officially changed to include group pay-

ments (Regulation (EU) No 1305/2013, Article 28(2)), the around 160 Dutch LECs were transformed and often merged into 40 certified farmer collectives (sometimes also called cooperatives). They cover the whole of the Netherlands and are eligible to carry out contracts and transfer EU payments (Westerink et al., 2020). In 2016, a joint scheme became mandatory, not allowing anymore for individual applications (Terwan et al., 2016). If farmers want to join the cAES, they need to become a member of the collective in their region and apply for the scheme jointly with other farmers. Following the tradition of cooperation, the cross-farm approach aims at designing more ecologically effective AES, offering greater flexibility on local design and implementation of actions and simplifying administration procedures while improving scheme compliance.

The design of the collective scheme follows a "front-door – back door principle", as illustrated in Figure 3 (Terwan et al., 2016). The government signs a contract with the collective, sets targets and describes the types of conservation activities to be carried out (front door). The agreements last for six years and establish results-based obligations related to specific habitats on specified land areas. The collective then enters into contracts with individual land managers, which include specific activities and payments at field level to realise effects at landscape level (back door). Between front and back door, the collectives are able to tailor conservation activities and payments to local circumstances.

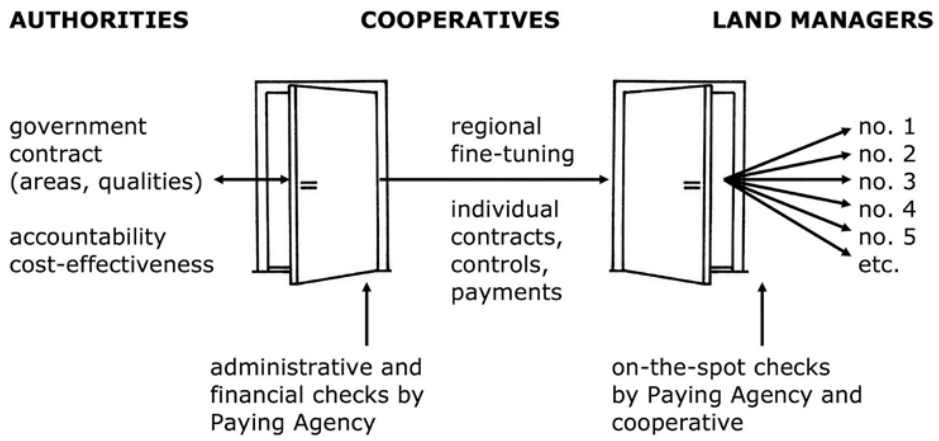


Figure 3: The Dutch front door - back door principle (Terwan et al., 2016)

The new approach involves a wide range of organisations. The national government defines national targets, provides a broad catalogue of conservation activities and payments and is responsible for reporting and establishing a framework for controls and penalties (Terwan et al., 2016). Netherlands Enterprise Agency RVO provides payments and carries out controls and, if necessary, penalties. The provincial government adjusts conservation policies to regional circumstances, selects target species, designates suitable areas, allocates the budget accordingly and is responsible for the scheme's administration. The collectives propose a six-year application to the province government and develop yearly management plans based on the selection of appropriate conservation targets

and activities from the government's lists. They provide ecological guidance, arrange for individual payments, carry out local work including contracting, payment, monitoring and further administrative tasks and assess activities on a yearly basis. On national level, the umbrella organisation BoerenNatuur represents the farmer collectives. Further, nature protection agencies are involved in monitoring and providing advice and external controlling agencies such as the Netherlands Food and Consumer Product Safety Authority (NVWA) are involved to monitor ecological indicators and measures at farm level (de Vries et al., 2019).

From the farmers' perspective, the collectives are the most important stakeholders in the context of cAES (van Dijk et al., 2016). As intermediary, they play a key role in motivating participants to join the schemes (Runhaar et al., 2017; Westerink et al., 2017). High investments were necessary to develop social relationships via meetings, visits, events for exchange and having representatives of collectives as contact persons to discuss issues and carry out administrative tasks together (de Vries et al., 2019). Initial concerns by governmental and nature organisations about farmers' motivation to join the collectives disappeared over time. Positive experiences reduced many of the initial uncertainties and contributed to positive attitudes towards the new policy. Indeed, not all farmers who applied could take part in the scheme due to insufficient funding or because their farms were not located in the focus area for the respective measure (Wanner et al., 2020). In 2021, the 40 Dutch collectives involve over 10,000 farmers (almost 20 % of all Dutch farmers) managing approximately 100,000 hectares of land (BoerenNatuur, 2021). Table 1 shows an overview with main characteristics, number of collectives and participants in cAES per province.

Table 1: Overview of Dutch provinces with number of collectives and participants in cAES (adapted from Barguhsen et al., under review based on BoerenNatuur, 2020 and CBS Statistics Netherlands, 2019)

| **Province** | **Land area** (hectare) | **Permanent grassland** (% of cultivated land) | **Arable farming** (% of cultivated land) | **Number of collectives** | **Participants in cAES in 2020** |
|---|---|---|---|---|---|
| Groningen | 232,400 | 30.1 | 52.9 | 3 | 700 |
| Friesland | 333,600 | 68.5 | 9.6 | 7 | 1875 |
| Drenthe | 263,300 | 28.3 | 40.4 | 1 | 362 |
| Overijssel | 331,900 | 54.8 | 8.8 | 3 | 876 |
| Flevoland | 141,200 | 4.5 | 69.0 | 1 | 101 |
| Gelderland | 496,400 | 52.1 | 10.6 | 3 | 2072 |
| Utrecht | 148,500 | 72.3 | 1.7 | 4 | 896 |
| Noord-Holland | 266,500 | 34.4 | 23.5 | 4 | 814 |
| Zuid-Holland | 270,000 | 44.8 | 30.0 | 8 | 1160 |
| Zeeland | 178,200 | 7.4 | 69.8 | 1 | 323 |
| Brabant | 490,500 | 18.8 | 31.1 | 4 | 888 |
| Limburg | 214,700 | 16.7 | 39.3 | 1 | 1313 |

## 3.4 Research design

**Q Methodology:** Guided by the research question, what motivates farmers to participate in cAES, a concourse of 117 items (statements) was created based on the literature review and information accessed through the project Contracts2.0, as it was beyond the scope of this thesis to carry out interviews as basis for the statements. Nevertheless, statements were formulated trying to adequately reflect existing opinions, building on assumptions and lessons learned from existing studies, for example, framing positive aspects positively in statements based on positive experiences or expectations, and negative aspects negatively in statements based on negative examples or caveats.

To cover the whole concourse, aiming at a balanced and unbiased Q set, the selection of items was based on a strategic sampling approach (cf. Webler et al., 2009). All items were clustered according to the conceptual framework, so the final selection would cover all categories with different statements. In an iterative process based on several review loops with researchers with expertise in the field and/or the methodology, a final number of 37 statements was selected, with a different number of items per category to account for different levels of complexity.

Statements were framed with the first-person perspective (using "I" instead of "farmers" in general), as Q aims to identify subjective perceptions, and because farmers have been found to wrongly assess their neighbours' attitudes, for example, by generally thinking that other farmers would be less willing to participate in cAES (Emery & Franks, 2012). Although causalities in statements should rather be avoided, some statements involve "I participate because" to establish a direct link between certain aspects and the motivation to participate. The final selection of statements is depicted in Table 5 (page 40). The number of each statements serves as identification and possesses no further meaning.

Following the recommendation by Brown (1980) for 40 or less statements, a nine-point distribution, ranking from high disagreement (-4) to high agreement (+4) was selected as depicted in Figure 4. To facilitate the sorting process and data analysis, a forced distribution was chosen, with two statements at each of the extreme positions (+4, -4) up to seven statements in the middle of the grid. The rather shallow distribution reflects that participating farmers are experts of their situation and are expected to have distinguished opinions on the matter.

While interviews in person should normally be preferred (Watts & Stenner, 2012), due to the geographic distances as well as travel and meeting restrictions related to COVID-19, the interviews were planned to be conducted online. Several software solutions for conducting online Q studies

are available. *HtmlQ* by *aproxima Gesellschaft für Markt- und Sozialforschung Weimar*[7] has been chosen, as it is (i) an open software with (ii) a highly user-friendly application, which does not require any downloads by the participants and allows them to always have an overview of the different statements, with statements rated positive, neutral or negative shown in green, grey or red respectively. Statements can simply be dragged and dropped or exchanged, if participants want to modify their rating. Furthermore, it (iii) offers all features relevant to the researcher, allowing to ask for additional information for each or specific statements and further information.


Figure 4: Q grid ranking from disagree (oneens) to agree (eens), filled in by one participant

Instead of showing the sorting grid in red (numbers below zero), grey (zero) and green (above zero) as in the default settings, the colours of the grid were adapted to different shades from red (-4) to grey (0) to green (+4) to support the gradual sorting process based on relative choices instead of agreement and disagreement only.

**Survey and additional questions**: In addition to Q, the format of a survey was chosen to obtain relevant farm characteristics of research participants (cf. chapter 2.2). Moreover, to Q subsequent qualitative questions were included to answer the second research question on general advantages and disadvantages of cAES compared to the previous individual AES.

[7] For further information see https://github.com/aproxima/htmlq

## 3.5 Data collection

13 Dutch collectives were contacted via email and phone with the request to forward the invitation to the study to all farmers participating in cAES or establish contacts with farmers preferably holding different opinions concerning their motivation. In the end, 15 interviews with farmers from six collectives were organised, as shown in Figure 5. The interviews to place between January 22nd, and February 11th, 2021. To ensure anonymity, each participant received a label from par_1 to par_15.

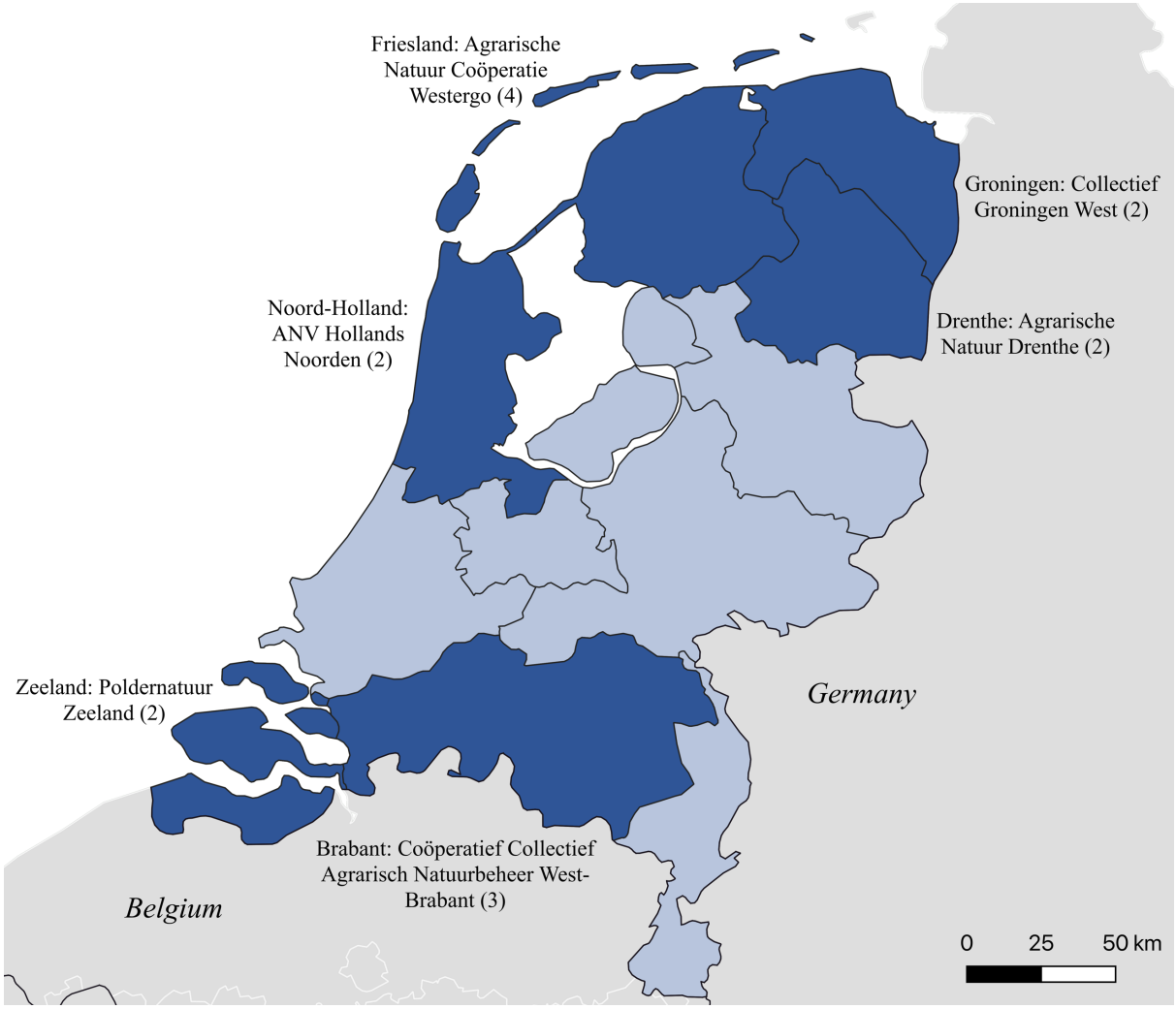


Figure 5: Overview of the Netherlands highlighting regions and naming collectives with number of research participants (created with *QGIS* based on *Natural Earth* data)

Table 2 summarises the overall number of participants in cAES and the focus of the schemes per collective of the study's research participants.

Table 2: Number of participants in cAES and focus of schemes per collective involved in the study[8]

| **Collective** | **Participants in cAES in 2020** | **Focus of cAES** |
|---|---|---|
| Agrarische Natuur Coöperatie Westergo | 251 | Biodiversity protection (in particular meadow birds) |
| Collectief Groningen West | 474 | Soil, water, and biodiversity protection (in particular meadow birds) |
| Agrarische Natuur Drenthe | 362 | Protection of biodiversity (in particular field and meadow birds), improving water quality and quantity |
| ANV Hollands Noorden | 205 | Improvement of landscape and water quality, bird protection |
| Poldernatuur Zeeland | 323 | Biodiversity protection (in particular coastal and farmland birds) via field margins, botanical grassland management, meadow bird management, landscape elements |
| Coöperatief Collectief Agrarisch Natuurbeheer West-Brabant | 393 | Biodiversity, soil, and water protection |

In scope of the project Contracts2.0, the translation of the Q study and the implementation of the interviews in Dutch have been facilitated by the *Wageningen University & Research*. Before participating in the study, all interviewees had to confirm their informed consent. Information on farm characteristics including personal and farming background (cf. chapter 2.2) was also obtained in advance of the interviews via a short survey (for the questionnaire see Annex I).

The interviews were carried out via an online video conferencing software. The farmers were asked to share their screen while implementing the Q study via https://comm.zalf.de/survey-q-studie/SitePages/Home.aspx in an online browser. Only in two cases where farmers joined with a tablet the interviewer shared the screen and sorted the statements according to the instructions of the interviewee. The statements were first sorted onto three piles according to whether the interviewee agreed (green), disagreed (red) or felt neutral (grey) about the statement. In a second step, the statements were sorted into the grid, starting with the 'green' pile from most agree towards less

[8] Based on Agrarische Natuur Coöperatie Westergo, 2021; Agrarische Natuur Drenthe, 2021; ANV Hollands Noorden, 2021; BoerenNatuur, 2020; Collectief Groningen West, 2021; Coöperatief Collectief Agrarisch Natuurbeheer West-Brabant, 2021; Poldernatuur Zeeland, 2021.

agreement, followed by the 'red' pile from most disagree towards more agreement, being completed by the neutral statements, as shown in . During the sorting process, all comments and remarks related to the statements were recorded for the qualitative analysis.

After the sorting process, farmers were asked to explain their most extreme sorting choices, add further comments if wanted and to reflect on general advantages and disadvantages of the Dutch collective schemes. Table 3 gives an overview of all post-Q sorting questions.

Table 3: Post-Q sorting questions

| **Method** | **Question** |
|---|---|
| Q | What do the statements at the positive extreme values (+4) mean to you? |
| Q | What do the statements at the negative extreme values (-4) mean to you? |
| Q | Are there other statements you want to comment on? |
| Q | Is anything unclear or missing? |
| Additional question | What are the main advantages of the collective schemes? |
| Additional question | What are the main disadvantages of the collective schemes? |
| Additional question | *Optional, if many negative aspects are mentioned:*<br>Would you prefer individual schemes? |

## 3.6 Data analysis

For the analysis of the grid data, an inductive approach (exploratory factor analysis) was chosen to allow for the most meaningful development of factors (cf. Watts & Stenner, 2012). While both CFA and PCA are applied for Q methodological research (cf. Akhtar-Danesh, 2016, Watts & Stenner, 2012, Zabala et al., 2018), this analysis like most studies in conservation research is based on a PCA (cf. Zabala et al., 2018). Principal components (also called factors) are orthogonal, i.e. uncorrelated linear combinations of actual scores (Kline, 1994). They are applied to reduce the complexity of data sets by identifying shared perspectives with the aim to maximise the variance explained for any number of factors.

**Correlation of Q sorts:** A total of 15 Q sorts were intercorrelated and factor-analysed via the package *qmethod for R* (Zabala, 2014).[9] The correlation of all Q sorts in the data serves to explore the relationships among them, with the factors mirroring patterns of similarity within the Q sorts,

[9] For further information see https://github.com/aiorazabala/qmethod

i.e. dimensions of shared meaning (Watts & Stenner, 2012). While the Pearson correlation coefficient $r$ is commonly applied for Q (cf. Akhtar-Danesh, 2016, Watts & Stenner, 2012, Zabala, 2014), for this thesis the Spearman correlation coefficient $r_s$ has been used. Pearson's correlation requires data to be scaled metrically including zero. On the one hand, the Q grid provides precise numbers with a zero for the sorting process, yet on the other hand (as explained in chapter 3.2.2) statements are ranked relative to each other without zero necessarily implying a neutral statement (instead only less positive than 1 and less negative than -1), which would be impossible in a forced grid distribution as the ratio of positive to neutral to negative statements differs for each participant. Also, even though participants sort the items into the fixed columns of the grid, they rank them according to their relative subjective choices with no indication that a statement in 4 is necessarily as far from 3 as a statement ranked at 2 is from 3. Hence, Spearman's rank correlation coefficient was deemed more appropriate for the analysis.[10]

**Factor extraction:** The following criteria have been applied for deciding on the number of factors to be extracted (cf. Brown 1980, Watts & Stenner, 2012; Zabala, 2014):

1) Kaiser-Guttmann criterion: Each factor's eigenvalue has to be greater than 1
2) The set of factors accounts for at least 35 % of variance
3) The *factor loading* is the correlation of a variable with a factor, i.e. describes the extent to which each Q sort exemplifies a factor's pattern (Kline, 1994). The squared factor loading is the amount of variance accounted for by the factor. At least two Q sorts per factor have to be flagged, which means that
    a. the factor loading $l$ should be significantly high, with the significance threshold for a p-value < 0.05 given by equation 1, with $n$ as number of statements and

$$l > \frac{1.96}{\sqrt{n}} \qquad 1$$

$$l > \frac{1.96}{\sqrt{37}} \qquad 0.32$$

    b. the square loading for a factor $j$ needs to be higher than the sum of square loadings for all of the other factors (equation 2).

[10] While some authors do not mention or discuss the selection of the correlation coefficient (e.g. Watts & Stenner, 2012, Zabala et al., 2018), Brown (1980) does state that from a theoretical point of view the Spearman correlation coefficient needs to be chosen. Yet, in his calculation, Spearman's and Pearson's correlation reach "virtually identical results" (Brown 1980, p. 279), leading him to the conclusion that the selection of the correlation coefficient has no impact. In this thesis, however, a PCA based on Pearson's correlation coefficient would have resulted in different factors, as explained in Annex II.

$$l_j^2 > \sum_{i=1}^{f} l_i^2 \quad l_j^2 \qquad 2$$

4) Humphrey's rule: a factor can be considered significant if the cross-product of its two highest loadings (regardless of the sign) exceeds twice the standard error with

$$Standard\ error \quad \frac{1}{\sqrt{n}} \qquad 3$$

which for 37 statements implies: standard error $= \frac{1}{\sqrt{37}} = 0.164$

i.e. $l_{max} * \ l_{max-1}$ !> 0.33

**Factor rotation:** Factors are extracted based on the similarity of Q sorts (Watts & Stenner, 2012). In an x-dimensional (x being the number of factors extracted) coordination system with the factors constituting the axes, all Q sorts are positioned between the different axes. To adjust the "view" and have a factor best representing a respective number of Q sorts, i.e. increase the factor loading of Q sort groups for each respective factor, factor rotation is used. The rotation changes the factor loadings and hence the meaning of factors, but the different solutions are mathematically equivalent and explain the same amount of variance (Kline, 1994). Different approaches of factor rotation with various advantages and drawbacks exist (Akhtar-Danesh, 2016). A main difference exists between orthogonal methods, in which all factors are non-correlated and oblique methods, in which factors can take any position (Kline, 1994). While in reality it is unlikely that factors will be completely uncorrelated, orthogonal rotation methods are used as a standard due to the mathematical complexity of oblique rotation methods. The data in this study was analysed with *varimax*, an orthogonal method which aims at maximising the sum of variance of squared loadings per factor. It is effective, reliable and can be used for large data sets (Watts & Stenner, 2012). On the downside, it focuses on viewpoints with high frequencies, while in reality others may be more influential. This bias may be overcome by an additional by-hand rotation, which however yields the risk of subjective bias and unreliable and invalid solutions (Akhtar-Danesh, 2016).

# 4 Results

## 4.1 Quantitative results

In the first sorting step, participants sorted an average of 23 statements to the positive pile, six statements to the negative pile and eight to neutral, implying that statements sorted to zero or even a little below (-1) were often still seen positively.

Two quantitative solutions of extracting two and three factors fulfilled all criteria for factor extraction as listed in chapter 3.6. Three factors were chosen, as they explain a plus of 7.72 % of variance in comparison to two factors and allow for more detailed findings and interpretation. Combined, the three factors explain 66.31 % of the study variance. 14 of the 15 Q sorts load significantly on one of the factors. Q sorts which significantly load on more than one factor are considered confounding and are not flagged (Zabala, 2014), which in this study is the case with Q sort of par_15. Par_15 is associated equally to factor 1 und factor 2 and does not meet extraction-criterion 3b (cf. chapter 3.6), thus can not be assigned to any factor.

The overview of the rotated factors, including factor loadings, flagging of the factors (indicated as *), eigenvalues, explained variance, reliability[11] and standard error of factor scores[12] is depicted in Table 4.

The respective Q sorts of the rotated factors can then be used to derive representative estimates of each factor's perspective, the *factor estimate* (Watts & Stenner, 2012). The factor estimate is ordinarily prepared via weighted averaging of all individual Q sorts which significantly load on that factor. As different numbers of Q sorts load into the weighted averages, scores have to be standardised to allow for cross-factor comparison. The conversion to a standard- or *z-score* for item X related to factor Y is calculated as

$$z_x \quad \frac{x - \mu}{\sigma} \qquad 4$$

with x being the total weighted score for item X, μ being the mean of total weighted scores of all items and σ being the standard deviation of total weighted scores for all items.

[11] Reliability measures the extent to which a person is consistent, i.e. under stable conditions provides the same responses at a later point in time (Brown, 1980). The higher a factor's reliability, the lower the magnitude of error associated with the factor's scores. Reliability ranges from 0 to 1 with values normally expected to rank between 0.8 and 0.9.

[12] The standard error factor score describes in absolute terms the range of how factors could change with the given reliability.

Table 4: Factor loadings and flagging (indicated as *)

| Q-sort | Factor 1 | Factor 2 | Factor 3 |
|---|---|---|---|
| par_1 | 0.06 | 0.25 | *0.77 |
| par_2 | *0.70 | 0.48 | 0.21 |
| par_3 | 0.18 | 0.36 | *0.71 |
| par_4 | 0.57 | 0.19 | *0.61 |
| par_5 | 0.31 | *0.70 | 0.26 |
| par_6 | 0.30 | 0.47 | *0.60 |
| par_7 | *0.56 | 0.16 | 0.41 |
| par_8 | 0.58 | -0.10 | *0.66 |
| par_9 | 0.12 | *0.81 | 0.37 |
| par_10 | *0.76 | 0.29 | 0.01 |
| par_11 | *0.74 | 0.09 | 0.30 |
| par_12 | *0.63 | 0.49 | 0.12 |
| par_13 | 0.22 | 0.40 | *0.54 |
| par_14 | 0.20 | *0.83 | 0.16 |
| par_15 | 0.45 | 0.45 | 0.27 |
| *Number of Q sorts flagged* | *5* | *3* | *6* |
| *Eigenvalue* | *3.53* | *3.24* | *3.18* |
| *Explained variance (%)* | *23.52* | *21.58* | *21.20* |
| *Sum of explained variance (%)* | | | *66.31* |
| *Reliability ($\in [0,1]$)* | *0.952* | *0.923* | *0.960* |
| *Standard error of factor scores* | *0.218* | *0.277* | *0.200* |

The z-scores for all factors are shown in Figure 6, with statements sorted from most consensus at the bottom, to most distinguishing at the top. The closer the symbols are to each other, the more consensus they show. The larger the distance between the symbols, the larger the difference between the sorting. Based on the difference between z-scores, statements are considered distinguishing when significantly differing from others, which is applicable when scores are greater than 1.96*standard error of difference (SED) for $p < 0.05$ (Brown, 1980, p. 245). Statements are considered as consensus, if none of the differences between any pair of factors is significant. In Figure 6, distinguishing statements are marked through colour-filling of the symbols, which shows that some

statements are distinguishing for all factors (stat_29, stat_20) and some statements are distinguishing for one factor only (e.g. stat_31, stat_9 or stat_5). The higher the z-score for a factor and statement, the more agreement it indicates; the lower the z-score, the more disagreement is shown.

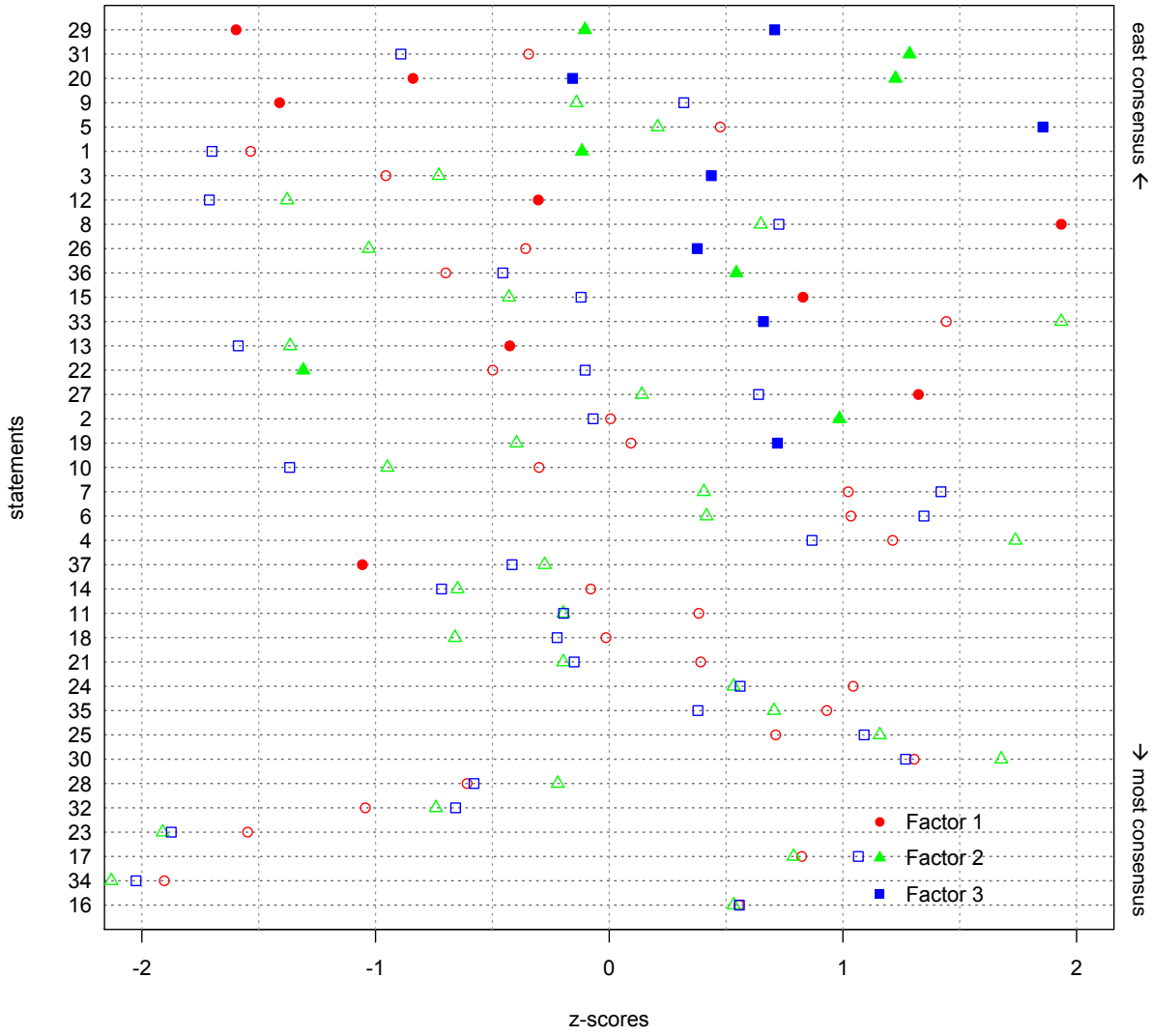


Figure 6: Factor z-scores ranking from most consensus at the bottom to least consensus at the top, with distinguishing statements marked through filling of colour

Finally, for each factor a *factor array* is constructed to obtain a holistic image of each factor's viewpoint. The factor array mirrors a representative, idealised Q sort for each factor, i.e. how the factor if it was a person would have sorted the statements into the grid. It therefore also resembles the sorting metric between -4 (disagreement) and +4 (agreement) (cf. Figure 4). Table 5 gives an overview of the different statements related to the respective motivation categories of the conceptional framework, as well as the z-scores and factor arrays for each factor.

Table 5: Overview of all statements with z-scores and factor arrays for each factor with distinguishing* statements for a certain factor written in bold, and consensus statements written in italic

| Statement | | | | Factor 1 | | Factor 2 | | Factor 3 | |
|---|---|---|---|---|---|---|---|---|---|
| **ID** | **Category** | | **Item** | **z-score** | **array** | **z-score** | **array** | **z-score** | **array** |
| 30 | costs & benefits | direct monetary rewards | For me, direct payments are a very important reason to participate. | *1.31* | *3* | *1.68* | *3* | *1.27* | *3* |
| 29 | | | The schemes would be more attractive if I received a financial bonus once we as a group achieve a certain level of participation. | **-1.6** | **-4** | **-0.1** | **0** | **0.71** | **1** |
| 17 | | indirect rewards | A main advantage of the collective scheme is that we get support with the application and administrative tasks. | *0.82* | *1* | *0.79* | *2* | *1.07* | *2* |
| 16 | | | The collective provides opportunities to get together and create useful networks. | *0.56* | *1* | *0.53* | *1* | *0.56* | *1* |
| 21 | | | The collective schemes offer more flexibility and are less restrictive than the schemes we had before. | *0.39* | *1* | *-0.2* | *0* | *-0.15* | *0* |
| 19 | | | Being part of a collective and participating in the scheme improves my image. | 0.09 | 0 | -0.4 | -1 | **0.72** | **2** |
| 18 | | | Implementing measures yields ecological benefits for my farm - beyond increases in biodiversity. | *-0.01* | *0* | *-0.66* | *-1* | *-0.22* | *-1* |
| 20 | | | I want to benefit from product marketing and labelling activities. | **-0.84** | **-2** | **1.23** | **3** | **-0.16** | **-1** |
| 36 | | cost savings | In the collective scheme I can save costs through easier access to information and resources. | -0.7 | -1 | **0.54** | **1** | -0.46 | -1 |
| 37 | | | In collective schemes we can save costs through division of labour and shared machinery usage. | **-1.06** | **-2** | -0.28 | -1 | -0.42 | -1 |

| Statement | | | | Factor 1 | | Factor 2 | | Factor 3 | |
|---|---|---|---|---|---|---|---|---|---|
| **ID** | **Category** | | **Item** | **z-score** | **array** | **z-score** | **array** | **z-score** | **array** |
| 06 | personal norms | problem awareness | I want to protect species that I know and like, for example meadow birds. | 1.03 | 2 | 0.42 | 1 | 1.35 | 3 |
| 07 | | | My agricultural land use maintains biodiversity. | 1.02 | 2 | 0.41 | 1 | 1.42 | 4 |
| 05 | | | Collective schemes yield higher ecological benefits than individual actions. | 0.48 | 1 | 0.21 | 0 | **1.86** | **4** |
| 03 | | | I want to tackle environmental problems in our region. | -0.96 | -2 | -0.73 | -2 | **0.44** | **1** |
| 01 | | | I am cautious about adopting new ideas and farm practices. | -1.53 | -3 | **-0.12** | **0** | -1.7 | -3 |
| 08 | | perceived responsibility | It's part of being a good farmer to care about the environment. | **1.93** | **4** | 0.65 | 1 | 0.73 | 2 |
| 04 | | | I love nature and our landscape. | 1.21 | 3 | 1.74 | 4 | 0.87 | 2 |
| 02 | | | It is a waste to leave farm land idle and not use it for production. | 0.01 | 0 | **0.99** | **2** | -0.07 | 0 |
| 09 | | | I may continue with some of the measures, even if I'm not paid anymore. | **-1.41** | **-3** | -0.14 | 0 | 0.32 | 0 |
| 27 | | group efficacy | I'm proud of what we achieve as a collective. | **1.32** | **3** | 0.14 | 0 | 0.64 | 1 |
| 24 | | | I value the meetings and exchange with other farmers to learn from each other. | *1.04* | *2* | *0.53* | *1* | *0.56* | *1* |
| 25 | | | Working collectively helps to bridge the gap between farmers and nature conservation-ists by supporting mutual understanding. | *0.71* | *1* | *1.16* | *2* | *1.09* | *3* |
| 26 | | | Within the collective I dare to try more complex schemes than I would on my own. | -0.36 | -1 | -1.03 | -2 | **0.38** | **0** |
| 22 | | | Through the collective we get a say in the design of the scheme. | -0.5 | -1 | **-1.31** | **-3** | -0.1 | 0 |
| 28 | | | I trust that my neighbours will do a good job cooperating. | *-0.61* | *-1* | *-0.22* | *-1* | *-0.58* | *-1* |
| 23 | | | In collective schemes I'm afraid that others will benefit from my work without contrib-uting themselves. | *-1.55* | *-3* | *-1.91* | *-4* | *-1.87* | *-4* |

| Statement | | | | Factor 1 | | Factor 2 | | Factor 3 | |
|---|---|---|---|---|---|---|---|---|---|
| **ID** | **Category** | | **Item** | **z-score** | **array** | **z-score** | **array** | **z-score** | **array** |
| 15 | social norms | injunctive norms | In the collective we help each other out if anyone needs support. | **0.83** | **1** | -0.43 | -1 | -0.12 | 0 |
| 11 | | | Most people who are important to me think positive about cAES. | *0.38* | *0* | *-0.2* | *0* | *-0.2* | *-1* |
| 14 | | | Even if meetings and administration are tiring: sharing moments of laughter, sorrow or pride unite us as a group. | -0.08 | 0 | -0.65 | -1 | -0.72 | -2 |
| 10 | | | I participate in cAES because collaborating for environmental protection is a tradition in this area. | -0.3 | 0 | -0.95 | -2 | -1.37 | -2 |
| 12 | | | I participate because most members of my collective think that it's important to join collective conservation measures. | **-0.3** | **0** | -1.38 | -3 | -1.71 | -3 |
| 13 | | | I would only cooperate with farmers that I respect. | **-0.43** | **-1** | -1.37 | -3 | -1.59 | -3 |
| 33 | | descriptive norms | It's important for me that on my own farm I remain the boss and decide how things are done. | 1.44 | 4 | 1.93 | 4 | **0.66** | **1** |
| 35 | | | It is important that people in the region realise and appreciate what we do with the schemes. | *0.93* | *2* | *0.71* | *2* | *0.38* | *0* |
| 31 | | | I won't implement measures that make the farm look messy. | -0.34 | -1 | **1.29** | **3** | -0.89 | -2 |
| 32 | | | There is a high pressure of society - if I don't collaborate for conservation I may just lose my license to produce. | *-1.04* | *-2* | *-0.74* | *-2* | *-0.66* | *-2* |
| 34 | | | I participate in cAES because my farmer colleagues participate. | *-1.9* | *-4* | *-2.13* | *-4* | *-2.02* | *-4* |

* as explained above based on a p <0.05 level. If p was reduced to <0.01, the following changes would occur: statement 19, 22, 26 and 27 would qualify neither as distinguishing nor consensus; statement 20 would distinguish Factor 2 only, statement 29 would distinguish Factor 1 only and statement 4, 14 and 37 would qualify as consensus. For further information see Annex III.

The data obtained from the Q study does not provide a possibility to indicate which motivational categories are particularly relevant for each factor, as (i) the sorting is based on agreement and not importance, (ii) data is not metrically scaled to zero, but scaled relatively and hence (iii) results cannot be transferred to a general population (which is not the aim of Q). Nevertheless, it is possible to show in which categories factors conform or differ. Based on a ranking of average z-score differences, Table 6 shows that all factors correspond on indirect rewards, aspects of group efficacy and descriptive norms. There is a medium consensus concerning direct rewards (with all agreeing on the importance of direct payments, but different opinions on bonus payments), cost savings and injunctive norms. The strongest differences occur in personal norms, both concerning problem awareness and perceived responsibility.

Table 6: Consensus and agreement according to motivational category

| Category | Mean rank |
|---|---|
| *Mean rank based on a ranking of z-score differences between factors for all statements from 1 (highest disagreement) to 37 (highest agreement).* | |
| a1) direct monetary rewards | 16.00 |
| a2) indirect rewards | 24.33 |
| a3) cost savings | 17.00 |
| b1) problem awareness | 11. 80 |
| b2) perceived responsibility | 13.00 |
| b3) group efficacy | 23.57 |
| c1) injunctive norms | 17.00 |
| c2) descriptive norms | 22.60 |
| *Total mean* | *19* |

## 4.2 Factor interpretation

The interpretation of factors entails a careful and holistic inspection of each factor, looking not only at the extreme values but at the composition of all values relative to each other (cf. Watts & Stenner, 2012). It is based on the quantitative information as well as qualitative explanations and information from the first sorting process (between positive, neutral and negative). Although par_15 does not belong to any factor, his comments were integrated in the qualitative analysis, as he holds no unique opinion (but in different aspects agrees with different factors), nor strongly deviates from the average of farmers in any of the farm characteristics. The shared farm characteristics and those that

distinguish each factor are introduced at the beginning of each section and summarised as an overview in Annex IV.

### 4.2.1 Communalities and points of consensus

All famers except one (F3)[13] were born in the province in which their farm is located and started farming at an age between 15 and 31 (mean average: 20.4). All of them are men and work full-time as farmers except one woman (F2), who works part-time and runs the farm together with her husband (who is also full-time farmer, but did not participate in the study). In each factor, people have received formal agricultural trainings and hold related vocational, polytechnic and/or university degrees except one person, who has no formal agricultural training but a Master of marketing and business management (F1). All except one farmer (F2) have been members of their collective since before 2014, i.e. before the transition to collective schemes. In each factor, some but not all farmers participate in further projects of the collective (besides cAES).

All farmers agree that direct payments are important (30: 3)[14], as without they would not be able to afford investing in nature protection.

> *"[…] You have costs and fewer yields and that has to be compensated. The money is […not] the only important thing, but it makes sure you can do the maintenance. Without money it is not possible. We have to continue with farming and therefore be paid."* (par_10)[15]

All perceive it as a main advantage of the collective schemes that the collectives support them with the application and administrative tasks (17: 1, 2, 2) and provide opportunities to get together and create useful networks (16: 1). Also, they value meetings and exchange to learn from each other (24: 2, 1, 1). While it is important for them that people acknowledge their effort with the schemes (35: 2, 0, 0), they do not perceive a pressure by society which would influence their actions (32: -2): *"That is not the case at all. There is no permit right now that I could lose. There is no question of social pressure, there is total freedom."* (par_7).

[13] In the following, the association to factors will be abbreviated as Factor 1 (F1), Factor 2 (F2) and Factor 3 (F3).

[14] In the following, the numbers in brackets refer to (Statement: factor array). When referring to several factors (chapter 4.2.1), one number means that all factors have ranked the statement the same way, while three numbers indicate three different rankings). When referring to one factor only, the factor array relates to this factor only (description of factors chapter 4.2.2 to chapter 4.2.4).

[15] If no further reference is mentioned, the quotation refers to the statement mentioned before. In case of ambiguity, a reference will be provided in the form of stat_ID-number of item. In chapter 4.3, responses to the additional question on advantages and disadvantages of cAES are included.

Further, they appreciate the collaboration of the collective with nature conservationists as well as with citizens (25: 1, 2, 3).

> *"I think that you can stimulate more interest into the same direction. Normally farmers and nature conservation are opposite to each other. Nature conservation likes to see nature and the farmer is traditionally anti-nature because he has to hand in agricultural soil for it. The collective creates a win-win. Normally the two of us never talk, but this is the opening of a dialogue."* (par_7)

For their farm they see little or no ecological benefits from the schemes beyond the increase in biodiversity (18: 0, -1, -1). Also, people who are important to them do not necessarily think positively about cAES (11: 0, 0, -1). All of the farmers strongly reject the idea of having joined the scheme because their farmer colleagues take part in cAES, although two farmers (par_4 and par_10) mention that they try to inspire others to join as well (34: -4): *"I don't care what other farmers do […]. I fight for my own farm. I don't follow others, I am too stubborn for that."* (par_14).

They do not necessarily trust that their neighbours are good partners for cooperation (28: -1), but are not at all afraid that someone in the collective would benefit without contributing himself (23: -3, -4, -4): *"It is good when others benefit from me. In the end we all have to do it and we are keeping up with that. I am not afraid at all."* (par_3). Also par_15 confirms *"That is related to motivation. We have to do it all together in the end. Otherwise we can't maintain a collective. If another farmer profits, I actually enjoy that."*

All farmers are neutral to slightly positive about whether the collective schemes offer more flexibility and are less restrictive than previous schemes (21: 1, 0, 0), but all of them prefer the collective schemes, which is further explained in chapter 4.3.

### 4.2.2 Factor 1: The Collectivists

Factor 1 comprises five conventional farmers from Drenthe, Brabant, Zeeland and Friesland aged between 26 to 57 (mean average: 44.6). They operate in the dairy (2 persons), arable (2 persons) or arable and livestock (1 person) sector and earn between 50 to 100 % (mean average: 84 %) of their personal income from their farming activities. The dairy farmers own an average of 170 dairy cattle. The farms comprise an average of 76.4 hectare. Depending on the sector, between none (arable) and all (dairy) of the land is grassland. On average, the farmers own 81 % of their land. Half of one farmer's land is located in a nature protection area. One participant once was a director, and another is board member of his collective.

For farmers from Factor 1 taking care of the environment is part of being a good farmer (8: 4):

> *"That is what I am grown up with. You do everything for nature. If you are not doing good for the land or the cows, you are not going to make it yourself. Since I was child it was important. If you don't have any affinity with nature, you should not become a farmer."* (par_2)

> *"That is the 'license to produce' stewardship. Duty to take care of nature and give future generations of farmers a chance in the long term too."* (par_12)

However, it has to be their own decision how to protect nature and which schemes to join (33: 4): *"I have to be able to make my own choices, only then I want to participate in cAES. If I am told (forced) to do it, then I won't participate."* (par_2). Also, par_11 emphasises *"...we are already so limited in our freedom, so I don't want to hand in even more freedom. The freedom of the job is an enormous motivation, not only the financial support."* (par_11).

They love nature and the surrounding landscape (4: 3) and want to protect species they feel attached to (6: 2). They are convinced that their land use maintains biodiversity (7: 2) and are open to new practices (1: -3).

> "*In the last few years I have noticed many changes, especially if the old agricultural practices of my dad and previous generations are compared with the present. Some measures are not effective anymore in the present, for example tillage is not necessary anymore or burning down the soil in spring is not necessary anymore. There are so many new techniques nowadays. However, you can also learn from the old farming practices."* (par_11, stat_1).

The farmers are proud of what they achieve as collective (27:3). They help each other out within the collective (15: 1) and are influenced in their decision on whether to participate in the schemes by what others in the collective think (12:0; a statement, which was strongly rejected by the two other factors). Yet, they do not see that they could save costs through sharing labour or machinery (37: -2).

Even though they would like to do so, they do not see a chance of continuing with the measures if they were not paid for it anymore (9: -3): *"[...] I have to invest so much time and money, it won't be worth it. Even as a lover for nature, in the end it is having a business."* (par_2)

They reject a system of financial bonuses for certain levels of participation reached (29: -4):

> *"It is almost not achievable to do this with a group. It is impossible to all agree on it. Everyone has different lots, which you cannot measure by the same standard. One farmer has to put way more effort than the other to achieve the same results. For example, it is easier to attract bird species if you are closer to a nature area. It requires a region-specific approach."* (par_10)

Also, product marketing and labelling activities by collectives do not contribute to their motivation to participate in the schemes (20: -2).

### 4.2.3 Factor 2: The Business Rationalists

Factor 2 comprises three farmers from Groningen, Brabant and Friesland aged between 41 and 59 (mean average: 52.3). One person operates in the livestock sector with 150 young cattle and two persons in the dairy sector with an average of 405 dairy cattle. They earn an average of 98 % from farming activities and own 89 % of their land. Almost all of their farm land, on average 86.3 hectare, is occupied by grassland.

For farmers from Factor 2 it is most important to 'remain the boss' on their own farm (33: 4):

> *"It is related to the fact that you have the feeling as farmer that many rules are imposed. The farm is your own business and still you want to be your own boss. We already have to comply with many rules. But within our collective you still have the freedom of deciding your own things. It is way better than during the individual contracts, that was more controlled by the government. Now, the collectives can design the packages themselves and we have short lines with them."* (par_5)

> *"I noticed that my enthusiasm and effort go away when rules are being imposed. I have more motivation when I can find a solution myself."* (par_14)

They love nature and the regional landscape (4: 4): *"That is because I have been growing up here. I am a real outdoor person. Roaming around here for years, so it is in my genes."* (par_14). Par_5 further remarks:

> *"We are also ambassadors, we are living in a beautiful landscape. We have a bike path here that is going right through our property and since COVID-19 it is very busy with bikers. And that is why we are extra aware of the fact how important this piece of nature is. We would like to keep it this beautiful."* (par_5)

However, they would not implement measures that make the farm look 'messy' (31: 3) and believe it to be a waste to leave farm land idle and not use it for production (2: 2). They are less optimistic than the other farmers that their land use maintains biodiversity (7: 1; including one person sorting the statement to the negative pile). Yet, they either believe that no environmental problems exist within their area or rather think about how to adapt to environmental problems from a business perspective than about how to mitigate environmental problems (3: -2).

The farmers want to benefit from marketing and labelling activities by the collectives (20: 3) and see the opportunity to save costs through easier access to information and resources (36: 1), maybe even through sharing labour and machinery (37: -1; but sorted to neutral or positive statements). They do not think that it is possible to only cooperate with farmers they personally respect, but that a cooperation with all farmers is necessary (13: -3).

They are more cautious than the other farmers about adopting new ideas and farming practices (1: 0) and would not participate in more complex schemes within the collectives compared to individual schemes (26: -2). Also, they do not think that through the collectives they got a say in the design of the schemes (22: -3).

> *"There are things that we would like to change and we know the people in the province. But it is a laborious and long-winded process. […] Especially when changes have to be made, it is hard to get them through the process. For example, for the Plasdrassen [pools for birds] the checks are so strict and laborious that there is only one farmer left at our collective who implements this measure. This system works counterproductive. It has been worked against the whole group. Solution: more awarding after effort and not results. The farmers who put most effort for nature measures are being demotivated."* (par_14)

### 4.2.4 Factor 3: The Environmental Optimisers

Factor 3 comprises six farmers from Drenthe, Noord-Holland, Groningen, Brabant and Friesland aged between 44 and 66 (mean average: 56.2). All of them are dairy farmers with an average of 152.5 dairy cattle. One of the farmers is an organic farmer. They earn between 50 to 100% of their income from farming activities (average: 87 %). They farm an average of 68 hectare, of which almost all is grassland. An average of around 70 % is their own land. For two farmers, 5 and 10 % of their land is located in a nature protection area. On person is director of his collective.

The farmers are convinced that collective schemes yield higher benefits than individual actions (5: 4) and that their land use contributes to the protection of biodiversity (7: 4).

> *"As a collective you make a mosaic landscape from the area. You cannot protect the biotope on your own. As collective you can offer much more and at the right spots. Individually you don't achieve anything. And as collective you learn from each other."* (par_3, stat_5)

They particularly want to protect species which they know and like (6: 3) and bridge the gap to nature conservation (25: 3).

> *"Those meadow birds are visible and they are very important to me. When I was 10 years old I was already protecting nests."* (par_4, stat_6)
>
> *"Traditionally, the collective had good contact with bird watchers and that is still the case. Also, we support the bird watchers. We are getting closer to the citizens […]. Facilitating this collaboration between farmers and nature conservationists is very important."* (par_13, stat_25)

Taking care of the environment is part of being a good farmer (8: 2), but also improves the own image (19: 2).

> *"The packages of FrieslandCampina contribute to my image, the consumers can choose from that. […]. I do 30 % meadow bird management […]. This directly gives a good story, where also we ourselves benefit from. […]"* (par_3, stat_19)

The farmers want to tackle environmental problems (3: 1) and are open towards trying out new things (1: -3): *"I would like to contribute to fight climate change through my collective. Binding $CO_2$, being $CO_2$-neutral for example. We also have to carry out climate measures."* (par_1, stat_3). They are also willing to implement measures which would make the farm look 'messy' (31: -2) and are more positive about continuing with the schemes even without payments than the other farmers (9: 0).

They would welcome an extra bonus for collaboration (29: 1). They are proud of the collective's achievements and feel supported in implementing more complex schemes (26: 0): *"It is true that I seek support from the collective when something more complex has to be done."* (par_13). However, they do not see their participation being influenced by other members of the collective (12: -3) and dismiss the idea of only cooperating with farmers they respect (13: -3).

## 4.3 Advantages and disadvantages of the collective schemes

When being asked about the advantages of the collective schemes, the organisation by the collective and the provision of knowledge and advice are strongly emphasised by six farmers (par_2, par_9, par_10, par_11, par_13, par_14 (all factors)). Par_1 (F3) also stresses that organising the schemes collectively saves a 'lot of money'. A short line between farmers and the field worker of the collective who *"speak[s] the language of the farmer"* (par_3 (F3)) and *"knows what's going on and gives tailored advice"* (par_5 (F2)) is highly appreciated. There is little administration, lowering the threshold for participating in the schemes and enabling *"a combination of decreasing regulations and collectively achieving results."* (par_3 (F3)). Being member of a collective widens the perspective (par_7 (F1)) and creates room for discussions, inspiration and mutual learning (par_10 (F1), par_15). Also, the collectives build bridges between the farmers and nature conservationists and citizens (par_7 (F1), par_8 (F3)). Moreover, the ecological benefits of the area-oriented approach are mentioned by many farmers (par_2, par_4, par_6, par_8, par_12 (F1, F3), par_15).

Nevertheless, some negative aspects were mentioned, when being asked about the disadvantages. The rules are still perceived as very strict (par_5 (F2)) and not as flexible, as had been promised to the farmers with the introduction of the new schemes (par_12 (F1)).

> *"An example: Until 15th of July I cannot mow, and all farmers complied with that measure. But then on 9th of July there is a fox killing all nests, so farmers are mad and the date is not negotiable. […] It was maximal ecological action, but not appreciated. So healthy common sense, farmers sense, is frowned upon."* (par_12 (F1))

Also par_14 (F2) complains about suffering from predators which destroy the results of the farmers' efforts in meadow bird protection and blames the EU policies for not being flexible enough to deal with it. In contrast, par_2 (F1), who also faces the same problem, mentions that the advisor from his collective provides them with 'simple solutions' to handle the issue.

Another critique is that actions which used to be part of the scheme became a new standard, meaning that farmers need to maintain the efforts but may no longer be able to receive compensation for it (par_3 (F3)). Similarly, there is the fear that once a certain threshold of success has been passed, for example regarding meadow bird protection, a new standard is set, which discourages farmers from joining (par_3 (F3)). While one farmer believes the scheme's duration of six years to be a long time of commitment (par_6 (F3)), another participant thinks that the schemes should last much longer, up to 30 years, to allow for meaningful planning (par_8 (F3)). Another farmer mentions that the organisation by the collective works so well, that there are only few meetings with other farmers, while in the past they would meet more often (par_13 (F3)). Also par_15 would appreciate more exchange and common actions. Moreover, a farmer mentions that (governmental) nature conservation can learn from the farmers and the way how they manage nature (par_11 (F1)) while another participant questions the efficiency of governmental nature management adjacent to farmland and states that this could be organised much better (par_3 (F3)).

In a further comment, par_10 (F1) explains that farmers used to benefit from an exemption on income tax, which was promised to be kept after the transition to collective schemes. However, there was confusion around whether it still existed, until in autumn 2020 it became clear that it was abolished. Par_14 (F2) criticises that efforts are being undervalued by only compensating losses in yield, which does not take into account (external) costs occurring due to changing management practices and the impacts on the quality of produced goods, while par_9 (F2) thinks the compensation they receive is 'pretty good'. Par_12 (F1) believes that the reward scheme should be shifted – granting financial awards for right action instead of receiving compensation for producing less.

# 5 Discussion

## 5.1 Key findings and implications

Three factors or groups of farmers could be identified, who differ through their sense of collective achievement (Factor 1), a rather conservative business perspective (Factor 2) and strong environmental ambitions (Factor 3).

The different factors show similarities to existing farming typologies, for example from Cullen et al. (2020), where F1 shows similarities to the forward looking farmers, F2 to a mixture of both the productivist and the conservative farmers and F3 to the optimistic caretakers. In the typology from Maybery et al. (2005), F2 could resemble the economic, F3 the conservation and F1 the lifestyle perspective adapted to the collective context. However, as pointed out by van Herzele et al. (2013), conservation and financial objectives are not mutually exclusive, as especially demonstrated by F1, in which farmers care for the environment, but at the same time strongly depend on compensation payments. In general, such comparisons should be regarded with caution, as the methodological approach is not the same and the typologies refer to individual schemes only.

Although clearly distinguished, the three factors coincide in several main points, in strong agreement as well as strong disagreement to the statements. For all farmers, the love to nature and the landscape is a key motivation for participating in cAES, yet the perception of the environment and of existing problems is very distinct between the different factors. For F1, taking care of the environment is an inherent obligation of being a farmer. For F2, nature is viewed in a more traditional way, which does not allow for land left fallow or a 'messy' landscape. Instead, all land has to fit to the overall farm purposes and environmental challenges are either not really acknowledged or rather assessed from an economic perspective, for example, in terms of the need to adapt crops to cope with changing environmental conditions. For F3, taking care of nature is central to the farmer's identity and goes beyond not harming nature, but also includes ideas on how circumstances can actively be improved, for instance through 'fighting climate change' by binding $CO_2$. Between the three factors, the higher problem awareness may for dairy farmers be reflected in farming less hectare with much lower stocking rates compared to farmers who show less awareness. The shift from seeing a good farmer as someone keeping his farm tidy and productive to someone additionally taking care of the environment was also described by Westerink et al. (2019).

All factors agree that financial compensation is very important, yet not because they expect positive revenues, but because financial support is a necessary mean to be able to carry out the schemes in the first place. Further, the idea of shifting the reward scheme to what was achieved instead of

promoting a reduced production supports the findings of Wanner et al. (2020). This also supports the need for cultural capital associated with non-food production to better acknowledge the work of farmers (cf. Wynne-Jones, 2013). However, especially in the case of meadow bird protection the efforts need to be rewarded, even if – due to predators – the results are not achieved.

All farmers strongly dismiss the influence of neighbouring farmers on their decision to participate in cAES. They disagree less with regard to the influence of other members of their collective, with 'the collectivits' (F1) even being partly positive about it. This is again in accordance with findings from Westerink et al. (2019) who discovered a reference shifting from neighbouring farmers to members of the collective. However, the influence of others should be interpreted carefully, as the values of independence (cf. Emery & Franks, 2012) or social norms based on autonomy (cf. Riley et al., 2018) may hinder a true reflection of the influence of others.

The qualitative analysis shows that all motivational categories were involved in the decision-making processes of farmers, widening the reasons of motivation in comparison to individual schemes through collective efficacy and social norms (cf. Barghusen et al., under review). For cAES to be successful, not only the motivation of farmers, but also their ability (referring to capacity, resources and skills) is crucial (Runhaar et al., 2017). Through their current role and the existing trust towards them (cf. de Vries et al., 2019) the collectives can support both. As a new reference group (cf. Westerink et al., 2019), injunctive norms can be defined through the collectives, further spreading environmental awareness and the feeling of collective efficacy. When activated (focused upon), injunctive norms can lead to changing behaviour across different situations (i.e. beyond following the obligations) (cf. Cialdini et al., 1991), enabling schemes to become culturally sustainable (cf. Burton & Paragahawewa, 2011). Through cAES and further projects of the collective, the idea that a good farmer also takes care of the environment can be transferred into action. The more established this cultural shift becomes, the more the descriptive norms (i.e. what others are actually doing) can additionally encourage farmers to join the scheme. Descriptive norms will only induce a desired change when being the norm, otherwise the focus on what others do is likely to lead to the opposite effect (cf. Cialdini et al., 1991).

Many of the caveats concerning collective schemes found in the literature could not be confirmed or were even explicitly rejected by all the farmers. For instance, a fear of depending on others (cf. Sutherland et al., 2012) or being afraid of free riders (cf. Mills et al., 2011) seems not to exist. Instead, similar as stated by Wynne-Jones (2017), farmers seem to enjoy greater autonomy as a group represented by the collective than before when directly dealing with governmental authorities. Moreover, the tradition of collaborating for environmental protection was – by almost all farmers – either perceived to play no role or to not even exist. While the Netherlands have a history of

farmers working together during the last decades (cf. chapter 3.3) and all except one research participant joined their collective before the transformation of collectives in 2014, it might not be perceived as a cooperation for environmental protection, but rather as working together to strengthen the farmers' position under increasing regulatory pressure concerning environmental policies. Also, it could be that the term 'tradition' is rather understood as hindering change and hence perceived as something negative, which is not associated with the collectives (cf. Barghusen et al., under review).

## 5.2 Policy recommendations

All farmers see advantages of the collective schemes and prefer them over the individual schemes which existed before. Yet, the drawbacks mentioned show that further room for improvement exists. While in the literature collective action is often associated with a participatory approach, the farmers' feedback implies that although the Dutch cAES are more participatory than the previous individual AES, the approach can still be enhanced. In particular to further strengthen the position of farmers in processes of scheme design and decision-making, integrating their expertise and further increasing the flexibility to adapt to challenges such as predation would be appreciated by the farmers. Generally, policy processes and decision-making should be transparent and promises be kept to avoid disappointments and mistrust. Similarly, consequences of joining the schemes should be communicated openly to prevent concerns of farmers about raising conservation standards and land possibly becoming protected and excluded from farming activities. Moreover, for certain measures it might be worth evaluating the possibility to provide voluntary long-term contract options beyond six years to allow for better planning. As with the collective approach the Dutch schemes enjoy increasing popularity, the government should try to guarantee sufficient funding to enable all applying farmers within the ecological target regions to actually join the schemes.

Remaining the boss on one's own farm – which is important to all of the farmers – does not seem to be threatened by the collective, but rather by governmental or EU regulatory pressures or even citizens: "*[…] Nowadays we are being approached by citizen-initiatives. They often have a different vision about how things work on a farm. The practice is often different from the theory. This can clash."* (par_15, stat_33). The farmers perceive that citizens may not be well informed:

> *"[…] I often get the question if I am an organic farmer, the "license to produce". I have to defend myself on many levels. […]. Depending on FrieslandCampina, there is a waiting list for transition to organic farming. And the consumer does not even really know what organic farming means."* (par_3 (F3), stat_19).

This indicates, as also mentioned by some of the other farmers, that external communication can still be improved to achieve more public appreciation for the farmers' efforts and increase public awareness about different production standards while promoting more informed consumer choices.

Concerning the challenge of predators in meadow bird protection, some farmers are supported and provided with practical guidance by their collective (par_2, (F1)), while others do not see solutions and blame the difficulties on (EU) policies (par_14 (F2)). This shows that further potential for exchange exists, possibly not only within a collective, but also between different collectives to share their approaches and solutions on such issues. Generally, some farmers would appreciate more exchange and meetings organised by the collective, if necessary due to COVID-19 also online.

## 5.3 Transfer potential to other EU member states

The Dutch cAES serve as vaunted example of successful cooperation (Riley et al., 2018). With many caveats rebutted and tradition not being perceived as important by the Dutch farmers, the question arises how other countries within the EU could follow the Dutch approach. 'Cutting and pasting' the Dutch scheme to another EU member state is unlikely to be successful due to path dependencies of schemes, i.e. differences in governance cultures and environmental priorities (Westerink et al., 2017). Also, the relations and cooperation between farmers in the past influence the present which is different in each context (cf. Riley et al., 2018). Consequently, scheme design must be sensitive to local ecological, economic and social conditions as well as cultural preferences (Siebert et al., 2006). Even in the Dutch case the scheme design can be further improved to fit the farmers' needs, as demonstrated by the disadvantages or concerns mentioned.

For a collective approach to AES following the Dutch example, governments need to be willing to decentralise decision-making authority to be taken over by local associations (Franks, 2011). Moreover, institutions similar to the Dutch collectives are needed which could support such a transition (Franks & McGloin, 2007b). Local field workers who know the region well and 'speak the language of the farmer' may be essential to overcome mistrust towards (EU) politics and gain trust towards a new approach. In particular, if new institutions are formed, social capital is crucial to be established (Westerink et al., 2020). However, also the former Dutch model until 2014 was associated with high transaction costs, high bureaucratic burdens and financial penalties with mistrust between actors leading to mistrust towards the scheme (de Vries et al., 2019). In the Netherlands, this could be changed during the process of establishing the collective approach, which was implemented in 2016. Not being forced to give up independence and not being vulnerable to defaulting by other farmers or exposed to free riders but instead benefitting from the facilitation by a coordinating

institution, including less administration, tailored advice, support and exchange may also in other countries be well received incentives to dare collective action.

While Greiner (2015) argues that general preferences for conservation contracts are the same throughout different countries (with significant heterogeneity regarding different contract attributes existing in each region), other authors detect cultural differences concerning scheme preferences even between different member states of the EU (Villamayor-Tomas et al., 2019; Wilson & Hart, 2000). As shown by Baur et al. (2016), farmers within Europe hold different values and are to a different extent open to change and innovation, with Dutch (also Danish and Swiss) farmers being significantly more open to change than farmers from other countries. Similarly, the reluctance to engage in formal cooperative arrangements due to socio-cultural preferences might pose a challenge in other countries (Emery & Franks, 2012). However, even though farmers need to work together to be able to participate in the Dutch cAES, in the end they sign individual contracts where each person remains responsible for the own action only. Hence, communicating the advantages of achieving greater ecological results and the facilitated implementation of measures for farmers due to the support through the coordinating institution, as well as defusing caveats may increase the willingness of farmers to engage in a collective approach beyond socio-cultural boundaries.

## 5.4 Further research needs

Q methodology does not allow for a generalisation of results, the most popular perspective among participants of this study may be the least popular view among Dutch farmers in general (cf. Webler et al., 2009). A follow-up study based on a large survey (cf. Zabala et al., 2018) would be an option to reach representative results and also make findings better comparable, for example, to more profoundly discuss differences between farmer typologies or perspectives of individual and collective schemes. A closer look on the measures applied by the farmers of each factor, for instance, how complex they are or whether the remuneration is based on actions carried out or results achieved, would allow for a more detailed insight into the different perspectives. Moreover, future research should not only focus on people who already participate in cAES, but in particular look at non-participants to discover further potential barriers and drawbacks of participating in cAES. Further studies carried out in other member states of the EU would be interesting to gain insights on the willingness of farmers to follow the Dutch example, including the question of whether any institution exists which would be able to carry out the tasks of the collectives in the Netherlands in the respective country.

## 5.5 Discussion of methodology

The data obtained within the thesis does not allow to indicate which motivational categories of the conceptual framework are of how much importance for the farmers of each factor. Nevertheless, the framework proved to be a useful basis for this Q study, as it allowed for a balanced selection of statements, which was confirmed by the research participants who did not perceive that any aspect was missing.

The quantitative results of the Q study fit well to existing Q conservation research, for example related to the size of the Q set (37 items), the extraction method (PCA) and rotation method (varimax), the number of factors retained (3) and the percentage of variance explained (66.3) (cf. Zabala et al., 2018). Also the number of 15 research participants lies in the recommended range based on the ratio of statements to participants (cf. Webler et al., 2009).

A major methodological limitation is that statements were developed based on a literature review and not directly taken from popular media or interviews with farmers or other stakeholders (cf. Watts & Stenner, 2012; Webler et al., 2009). The formulation of statements by the researcher may have resulted in some degree of bias. Moreover, research participants with a variety of opinions should be selected, for which the researcher should be familiar with potential participants and their views (Zabala et al., 2018). While this task of knowing the stakeholder was transferred to representatives of the different collectives contacted when asking for interview partners, emphasising the need for different perspectives, an unbiased selection of participants cannot be guaranteed. Instead people more engaged in the collective and well known to the representatives were probably most likely to be contacted.

Since the three factors agree in many aspects, it has to be highlighted, that this consensus needs to be interpreted carefully taking into account the qualitative information, as ‘consensus’ statistically speaking only refers to a lack of significant differences. As mentioned in Table 5 and further elaborated in Annex III, a change in p from $<0.05$ to $<0.01$ in this case already changes the classification to distinguishing or consensus of nine statements.

The low number of research participants does not allow for a generalisation of the farm characteristics, yet, it is important to note that the affiliation with a factor cannot be associated to any region, but that instead all factors include farmers from the north, the west as well as the south of the Netherlands. Moreover, all factors are represented by farmers with large farms compared to the Dutch national average, as shown, for example, in the average number of cattle per dairy farmer (170 (F1), 405 (F2), 152 (F3) compared to a national average of 97) (Statista, 2020).

# 6 Conclusion

The aim of this thesis was to explore farmers' motivation in the Netherlands to participate in collective agri-environment schemes via Q methodology. While AES are seen as key to compensate for negative externalities by agricultural practices and to improve the ecological conditions of agricultural land, they are associated with a lack of effectiveness. The ecological effects might be enhanced through a coordinated landscape approach, which on a larger scale within the EU is only applied in the Netherlands.

The results show that three different perspectives exist among the Dutch farmers participating in cAES, with one group of farmers being distinguished through their sense of collective achievement, a second group through a more conservative business perspective and the third group through strong environmental ambitions. For all of them, the love to nature and their region is a crucial motivation to participate, while financial rewards are important to be able to implement the required changes, rather than being an additional stream of revenue. While they show different levels of problem awareness, all agree that taking care of the environment is part of being a good farmer. Individual independence is important to all of them, yet the cooperation within the collective does not threaten, but rather strengthens their autonomy as farmers. Also, they disagree with other caveats such as being dependent on others or being afraid of free riders. They all agree that the collective schemes yield advantages compared to the previous individual schemes, particularly concerning ecological effects and the facilitation by the collectives. While the overall résumé of the collective scheme is very positive, farmers still wish for more flexibility and a better integration of their knowledge and experiences into scheme design as well as an improved communication of their achievements.

Through their current role and the trust towards them, the collectives can promote not only the motivation of farmers to join cAES, but also necessary knowledge and skills for a successful implementation of the measures. Hence, the collectives are able to facilitate and strengthen social as well as cultural capital, through which the farmers' work in the context of the schemes will more likely be perceived as achievement, which again fosters pride and prestige associated with participation. While promoting a change in attitudes of participating farmers, this process may enable the schemes to become culturally sustainable.

A follow-up study based on a large survey also including non-participants in cAES would be needed to reach representative results and allow for further insights into the farmers' perspectives. Moreover, based on the advantages of cAES, and many caveats related to collective action being dismissed

by the farmers, future research should focus on how the Dutch approach to cAES could be implemented in further EU member states beyond socio-cultural boundaries and which institutions might be capable of taking over the role of the Dutch collectives in the respective country.

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# Annex

## Annex I: Survey

contracts2.0

zalf Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF) e.V.

**SURVEY**

**Background**: To better understand farmers' motivation to participate in collaborative agri-environment schemes, we would like to know a few details about you and your farm.

**SECTION A: FARMING BACKGROUND**

1. **For how many years have you been farming?**

   For _____ years

2. **What is (a) your employment status as a farmer and (b) what type of farming do you practice?**

   **(a) employment:**

   ☐ full-time

   ☐ part-time

   **(b) Type of farming**

   *Multiple answers possible.*

   ☐ conventional

   ☐ organic (certified)

   ☐ transitioning to organic since _____

   ☐ other: _____

3. **Approximately what percentage (%) of your personal income comes from your farming activities?**

   _____ % of my total income

4. **Have you had any formal agricultural training? If so, in what form?**

   *Multiple answers possible.*

   ☐ None

   ☐ vocational training

   ☐ polytechnic degree

   ☐ university degree

   ☐ other: _____

5 **In which year did you become a member of a collective for agricultural nature and landscape management?**

| Before 2014 (initially an ANV) | Between 2014 and 2016 | Later than 2016 |
|---|---|---|
| ☐ | ☐ | ☐ |

6. **Are you participating in further projects of your collective (other than cAES)?**

   ☐ yes

   ☐ no

**7. Are you a member of any producer cooperatives (e.g. for dairy, potatoes, fruit and vegetables)?**

☐ Yes. How many? ____

☐ no

**Section B: FARM CHARACTERISTICS**

**8. In which farming sector are you operating?** *Multiple answers possible..*

☐ dairy farming
☐ horticulture
☐ livestock farming
☐ other: _____
☐ arable farming

**9. If you keep livestock: Which type and how many livestock do you currently manage?**

Type of livestock: _____

Total number of livestock: _____

☐ I do not keep livestock

**10. How many hectares are you (a) currently farming on, and approximately how much of this is (b) grassland?**

**(a)** _____ ha **total** farm size

**(b)** _____ ha **grassland**
(of _____ **%** is **grassland**)

**11. How much of your farmland area do you own?**

☐ Approximately _____ %
☐ None (all rented)

**12. Is any of your farmland located within a nature protection site?**

☐ yes, approximately _____ % and the type of nature protection area is:

_____

☐ None of my farmland is located in a protected area

**SECTION C: PERSONAL BACKGROUND**

**13. Please indicate your gender:**

☐ female

☐ male

☐ other

**14. What is your age?**

_____ years young

**15. What is your postal code?**

My postcode is: _____

☐ I prefer not to say

**16. How long have you been living in the province where you farm?**

For _____ years

Thank you very much for your participation. If you want to make any feedback, please send us an email: Margarethe Schneider (German or English, margarethe.schneider@zalf.de) or Iris Flamand (Dutch, irisflamand@hotmail.com).

## Annex II: Comparison of Spearman and Pearson correlation matrix-based factor affiliation

The first overview shows the factor characteristics as given by R for three factors based on the spearman correlation (results3s) and Pearson's correlation coefficient (results3p). Most importantly, they differ in persons flagging each factor, which is further detailed by the second comparison, which shows the loadings and flagging of each participant for each factor (loa.and.flags).

If Pearson's correlation had been chosen, par_6 and par_7 would have been excluded from the factors. Instead, par_15 would have been part of Factor 1. As the qualitative input of each participant shapes the interpretation of the factors, a different association of participants to factors would have resulted in a different factor-interpretation.

```
> results3s$f_char$characteristics
   av_rel_coef nload eigenvals expl_var reliability se_fscores
f1         0.8     5  3.528227 23.52151   0.9523810  0.2182179
f2         0.8     3  3.237360 21.58240   0.9230769  0.2773501
f3         0.8     6  3.180678 21.20452   0.9600000  0.2000000
>
>
> results3p$f_char$characteristics
   av_rel_coef nload eigenvals expl_var reliability se_fscores
f1         0.8     5  3.563848 23.75899   0.9523810  0.2182179
f2         0.8     5  3.411963 22.74642   0.9523810  0.2182179
f3         0.8     3  2.995890 19.97260   0.9230769  0.2773501
```

```
> loa.and.flags(results3s)

       fg1   f1 fg2    f2 fg3   f3
par_1      0.06      0.25   * 0.77
par_2    * 0.70      0.48     0.21
par_3      0.18      0.36   * 0.71
par_4      0.57      0.19   * 0.61
par_5      0.31    * 0.70     0.26
par_6      0.30      0.47   * 0.60
par_7    * 0.56      0.16     0.41
par_8      0.58     -0.10   * 0.66
par_9      0.12    * 0.81     0.37
par_10   * 0.76      0.29     0.01
par_11   * 0.74      0.09     0.30
par_12   * 0.63      0.49     0.12
par_13     0.22      0.40   * 0.54
par_14     0.20    * 0.83     0.16
par_15     0.45      0.45     0.27
```

```
> loa.and.flags(results3p)

       fg1   f1 fg2    f2 fg3    f3
par_1      0.08    * 0.71      0.33
par_2    * 0.72      0.24      0.44
par_3      0.14    * 0.71      0.37
par_4      0.54    * 0.64      0.17
par_5      0.36      0.29    * 0.67
par_6      0.39      0.54      0.44
par_7      0.49      0.47      0.14
par_8      0.45    * 0.76     -0.09
par_9      0.18      0.34    * 0.82
par_10   * 0.76      0.07      0.22
par_11   * 0.75      0.35      0.05
par_12   * 0.63      0.19      0.41
par_13     0.13    * 0.65      0.38
par_14     0.27      0.15    * 0.81
par_15   * 0.60      0.19      0.40
```

## Annex III: Classification of consensus and distinguishing statements

In the package *qmethod for R* by Zabala (2014), the code[16] nominates distinguishing and consensus statements according to the following rules:

- "Distinguishes f* only" when the differences of f* with all other factors are significant, AND all other differences are not.
- "Distinguishes all" when all differences are significant.
- "Distinguishes f*" when the differences of f* and all other factors are significant, AND some (but not all) of the other differences are significant.
- "" leaves empty those which do not fulfil any of the above conditions, i.e. are not consensus neither are clearly distinguishing any factor
- Statements are considered as consensus, when none of the differences between any pair of factors is significant

For the labels in the overview presented below, differences are considered significant when > 1.96*SED for $p < .05$ or the same value rounded upwards.

The stars indicate a more detailed picture on the influence of p:

- "*": differences are significant when > 1.960*SED for $p < .05$, or the same value rounded upwards (as explained through labels)
- "**": differences are significant when > 2.576*SED for $p < .01$, or the same value rounded upwards
- "***": differences are significant when > 3.291*SED for $p < .001$, or the same value rounded upwards
- "6*": differences are significant when > 4.8916*SED for $p < .000001$, or the same value rounded upwards

The following overview shows the results for 3 factors based on Spearman's correlation coefficient for all 37 statements as calculated by R.

[16] For detailed information see https://github.com/aiorazabala/qmethod/blob/master/R/qdc.R

```
> results3s$qdc
           dist.and.cons       f1_f2 sig_f1_f2       f1_f3 sig_f1_f3        f2_f3 sig_f2_f3
1  Distinguishes f2 only -1.41805018       ***  0.165457268            1.5835074492       ***
2  Distinguishes f2 only -0.97967327        **  0.074525057            1.0541983249        **
3  Distinguishes f3 only -0.22687958           -1.392776456       *** -1.1658968767       ***
4                        -0.52517549            0.345114632            0.8702901203         *
5  Distinguishes f3 only  0.26789175           -1.380748503       *** -1.6486402518       ***
6                         0.61785400           -0.312754072           -0.9306080718        **
7                         0.61774441           -0.396693668           -1.0144380808        **
8  Distinguishes f1 only  1.28536638       ***  1.208129981       *** -0.0772364015
9  Distinguishes f1 only -1.27055979       *** -1.729766391        6* -0.4592066017
10                        0.64868677            1.067112635       ***  0.4184258649
11             Consensus  0.57941946            0.578518365           -0.0009010972
12 Distinguishes f1 only  1.07442745        **  1.407970851       ***  0.3335433979
13 Distinguishes f1 only  0.93956986        **  1.161844429       ***  0.2222745649
14                        0.56979540            0.638248068         *  0.0684526660
15 Distinguishes f1 only  1.25824425       ***  0.949882792        ** -0.3083614579
16             Consensus  0.02264716           -0.001786166           -0.0244333232
17             Consensus  0.03450852           -0.242572686           -0.2770812092
18             Consensus  0.64625191            0.209066816           -0.4371850931
19 Distinguishes f3 only  0.48957217           -0.626933200         * -1.1165053659        **
20     Distinguishes all -2.06507829        6* -0.682930796         *  1.3821474972       ***
21             Consensus  0.58762870            0.541230509           -0.0463981907
22 Distinguishes f2 only  0.81071981         * -0.395472342           -1.2061921534       ***
23             Consensus  0.36336020            0.326774955           -0.0365852451
24             Consensus  0.51147386            0.483742664           -0.0277311937
25             Consensus -0.44543952           -0.378479851            0.0669596717
26 Distinguishes f3 only  0.67110897           -0.734642598         * -1.4057515721       ***
27 Distinguishes f1 only  1.18327996       ***  0.684177016         * -0.4991029468
28             Consensus -0.38829880           -0.029750077            0.3585487196
29     Distinguishes all -1.49286469       *** -2.304437244        6* -0.8115725517         *
30             Consensus -0.37255131            0.037199644            0.4097509510
31 Distinguishes f2 only -1.63029932       ***  0.546682954            2.1769822785        6*
32             Consensus -0.30212725           -0.386286334           -0.0841590873
33 Distinguishes f3 only -0.49186902            0.782542405        **  1.2744114242       ***
34             Consensus  0.22672159            0.120890240           -0.1058313497
35             Consensus  0.22581619            0.551455706            0.3256395167
36 Distinguishes f2 only -1.24307846       *** -0.243875226            0.9992032320        **
37 Distinguishes f1 only -0.78014382         * -0.640661377         *  0.1394824422
```

## Annex IV: Overview of farm characteristics

| | **Factor 1** (n = 5) | **Factor 2** (n = 3) | **Factor 3** (n = 6) |
|---|---|---|---|
| **Province** | Brabant, Drenthe, Friesland, Zeeland | Brabant, Friesland, Groningen | Brabant, Drenthe, Friesland, Groningen, Noord-Holland |
| **Gender** | men | men (2), woman (1) | men |
| **Average age (years)** | 44.6 (26 to 57) | 52.3 (41 to 59) | 56.7 (44 to 66) |
| **Living in the region since** | always | always | always (5); one person (age 66) since 35 years |
| **Farming for years (since age of)** | 24.4 (20.2) | 33.7 (18.7) | 33.8 (22.3) |
| **Average income from farming (%)** | 84 (50 to 100) | 98.3 (95 to 100) | 87.2 (50 to 100) |
| **Farming occupation** | full-time | full-time (2), part-time (1) | full-time |
| **Agriculture-related training** | vocational (3), polytechnic (1), none (1, but Master in marketing and business management) | vocational (3) | vocational (3), vocational and polytechnic (1), polytechnic and university (1), university (1) |
| **Farm type** | conventional | conventional | conventional (5), organic (1) |
| **Farming sector** | dairy (2), arable (2), arable and livestock (1) | livestock (1), dairy (2) | dairy |
| **Average number of cattle in dairy farming** | 170 | 405 | 152.5 |
| **Average farm size (ha)** | 76.4 | 86.3 | 68.2 |
| **Average grassland area (ha)** | 35 | 82.2 | 64.2 |
| **Average own land (%)** | 80.7 | 89 | 69.7 |
| **Land in protected area?** | no (4), 60 ha (1) | no | no (4), 5 ha (1), 10 ha (1) |
| **Member of collective since** | before 2014 | before 2014 (2), after 2016 (1) | before 2014 |
| **Participation in further projects of collective** | yes (3), no (2) | yes (2), no (1) | yes (3), no (3) |
| **Number of memberships in producer cooperative (e.g. for sale of dairy or cereal products)** | between 0 and 3 (mean: 1.6) | between 0 and 4 (mean: 1.7) | between 0 and 3 (mean: 1.3) |

# Statutory Declaration

I do solemnly declare that I have completed the submitted master thesis independently without undue help from others and without using tools other than those specified.

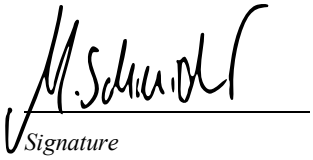
Where I have used thoughts from external sources, directly or indirectly, published or unpublished, this is always clearly attributed. The presented intellectual work of this master thesis is my own.

Furthermore, I certify that this master thesis or any part of it has not been previously submitted for a degree or any other qualification at the Technische Universität Dresden or any other institution in Germany or abroad.

The submitted electronic version of the thesis matches the printed version.

Bischofshofen, April 20th, 2021

*Place, Date*



*Signature*