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Exploring the Effect of Perceived Transaction Costs on Farmers' Attitudes toward Participation in Agri-Environment-Climate Measures (AECMs)

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Abstract: There is growing interest in research and policy to provide alternatives for developing and supporting sustainable business models in the agricultural sector. Agri-environment–climate measures (AECMs) were devised with the intention of compensating land users for potential income losses generated from the uptake of more appropriate, less intensive management practices in areas considered environmentally sensitive. Nonetheless, the effectiveness of these public initiatives is influenced by farmers' decision to participate, which in turn is influenced by the level of transaction costs (TC) they must bear when engaging in these programs. Most studies have approached this topic from a quantitative perspective, trying to measure and estimate transaction costs; however, there is a lack of qualitative studies exploring the perceptions of farmers around these costs and analyzing how such perceptions influence their attitude toward AECM participation. This study presents the results of thirty semi-structured interviews conducted among farmers involved in different AECMs across seven European countries, in which their perceptions about transaction costs were explored through the assessment of the time required to perform certain activities. The objective was to gain deeper insights into the way in which the perceived level of TC can affect farmers' attitudes and decisions toward the implementation of environment-friendly management practices through AECMs. Results showed that such perceptions are influenced by several factors, such as the presence or absence of intermediaries helping farmers to carry out some of the most time-consuming activities, the organizational structure of the contract, and the experience farmers acquire through repeated participation.

Keywords: agro-environment–climate measures; transaction costs; exploratory qualitative analysis

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1. Introduction

The agricultural sector has been under pressure for restructuring due to the rising challenges related to sustainability and climate change (Velten et al. 2015). The emerging, more environmentally friendly approaches and initiatives have highlighted the necessity for encouraging stronger entrepreneurial orientation in rural areas by fostering the positioning of farmers as entrepreneurs and by supporting them in the development of business models that go in line with the sustainable development goals (SDGs) (Pindado and Sánchez 2017). Indeed, entrepreneurial activities are widely studied (Scuotto et al. 2020; Nespoli et al. 2022; Santoro et al. 2020) and they play an important role in agricultural field. Although some studies have suggested that farmers struggle with the idea of considering themselves entrepreneurs (Burton and Wilson 2006), an emerging entrepreneurial identity among farmers in Europe is being fostered by the latest Common Agricultural Policy (CAP) reforms (Janker et al. 2021). There is growing interest in research and policy to provide alternatives for developing sustainable business models in the agricultural and food sectors (Barth et al. 2017). The adoption of sustainable practices in agriculture has been shown to improve soil fertility, reduce water shortage and erosion, and maintain biodiversity (Mbow et al. 2014; Price and Leviston 2014; Wauters and Mathijs 2014). However, undertaking more

sustainable farming practices often depend on farmers' willingness to adopt them, their level of resistance to change, or if they are mainly moved by economic objectives (Dessart et al. 2019). Economic objectives are an important determinant of entrepreneurship behavior in the agricultural sector (May et al. 2019). While advances in behavioral economics and studies on factors affecting adoption by farmers suggest that profit maximization is not the only element driving their behavior (Howley 2015; Dessart et al. 2019), it is undeniable that it plays a crucial role in their decision-making process (Alsos et al. 2011). More specifically, when deciding to participate in public initiatives that promote the adoption of environmentally friendly managing practices, farmers tend to consider the financial incentive level or economic compensation to offset the opportunity cost and transaction costs of a more sustainable farming system (Liu et al. 2018). Incentives are useful tools used by the public and private sectors to encourage farmers to protect the environment and improve the level of ecosystem services in rural areas. According to (Piñeiro et al. 2020), such incentives are classified into three categories: market and non-market-based incentives, regulatory measures, and cross-compliance incentives. Market-based incentives promote behavioral change by providing economic support to agricultural producers through market signals such as subsidies, input and output prices, income transfer, etc. Non-market incentives are broader and can be anything as long as they are not market-based, such as technical support or fiscal measures (taxes). Regulatory measures are those rules imposed by the government aiming to improve the environment, such as certifications or standards. Lastly, cross-compliance incentives are direct payments linked to farmers' compliance with certain activities or standards that seek to maintain and improve the environmental condition of their land. Good examples of this type of incentive are payment for ecosystem services (PES) and agri-environment schemes (AES).

Policy initiatives such as agri-environment schemes (AES) have been developed to encourage farmers in the production of ecological public goods and to mitigate the environmental impact of agriculture. Agri-environment schemes "provide financial support for Member States to design and implement agri-environment–climate measures (AECMs). Each measure has a specific environmental objective such as the protection or enhancement of biodiversity, soil, water, landscape, or air quality, or climate change mitigation or adaptation" (European Commission 2017). AECMs are voluntary multi-annual contracts that usually consist of a per-hectare payment and are devised with the intention of compensating land users for potential income losses generated from the uptake of more appropriate, less intensive management practices in areas considered environmentally sensitive.

Because participation in programs like AECMs is voluntary, their effectiveness is influenced by farmers' decision to take part in them (Mettepenningen et al. 2013; Falconer and Whitby 2000). One of the most important factors influencing that decision is transaction costs (TC) (Weber 2014; Peerlings and Polman 2004). TC in AECMs can be seen as "scheme organizational costs" (Falconer and Whitby 2000) and represent "resource losses due to imperfect information" (Dahlman 1979). TC borne by farmers are usually referred to as private TC and can arise due to several reasons, including more working time or physical workload required to carry out new farm management activities (Dorosh et al. 1996), forgone income (Uthes et al. 2010; Mettepenningen et al. 2009), or an increment of administrative work (Vernimmen et al. 2000). Although some of these costs can be measured relatively easily, others are quite subjective, difficult to quantify, or hard to differentiate from other costs (Saidah et al. 2019). Several studies have tried to investigate private TC in AECMs in a quantitative way, measuring and estimating transaction costs by using different methodologies (Mack et al. 2019; McCann and Claassen 2016; Coggan et al. 2015). However, studies addressing this topic in a qualitative way are scarce. Little is known about the way in which the perceived level of transaction costs by farmers can influence their attitudes toward AECMs and their decision to participate in them. By using a qualitative approach, our study aims therefore to find out how burdensome farmers perceive the level of TC in AECMs to be and in what way such perceptions may influence their decision to participate. Moreover, exploring farmers' perceptions in a qualitative way

might allow us to gain a more holistic understanding of the causes and effects behind the diverse attitudes and opinions linked to these costs, which often depend on the context farmers develop their agricultural activities; but more importantly, it might enable us to identify common and/or shared key issues, which policymakers could tackle to encourage and motivate farmers to take part in programs seeking the implementation of better farming management practices such as AECMs.

To this, we interviewed thirty farmers who are or have recently been involved in AECMs. These semi-structured interviews were carried out in seven European countries and consisted of a set of questions that aimed to assess the perception of farmers about how time-consuming certain TC-related activities were and how such perceptions influenced their attitude toward participation in AECMs. We consider that obtaining deeper insights into subjectively perceived TC is important as they have been shown to play a relevant role in the uptake of various direct payment schemes, which in turn can have a relevant effect on the effectiveness of those programs and the well-being of farmers (Banerjee et al. 2017; Mack et al. 2019).

This paper is structured as follows: In the second section, we describe the conceptual framework related to transaction costs in AECMs together with the method and data collection process implemented. The third section presents the results derived from the study and reports the key findings from the interviews with farmers. Lastly, the fourth section provides a discussion and draws some conclusions related to the effect of perceived transaction costs in AECMs on farmers' decision-making together with some policy implications and suggestions.

2. Conceptual Framework, Methods, and Data Collection

2.1. Transaction Costs in AECMs

Agri-environment–climate measures (AECMs) are essentially a transaction of ecological capital between the farmer as the seller, and the government as the buyer of the agri-environmental goods and services (Mettepenningen et al. 2009). Through this transaction, society's demand for conservation is satisfied to a certain extent, and farmers are compensated for additional costs, forgone farming revenue, and in some cases, for the transaction costs (TC) resulting from their compliance with the contract. Considering TC when designing and implementing these kinds of policies should be a priority, especially when targeting difficult environmental and natural resource issues (McCann 2013), because if TC are too high, farmers may feel less willing to enroll and participate, which in turn can lead to low uptake and effectiveness of the policy (Ducos et al. 2009; Weber 2014; Peerlings and Polman 2004). TC in AECMs can be seen as "scheme organizational costs" (Falconer and Whitby 2000) and represent "resource losses due to imperfect information" (Dahlman 1979). A basic distinction can be made between private TC, borne by farmers, and public TC, borne by the government (Mettepenningen et al. 2009). Imperfect information and its implicit uncertainty can lead to opportunistic behavior or measurement problems, which are hazards that affect the contractual relationship (Williamson 1998). More specifically, when it comes to the provision of environmental goods, some informational deficiencies arise from the high heterogeneity in farm business characteristics, which can affect the outcome of the transaction in terms of quality and price (Wätzold and Schwerdtner 2005). Additionally, intrinsic difficulties in observing and measuring the actions of farmers may end up enabling the right conditions for moral hazards to take place (McCann 2013). Therefore, the actors involved in the transaction undertake additional activities or actions to manage these shortfalls, and by doing so, TC are generated (Coggan et al. 2010).

In this study, we focus on private transaction costs as the aim of the analysis is to explore the perceptions of farmers involved in different AECMs regarding the level of transaction costs, which can hinder their participation in these programs and influence their attitudes and decisions related to the implementation of sustainable management practices in their farms. Different TC typologies have been proposed in order to facilitate the analysis in the context of agri-environmental policies (McCann et al. 2005). One of the

most common classifications used to analyze TC is based on the main transaction stages of AECMs, and encompasses three principal categories of costs: search costs, negotiation costs, and implementation costs (Ansell et al. 2016; Mettepenningen et al. 2009; Dahlman 1979).

- Search costs (SC)

Before farmers engage in any AECM, they must look for the right information that helps them decide wisely. Searching for this information can be time-consuming and costly, but it is necessary to determine if such a program fits with their farm business goals and to understand more objectively the financial consequences of scheme participation as well as those of non-participation (Wätzold and Schwerdtner 2005). This stage usually implies analyzing potential opportunity costs, calculating benefits, becoming informed about the dynamics and requirements of the contract, seeking advice from accountants and other farmers, etc.

- Negotiation costs (NC)

Once farmers have evaluated their options and, based on all the information they gathered, decide to participate in an AECM, the next step is applying to the program and officializing their agreement with the administration by signing a contract. Negotiating the compensation and contract terms with the administration and fulfilling all the requirements to participate, are some common actions at this stage. Activities at this stage can be time-consuming and costly as farmers may need to incur administrative costs such as the preparation of documentation, understanding the flow of paperwork with the administration, filling out and submitting application forms, and in some cases, waiting for a period to be accepted, making corrections, or sending additional documentation.

- Implementation costs (IC)

After officializing their participation in an AECM, farmers must comply with the new measures specified in their contract. However, this new dynamic in the farm involves not only production costs (i.e., the costs necessary to generate or/and maintain the environmental goods) but also other organizational and administrative costs. For example, farmers may need to dedicate additional time to activities such as training and technical support, re-organization of "in-farm" administrative tasks, attendance to control visits, monitoring, reporting, payment application, etc.

2.2. Case Study Selection and Data Collection

This study was carried out as part of the Horizon 2020 project Contracts 2.0[1], which aimed to develop innovative contractual solutions that provide the right incentives for farmers and land managers to preserve and improve the production of environmental public goods. This European project was based on the "living lab" approach, where researchers and a variety of stakeholders collaborate in the so-called contract/policy innovation labs (CILs and PILs) to co-design "dream contracts" for agri-environment–climate measures (AECMs). The data collection for this study was possible owing to the collaboration of some of the CILs established in different European countries linked to the project partners. The main objective of the CILs within the project was to bring together farmers, farmers' organizations, extension service providers, trainers, agri-ecological agents, environmental NGOs, companies, local development groups, public administrations, etc., to address specific real-life needs, following the principles of "living labs": offering open and inclusive spaces for participation, cooperation, and collaboration that enables reflective social learning through a collaborative multi-actor approach. The methodology adopted for this study includes qualitative data collection primarily derived from interviews using purposive sampling (Etikan 2016). In order to find the appropriate type of respondents for this study, farmers linked to the different CILs within the project were contacted and inquired about their willingness to participate in these interviews; the only prerequisite was to be engaged in an AES or to have participated in one in the last five years. In total, thirty

semi-structured interviews were conducted among farmers actively enrolled in AECMs across seven different CILs in seven different European countries (Table 1).

Table 1. CILs included in the analysis and focus of the AECMs that farmers were involved in.

CIL Name	Country	AECMs	Number of Farmers Interviewed
North Rhine–Westphalia	Germany	Management of grassland and nature areas, wildlife protection	6
Bornholm	Denmark	Management of grassland and nature areas, biodiversity conservation, organic farming	2
Őrség National Park	Hungary	High nature value grassland management for nature conservation (butterfly species)	4
Unione Comuni Garfagnana	Italy	Cultivation of local varieties, biodiversity conservation, and sustainable use of genetic resources in agriculture, seed banks	5
Beverhoutsveld	Belgium	Botanical grassland biodiversity	5
Madrid Region	Spain	Organic farming: aromatic plants, vineyards, and orchards	4
Natuurrijk Limburg	The Netherlands	Agricultural nature and landscape protection, biodiversity conservation.	4

2.3. Description of the Qualitative Approach Implemented

This study adopted an exploratory qualitative design (Figure 1) aiming to dig into farmers' perceptions regarding the level of transaction costs in AECMs. As mentioned before, subjectively perceived TC have been shown to play a relevant role in the uptake of various cross-compliance incentives, which in turn can have a relevant effect on the effectiveness of those programs and the well-being of farmers (Mack et al. 2019). All semi-structured interviews with farmers followed the same structure based on a questionnaire with both closed and open-ended questions. CIL representatives and other project partners contributed to the execution of the interviews and, when required, provided the translation of the discussions with the farmers.

The questionnaire was divided into four main parts: (1) questions intended to obtain some general information about the farmers and the AECM they were involved in; (2) questions related to their perception on search costs; (3) questions related to their perception on negotiation costs; (4) questions related to their perception on implementation costs. Closed-ended questions consisted of a set of general activities (Table 2) linked to transaction costs in AECMs, which were based on other related studies (Mettepenningen et al. 2009; Coggan et al. 2010; McCann et al. 2005; Ansell et al. 2016). Farmers were asked to score those activities on a five-point Likert scale in terms of how time-consuming they perceived them to be. Although mainly used in quantitative studies, the Likert-type scale is also used in qualitative research to gather the experts' opinions (Habibi et al. 2014) and to capture qualitative data that is (1) difficult to measure or (2) addresses a sensitive topic, to which a respondent would likely not respond, or would respond falsely if asked directly (Russell 2009). Therefore, we used closed-ended response categories in the Likert scales to help farmers describe their perceived level of transaction costs in AES through an approximation of the time they spent in certain activities. The scale ranged from level 1, indicating that the activity in question was not at all perceived as burdensome for the farmers in terms of the amount of time required to perform it, up to level 5, which indicated that they perceived it as a very time-consuming activity. Additionally, farmers were offered the possibility of labeling the activity as non-applicable. During this phase, farmers would also express their opinion about these activities in the context of their AECMs and were encouraged to suggest any other activities that were not encompassed by the questionnaire.

On the other hand, open-ended questions were provided at the end of each section of the interview and aimed to inquire more deeply about the reasons behind their scoring choices as well as understand the way in which such costs influenced their perspectives on AECM participation and, therefore to what extent such perceptions could affect their attitudes toward more sustainable types of farming businesses. Farmers were also asked to assess the overall performance of the measures they were involved in and provide suggestions and recommendations to improve it based on their own experience. The scores obtained from the Likert scales were complemented by the answers to the open questions; therefore, to provide a clearer impression of farmers' responses, some quotes from the interviews are presented. Please note that some excerpts from the interviews are not verbatim but paraphrased to improve their readability.

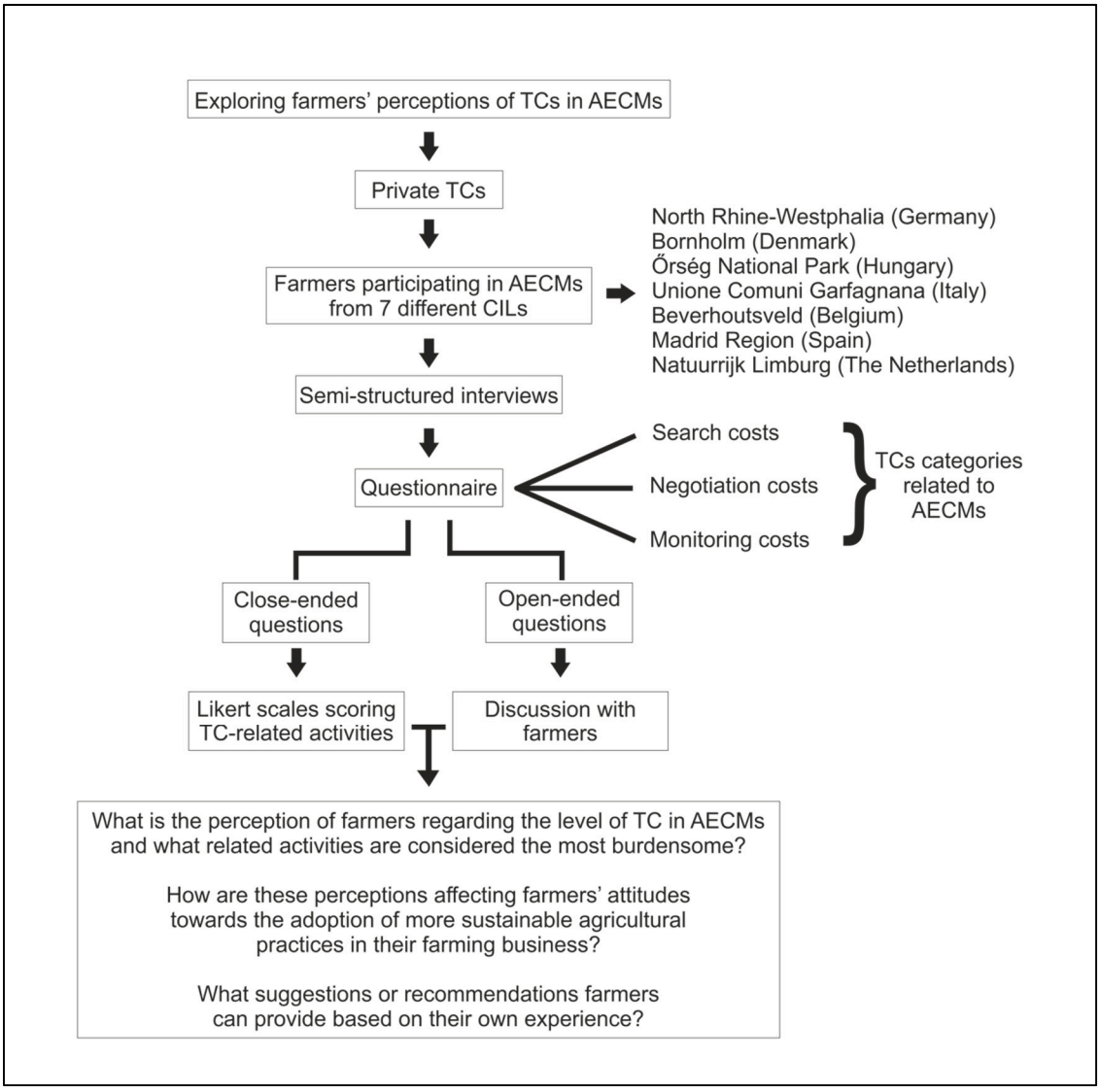

Figure 1. Qualitative design used to explore the perceptions of farmers about transaction costs in AECMs.

Table 2. Activities scored by the farmers interviewed (based on Mettepenningen et al. 2009; Coggan et al. 2010; McCann et al. 2005; Ansell et al. 2016).

TC Category	Acronym	Activities Assessed
Search Costs	S_C_1	Gathering information about the contract details via the internet, press, etc.
	S_C_2	Gathering information about the contract by talking to other farmers
	S_C_3	Gathering information about the contract from private consultants/advisors/accountants
	S_C_4	Collecting information about the contract from the responsible public administration/entity
	S_C_5	Collecting information about the potential profit margins associated with the contract
	S_C_6	Collecting information about the environmental benefits associated with the contract
	S_C_7	Collecting information about operational aspects of the contract and fit with your farming business
Negotiation Costs	N_C_1	Compiling and providing information in order to apply to the contract (e.g., presenting field maps, taking soil samples, etc.)
	N_C_2	Consulting the parcel owner about the planned implementation of the contract
	N_C_3	Consulting the administrative entity about the application procedure, criteria, the contract's details and requirements
	N_C_4	Filling out and submitting application forms
	N_C_5	Making corrections in case of mistakes or amendments of the application
Implementation Costs	I_C_1	Undertaking training to build up specific knowledge and skills for the implementation of the contract
	I_C_2	Contacting the administrative entity regarding questions or issues about the implementation of the contract
	I_C_3	Understanding how the reporting and documentary system works
	I_C_4	Preparation and attendance to control visits
	I_C_5	Compilation and submission of monitoring data
	I_C_6	Preparing and submitting annual payment application

Although all the interviews reported here were equally structured, not all of them were conducted in the same way or during the same period. Owing to the COVID-19 restrictions that took place during the implementation of the project, some interviews were carried out in a telematic way, either through video or phone calls, and others were conducted in person (Sattler et al. 2022). In some cases, it was not possible to obtain an audio recording of the interviews, since they were carried out in different countries and in different languages; however, interviewers provided the English translation of the answers to the open-ended questions and other relevant comments made by farmers during the interview, which then were used to enrich the dataset. The average length of the interviews was 45 minutes but ranged between 20 and 75 min. The audio-recorded interviews were transcribed verbatim for their analysis.

3. Results

The type of transaction costs with the highest average score was implementation costs (IC); in other words, a greater number of activities received higher scores within this

category than in the others, signaling that the activities at this stage of AECMs tend to be the most time-consuming and burdensome for most of the farmers interviewed. The activity with the highest score within this category was I_C_5 "Compilation and submission of monitoring data". Farmers, in general, mentioned that when they first enrolled in their AECMs, they had to dedicate much time adapting or transitioning to the new required activities and to the training necessary to acquire the knowledge to perform everything in the right way. However, they also mentioned that over time the process becomes easier as they acquired experience throughout the years by repeating their participation in AECMs. For example, the Spanish farmers, who were mostly involved in organic farming, expressed that they had to spend much time in training activities, taking courses, and building knowledge on how to carry out all the activities according to the protocols demanded by the certification entity (*Comité de Agricultura Ecológica de la Comunidad de Madrid—CAEM*), as the certification in organic agriculture was the main requirement to be able to apply to related AECMs. They also mentioned that keeping a record of the activities on the farm and the preparation and attendance to control visits required much time and dedication from their side:

> "For a farmer with more knowledge in organic agriculture, the cost of training would be lower; however, in my case, I had to take courses, talk to many people and spend a lot of time learning about it on my own…; it is very time-consuming and stressful to prepare everything for the control visits and make sure that everything is up to date and according to the regulations of the CAEM because if something is not right, the process is delayed for a long time…; additionally, any changes in the farm must follow a protocol that is time-consuming. For example, if I decide to plant something new, I must keep a record of the labels, invoices, send pictures, etc.; it takes a significant amount of time". (Framer from the CIL in Spain)

Farmers from the CIL in Germany expressed that the most time-consuming activities at the implementation stage are caused by the higher levels of control exerted on them by the government. They perceived that the pressure of being subject to higher levels of supervision on their activities creates great discomfort for them as it increases the amount of time and effort required to maintain everything working well at all times.

> "The subsequent controls conducted by the relevant authorities cost a lot of time and money…; once you take part in these types of EU-funded programs, you are more frequently supervised, which means a greater demand of time for preparation and attendance, but it also leaves a bad taste in our mouth and does not motivate us to keep engaged". (Farmer from the CIL in Germany)

Naturally, perceptions and opinions on these costs varied across the different CILs, which mainly seemed to depend on the presence or absence of intermediaries helping farmers to carry out some of the most time-consuming activities. However, the service provided by such intermediaries is not free of charge, and farmers must pay for it. For example, the Hungarian and Danish farmers expressed that many of the activities in this category were carried out by a private consultant or advisor they hired, and therefore they did not have to spend much of their time on those tasks; however, they had to consider not only the cost of the intermediaries, but also the time they had to spend with them:

> "Most activities related to monitoring, control, reporting, and payment application are handled by private consultants, but we pay for their service from our own pocket". (Farmer from the CIL in Hungary)

> "The advisor helps with many of these activities, but we have to consider both the cost of the advisors' service and the time we spend with them discussing things and making the right decisions". (Farmer from the CIL in Denmark)

In other cases, the existence of collectives facilitating the interaction between the government and the farmers, such as in the CILs from the Netherlands and Belgium,

generates a different perception of these costs among farmers. For example, for Dutch farmers to have access to the AECMs, they are required to be part of a collective. This collective is financed with 2.5% of the payment farmers receive from the government. For this reason, farmers do not need to spend much time on activities such as monitoring, control visits, payment application, etc., as the collective facilitates their execution or performs those tasks; however, since being a member of the collective is not free of charge, farmers are partially paying for these services:

> "We need to be part of a collective to have access to the incentives, and although membership is not for free, it provides a lot of advantages…; the submission of monitoring data is performed by the collective…; controls can be done by the authorities on their own, so we don't need to spend time on it. However, if the authority states that the management was not carried out well, it might take a significant amount of time because a discussion needs to take place...; regarding the payment application, we just need to check if everything is fine on the form of the collective, so it does not take much time. If the form is okay, we get paid, if it is not okay, we must dedicate some time sending documents, etc., but it is not much". (Farmer from the CIL in The Netherlands)

According to the results, the second most time-consuming type of TC for the farmers interviewed was negotiation costs (NC). The activity perceived as the most time-consuming within this category was N_C_4 "Filling out and submitting application forms". Although the perceptions of these costs varied again depending on the availability of assistance provided by intermediaries, most farmers expressed that, in general, the activities at this stage tend to take more time than they should due to excessive bureaucracy and the utilization of outdated systems that reduce the speed and efficiency of the application process. For example, the Danish farmers pointed out that there is no margin for error in the application process, and it is not possible to modify the information once it is entered into the system, which creates much tension and stress for farmers. Additionally, because the process is very slow and difficult from the administrative side, it becomes quite expensive for the farmers as they must pay their advisor per hour of service and dedicate much time with them to assure that all the information is entered correctly. Additionally, there is great uncertainty and stress after the submission due to the possible consequences in terms of time and money that farmers must face if mistakes are made during the application:

> "Because we have to consider our own time invested in these activities and the cost of the hours invested by the advisor, there are several things that make the application time-consuming and expensive: the program is slow and cumbersome, and entries need to be checked carefully, both farmer and advisor are afraid of mistakes as they can be costly and have major consequences for us…; the program and the scheme lack flexibility, many of the entries are "absolute" and cannot be changed again…; also, we have noticed that the smaller your farm is, the longer the amount of time required…". (Farmer from the CIL in Denmark)

Some farmers also reported that gathering all documents, tests, certifications, forms, etc., implies not only much time but also a significant economic investment that they must assume prior to receiving any money from the government. For example, the farmers from Spain reported that before they can apply to the related AECMs, they must obtain the organic farming certification, which not only takes extensive time and effort, but also it is not free of charge as they have to pay for it. Similarly, the farmers from Hungary expressed that they have to incur costs related to documentation for the application process:

> "We have to gather lots of data and information in order to apply for the incentives, such as soil sample examination, and field measurement, which take a significant amount of time, but also we have to finance these costs upfront". (Farmer from the CIL in Hungary)

> "If I want to have access to the economic incentive from the AECMs for organic/ecological farming, I first have to get certified by the CAEM. It took a long time, and it was an investment because I had to pay for it, so, it was a big effort to achieve this, but now that I am already certified, the process of applying for the CAP incentive is very slow too. The most annoying thing is that many of the documents that they asked me for the certification are now again required for the incentive, as there is no communication between those two institutions. So, a lot of time is wasted doing paperwork with the administration and waiting for their responses. Besides, the forms they ask you to fill out are still on paper, the system is very outdated and slow, and there's a lot of confusion in calculating the incentive as it varies according to the zone or the area your farm is located in".

In the CILs from the Netherlands and Belgium, farmers had a different perception of these costs since the collectives they belong to facilitate the application process. In these particular cases, the collectives assist farmers in the preparation of documentation, and communication is fast whenever they need help to fill out the forms or to make corrections in their applications. Additionally, they expressed that because there is much trust between the farmers and the collective, the amount of time required for the verification of forms, reading contracts, etc., is diminished:

> "Regarding the application process, we mostly talk with the people at the collective's office…; forms are filled out by the collective, so we don't have to spend time on it…; correcting mistakes is mostly easy; we just have to consider the time we spend talking on the phone with the collective…; of course, it also depends on the experience you have, if it is the first time you will sign a contract you will dedicate more time to reading it and making sure that everything is correct, however after you participate several times you don't feel the need to verify everything because between the collective and the farmer a lot of trust is developed; so, I don't spend time reading the contract anymore; trust is very important". (Farmer from the CIL in The Netherlands)

Similarly, the Italian farmers expressed that these activities were not a big burden for them as they count on the assistance of the local seed bank, which helps them with the application process and most of the administrative procedures. Seed banks are financed by the "*Ente Terre Regionali Toscane—(ETRT)*", an operational entity recently established by the Tuscany Region and which, among others, oversees the incentives for the "custodian farmer" program that was created to encourage farmers to preserve seeds and keep in cultivation ancient varieties of herbaceous plants. Although they are not yet officially recognized as such, seed banks are a crucial intermediary in these contracts between the ETRT and the farmers participating in the program. In this case, farmers do not have to assume any extra costs for their assistance, and therefore, their perceptions of the time required to perform the activities within this type of transaction costs were low.

Finally, the results showed that the third most burdensome type of TC for the farmers interviewed was search costs (SC). The activity perceived as the most time-consuming was S_C_7 "Collecting information about operational aspects of the contract and fit with your farming business". Scoring these activities was quite challenging for the farmers, as most of them have been involved in their AECMs for a long time; therefore, remembering the time invested in the activities preceding their decision to participate was not easy. Most of them recalled the significant amount of time they had to dedicate to becoming informed about the incentive programs by talking to other farmers, visiting the administration office, and looking for information on the internet and other available sources. They mostly agreed that these costs depended on the accessibility and the quality of the information available. For example, for the farmers from Spain, these activities required much time because communication with the CAEM and the administration was not easy. They decided to keep going on despite the many challenges they faced because they are driven by sustainability principles, although they acknowledge that not everybody has the same mentality. In their

opinion, for a conventional farmer it is much easier to have access to incentives than for organic farmers as there are fewer restrictions; therefore, not many people are willing to make the required effort, especially if the government does not make the process easier. They also mentioned that there was not much information available for them regarding the cost/benefit of implementing organic farming. They had to look for guidance from people external to the program and it was neither always easy nor free of charge to obtain the right information they needed.

> "I don't think any of us (organic farmers) is doing this for the economic incentive; if that was the case, we would give up very quickly because the process is very slow, it requires a lot of effort, and you barely see any money. . . .; I personally do it because I believe in organic farming and agroecology, and I have the confidence that things will get better eventually. . . ; I was lucky because I have an education, I studied abroad, and received a lot of training in these things, so for me, it was a relatively easy decision, but for other people, it can be more difficult, and they might get discouraged quickly when they realize that there's not much support from the government, especially to get started. . . ; if you are a conventional farmer you have much more possibilities of getting economic incentives as the process is much easier". (Framer from the CIL in Spain)

Likewise, the farmers from the CILs in Hungary and Denmark described the difficulties they faced trying to understand the administrative procedures to enroll in AECMs. The latter expressed that the most time-consuming activities at this initial stage were related to the verification of the suitability of their land to be able to apply for the incentives. Additionally, calculating the benefit they receive for their participation was challenging because rules tend to be confusing, even unfair at times, and vary greatly from one measure to another:

> "Although it is primarily the advisor who collects the relevant information about the schemes, we also spend a lot of time reading about the schemes and getting informed. . . ; the amount of time needed depends on the size of the farm and how much the measures change. . . ; we also spend a significant amount of time with the advisor deciding which nature areas to apply for; if the areas are too small, and/or too risky, then no application is made because there's a big possibility of rejection of the application. . . ; also, the guidelines for entering the schemes are confusing. . . ; at times the rules and penalties are very unfair, for example, if you fail one year, that affects the grants or incentives you would receive from previous years too". (Farmer from the CIL in Denmark)

> "There are some silly rules that we don't understand; for example, it is not allowed to reap between 15 June and 15 August because of what they call 'protection of moths'". (Farmer from the CIL in Hungary)

On the other hand, the farmers from the CILs in the Netherlands and Belgium expressed that their collective was also very helpful with some of those initial activities. They mentioned that the time spent talking to the collective and making decisions depends on the type of measures farmers are applying for, and that, in general, communication with the collective is very smooth, and they could reach out to them whenever they had questions about the AECMs. However, they also acknowledged that there are some prerequisites that can take a significant amount of time, such as the registration of their land in the platform of the government. They need to make sure everything is correct since that is the platform the collective will use to carry out the contracts. They also mentioned that every six years, the contract is renewed, and there are some changes; therefore, farmers must dedicate time to understand and agree with the new adjustments before signing the new contract. Additionally, they are advised to attend some informative meetings to learn more about the management and operational aspects of the contract, so this part can be time-consuming for farmers.

> "The collective is always there to give us a hand. However, the time invested from our side depends on the complexity of the measure; if a farmer wants to apply for more complex measures, then more management and administrative stuff is required. For example, with measures linked to birds, it will take more time than for measures with trees. . . ; it is not possible to negotiate the compensation we will receive, so we dedicate a lot of time discussing it with our family, farmers, and other people to make the right decision. . . ; in 2023: there will be new rules, new amounts of money, so it will probably take more time to understand the new contract. . . ; farmers can go to meetings to learn about the management, the incentive, etc.,. . . ; In my opinion, farmers don't think much about the environmental benefits of their contract but about the profit; if the contracts fit in their total management, extra work, etc., they will participate; otherwise, they won't". (Farmer from the CIL in The Netherlands)

A common opinion among all farmers was that the experience linked to the frequency of the contract or to repeated participation plays an important role in the reduction in TC in AECMs, especially at the initial stages, because the time required to look for information about the contract, analyze the opportunity costs of participating in the measures, and understand the dynamics of the contract, the transition, and the adaptation to new farming practices, etc., becomes easier over time and many of those activities are no longer required.

> "A new farmer participating for the first time will surely need a significant amount of time when entering the contract, but a farmer like me, who has been on this for many years and have a lot of experience, doesn't need to spend a lot of time on these activities". (Farmer from the CIL in The Netherlands)

> "It has become a bit easier over the years because I have acquired a lot of knowledge from previous similar contracts". (Farmer from the CIL in Hungary)

4. Discussion

The effectiveness of incentive programs such as AECMs, which aim to improve the production of environmental public goods in rural areas, is influenced by farmers' decision to participate in those voluntary programs (Falconer 2000; Mettepenningen et al. 2013). Such a decision depends to a certain extent on farmers' attitudes toward the adoption of sustainable farming management practices, which in turn can be influenced by the institutional and economic contexts in which they develop their business (Coggan et al. 2021). One of the economic factors influencing farmers' decision-making is transaction costs (TC) (Weber 2014; Peerlings and Polman 2004). Several studies have addressed this topic from a quantitative perspective, trying to measure and estimate private TC in AECMs (Mack et al. 2019; McCann and Claassen 2016; Coggan et al. 2015). However, relying merely on quantitative approaches is not enough to unveil all the underlying effects these costs have on farmers' attitudes toward AECMs. In fact, according to (Saidah et al. 2019) "transaction costs cannot be calculated directly but are estimated using various approaches (proxy) in which each component of transaction costs faced by farm households is not always the same". Therefore, this study adopted an exploratory qualitative design aiming to gain deeper insights into farmers' perceptions regarding the level of transaction costs in AECMs and to understand the effect of those perceptions on their attitudes toward participation in public agri-environmental incentive programs. Subjectively perceived TC has been shown to play a relevant role in the uptake of various direct payment schemes, which in turn can have a relevant effect on the effectiveness of those programs and the well-being of farmers (Saidah et al. 2019; Mack et al. 2019). For this study, we interviewed thirty farmers who were or had recently been involved in AECMs. These semi-structured interviews were carried out in seven European countries and consisted of a set of questions that aimed to assess the perception of farmers about how time-consuming certain TC-related activities were and how such perceptions influenced their attitude toward participation in AECMs.

Results showed that although farmers are involved in a similar type of policy initiative (i.e., AECMs), their perception of the level of TC derived from their participation in it can vary significantly across cases. Therefore, investigating the diverse opinions and perspectives of farmers from different contexts and who decide to take part in similar public programs can be very useful, especially when trying to identify common weaknesses and bottlenecks that hinder the level of participation in voluntary environmental policies at the European level. The interactions that took place right at the start of the interviews revealed that some farmers tend to struggle with the concept of transaction costs. This seems to corroborate the fact that analyzing transaction costs is not an easy task. In fact, several studies have acknowledged how challenging this type of analysis can be for researchers, due to a lack of consensus in their definition, and the methodologies used to measure them (Phan et al. 2017; Rørstad et al. 2007; Peerlings and Polman 2004). Nonetheless, although the interpretation of our findings is explorative due to the diversity of countries and the heterogeneity of measures that participants were involved in, the results obtained provide some interesting explanations that might be helpful in better understanding farmers' perceptions and attitudes toward transaction costs in AECMs. To improve the quality of the interview process, and to ensure that farmers and researchers talked "the same language", an introductory explanation about transaction costs was provided, describing the three different categories encompassed by the questionnaire and the scoring process for the different activities presented. Throughout the interview, some farmers expressed that it was challenging for them to recall the amount of time required for certain activities since they had taken place a long time ago. However, the use of Likert scales facilitated the process as they did not have to think about the exact number of hours, days, or weeks spent on those activities, but instead reflected on how time-consuming or burdensome they perceived those activities had been and gave them a score from 1 to 5. At times, it was also difficult for farmers to differentiate transaction costs-related activities from other types of costs (such as production costs) connected specifically to their participation in AECMs; however, as they had the opportunity to express their opinion in a deeper way throughout the interview, new ideas emerged, and they were able to recognize and identify the different activities linked to the three categories of transaction costs.

The average score obtained from the Likert scales showed that implementation costs were perceived as the most burdensome type of transaction costs for the farmers interviewed, followed by negotiation costs and search costs, respectively. However, their perception of the time required to carry out certain activities varied depending on certain factors, such as the existence of intermediaries that could assist them throughout the contractual process. Intermediaries such as advisors, consultants, agents, etc., played a crucial role in lowering the perceived level of transaction costs, as farmers did not have to carry out many time-consuming activities such as filling out forms, interacting with the administration, understanding how the application process works, preparing monitoring reports, submitting payment requests, etc. This is in line with other studies (Schomers et al. 2021, 2015; Coggan et al. 2013) that have highlighted the positive role of intermediaries in AECMs. However, it is important to point out that, in most cases, farmers must bear the cost of their service and spend time with them. Therefore, although intermediaries make the process easier for farmers, as their perceived level of time required to perform certain activities is lowered, the cost of the intermediary should be taken into consideration when calculating the compensation. Similarly, the organizational structure of the AECMs had a big effect on the perceived level of TC among the farmers interviewed. For example, farmers belonging to collective AECMs perceived lower levels of TC because the collective facilitates most of the administrative procedures and assists them in every step of the process. This close interaction between farmers and the collective not only makes the contract more efficient but also contributes to developing higher levels of trust and social capital, which has been shown to be beneficial for successful agri-environmental management (Prager 2015). Another factor that affected farmers' perceived level of TC was their previous experience in AECMs. Farmers who had already participated in similar programs

expressed that many activities required much time when they first became involved, but over time they developed the skills and acquired the necessary knowledge to perform them faster; this effect also is in line with some studies that have reported the influence of experience in TC (Coggan et al. 2015; Falconer 2000).

Regarding the aspects that seemed to affect farmers' attitudes toward their participation in AECMs, there were several references to the higher level of control exerted over them by the government. Some farmers expressed that once they decided to take part in one of the measures, they would feel more supervised, which created much stress because their contracts were designed in such a way that even minimum failures could have a big impact on their incentives. Another aspect that seemed to discourage farmers from participating in AECMs was the long and confusing administrative procedures, which, in the absence of intermediaries that facilitate the process, represent a big burden for them. They mentioned aspects such as outdated platforms and excessive paperwork characterized by poor communication between different administrative bodies, which forced farmers to repeat certain procedures. Additionally, some farmers expressed the need for direct communication channels with the respective public administration before and after signing their contracts, to receive support and advice. Some of them also acknowledged that transitioning to organic farming systems tends to be a challenging task that only a few are willing to undertake because of the excessive requirements and the low level of support from the government, which at times seems to reward and favor the traditional systems over the more sustainable ones.

5. Conclusions

This study explored farmers' perceptions regarding the level of transaction costs they incur when participating in AECMs. By using an approximation of the time farmers tend to spend in some activities as a proxy for TC, and by discussing in an extended way the causes and effects that such costs have in their decision-making, it was possible to conclude that implementation costs were perceived as the most burdensome type of transaction costs for the farmers interviewed, followed by negotiation costs and search costs, respectively. However, these perceptions seemed to depend on certain factors, such as the presence or absence of intermediaries facilitating administrative tasks, the level of cooperation among farmers and institutional support allowing the development of collective initiatives, and the experience farmers acquired from repeated participation. Additionally, it was also found that, in general, farmers' attitudes toward participation in AECMs can be affected negatively by excessive bureaucracy, high levels of control, lack of efficient communication channels with the administration, and rigid and seemingly unfair penalties affecting their access to the incentives. We believe these findings should be considered by governments, policymakers, and other relevant institutions interested in developing new or improved AECMs, as they reveal some of the causes behind bottlenecks in farmers' participation as well as alternative ways to reduce private transaction costs. On the other hand, it is also relevant to point out that this study was subject to several limitations. First of all, the score farmers provided in the Likert scales depended on their capacity to recall the time they invested in certain activities, some of which had been executed a long time ago. The interviews were carried out in different languages, and therefore some details could be lost in translation, and thus in the accuracy of the answers obtained. Owing to the great diversity and context-specificity of the cases included in this study, the results from this explorative analysis should not be generalized to all farmers participating in European AECMs. Further research could focus on the analysis of the variability of perceived transaction costs and willingness to participate when a mix of these factors is present or absent in different AECMs.

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