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# Public transaction cost of agri-environmental schemes and its determinants - Analysing stakeholders' involvement and perceptions

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**Abstract—** Despite a total budget increase for rural development in the new programming period (2007-2013), for most older Member States in the now expanded European Union the multi-annual spending plan for the period 2007-2013 predicts a substantial decrease of the budget for rural development and thus for agri-environmental schemes (AESs). It can be assumed that nothing or only part of this loss could be compensated by national funds in most countries. Therefore designing more efficient national governance structures for AESs, which decrease public transaction costs (TCs), would be an appropriate answer to this problem. The objective of this paper is to define the factors influencing these public TCs, because then appropriate action can be taken to reduce them. A statistical analysis with a proxy for public TCs is combined with an analysis of the perception on public TCs influencing factors of the stakeholders involved (not including farmers). The research showed that mainly scheme related factors are perceived to be important, although the governance structure, institutional environment and trust also play a role. High public TCs are however not necessarily a problem, if they would lead to a higher environmental effectiveness of the schemes. It is important to pay attention to the heterogeneity of the natural environment and on the basis of that decide for a more centralised or decentralised approach to AES design.

**Keywords—** Public transaction costs, agri-environmental schemes

## I. INTRODUCTION

Agri-environmental schemes (AESs), with the implementation of Reg. (EC) 1257/1999 a core element of the second pillar of the European Common Agricultural Policy, are currently entangled in critical debates questioning their environmental effectiveness [1-4]. However, the economic efficiency of the schemes also deserves attention. Especially in the light of recent changes in the European budget for rural

development, which provides up till 55% of the funding for the schemes<sup>1</sup>, this last concern can be justified. Despite a total budget increase for rural development in the new programming period (2007-2013) compared to the old (2000-2006) one [5, 6], for most 'old' countries<sup>2</sup> in the now expanded European Union the multi-annual spending plan for the period 2007-2013 predicts a substantial decrease of the budget for rural development, which is mainly caused by the increased number of Member States (27 compared to 15 in 2000-2004 and 25 in 2004-2006). Next to this, new responsibilities were added to the rural development policy such as support linked to Natura 2000 areas. Taking into account these changes, the Commission asked for a higher budget than the one that was agreed upon by the Council. Even if the funding would have remained the same, one could wonder whether it would be sufficient in the new programming period because it builds on the first one, and is therefore immediately operative and bound to agreements already entered into. It can be assumed that, nothing or only part of this loss could be compensated by national funds in most countries. Additionally, most countries are faced with stronger budget restrictions for their Administrations. Designing more efficient national governance structures for AESs, which decrease public transaction costs (TCs), would be an appropriate answer to this problem. Therefore, the objective of this paper is to define the factors influencing these public TCs, because then appropriate action can be taken to reduce them. When judging TCs related to AESs, however, the costs for missing the target (CMT) or the environmental utility losses shall always be taken into account, since it is the sum of TCs and CMT that

<sup>1</sup> 80% in Convergence regions

<sup>2</sup> These countries are Germany, Greece, Spain, France, Ireland, Luxemburg, the Netherlands, Austria and Finland

should be minimised to design measures with the optimal precision [7].

First an overview will be given of the literature concerning the factors influencing public transaction costs regarding agri-environmental policies. This is followed by a description of the methodology used to assess these factors. Results are presented in the fourth section and critically discussed in the last part, including some policy recommendations for decreasing public TCs regarding AESs.

## II. DEFINITION AND BACKGROUND

TCs, which can be defined as the costs arising not from the production of goods, but from their transfer from one agent to another [8], are currently gaining importance in socio-economic research on agri-environmental policies [9-12]. From a transaction cost economics point of view, an AES can indeed be seen as a transaction between the farmer and the government, who respectively represent the seller and the buyer of the agri-environmental goods and services. The costs directly resulting from this transaction are called private TCs when borne by the farmer and public TCs when borne by the government. A direct transaction between citizens and farmers suffers from the absence of fully articulated property rights, which leads to market failure and hence governmental organisation of AESs [13, 14]. According to Transaction Cost Economics (TCE), and its principle of discriminating alignment, the chosen mode of governance has to match with the characteristics of the transaction in such a way that the costs incurred are minimised [15].

Following this principle, the present governance form could indeed minimise the costs. However, there are also other factors which might influence public TCs regarding AESs. The analysis of public TC influencing factors in this paper is not only done on the basis of measurements of these costs, but also on the perception of the stakeholders involved in AESs. Buckley and Chapman [16], investigating the influence of TCs on managerial decision making found out that managers very often don't know what TCs are, but that they do take them into account, although not in a numerical way. They therefore claim a higher importance of the perception of TCs, since

this determines their effect on decision making. This view is shared in this paper, hence the choice of working with perceptions supplementary to time data. The data used have been collected in the framework of the European research project ITAES<sup>3</sup> and reflect the situation regarding AESs in Europe. However, the scope of the results goes beyond the European case and can even be extended towards other policy areas than the agri-environmental one.

## III. FACTORS INFLUENCING PUBLIC TCs RELATED TO AESs

According to Oliver E. Williamson, the main founding father of the TCE theory, TCs are influenced by: (1) the behaviour of the actors involved in the transaction, (2) the attributes of the transaction, which are the asset specificity of the transacted good or service, the frequency of the transaction and the uncertainty regarding the outcomes of the transaction, (3) the institutional arrangements or governance structures and (4) the institutional environment in which the transaction takes place [17]. Specifically for agri-environmental policies, several empirical studies are available dealing with this topic, which will be described in the next paragraphs.

In a comparable large scale European research project on AESs (STEWPOL), Falconer and Whitby [18] found numerous factors influencing administrative cost levels. First of all there is the farmers' attitudes towards and understanding of AESs. North [19] also mentioned that a common ideology between the actors in the transaction may reduce public TCs, since it entails a smaller need for control. Closely connected to this factor are the observability of compliance by farmers and the technology available for monitoring and administration [18]. Fullerton [20] also mentions monitoring technologies as important public TC influencing factors [20]. Scheme transparency, the scheme objectives, the degree to which they are pursued and the degree of targeting of the schemes can be connected to Williamson's factor of asset specificity [18]. In the same study finally the regularity of interactions between regulators and participants, the time since scheme implementation

<sup>3</sup> Integrated Tools to design and implement Agri-Environmental Schemes

and the potential for economies of scale are mentioned as influencing factors, relating then to Williamson's final attribute of frequency of the transaction. The former two factors refer to the possible occurrence of learning effects when implementing AESs, but also to the creation of trust between the actors in the transaction.

Learning effects, or scheme experience, and economies of scale with higher participation levels come back as influencing factors in a later article of Falconer et al. [13]. Whitby [14] adds the time in the lifecycle of the schemes as a factor influencing public TCs with higher costs in the first phase of establishing the schemes and setting up the contracts. Stavins [21] concluded that, next to the frequency of the transactions and uncertainty, the TCs depend on the number of trading partners involved in the transaction with lower TCs per participant when the number of participants increases. The same influencing factors come back in Eklund's [1999, cited in 22] research on TCs of the Swedish agri-environmental program. She however also mentions the level of education and heterogeneity of the people affected by the policy, and institutional influencing factors such as the design of the AESs and the general administrative institutions.

When investigating the TCs involved in different agricultural policies, Rørstad et al. [23] found that TCs vary according to the point of policy application: policy instruments applied to a commodity in the case of jointness in production between public and private goods (e.g. taxes on pesticides) will involve lower TCs than instruments aimed directly at the public good (e.g. support for special landscape ventures). Eggers [7] also points at the influence of institutional factors on public TCs related to AESs, with higher TCs connected to a more decentralised approach of designing AESs (e.g. in a regional Agricultural-Environmental Forum). However, decentralisation could lead to lower environmental utility losses when the environment is heterogeneous across the country, because the schemes are then better adapted to the local environmental conditions.

Another possible influence of the institutional governance structure can come from whether farmers can take up single agri-environmental measures, a combination of measures in AESs or there is a whole farm approach like in Ireland or the UK. Offering a

combination of measures to farmers has an equivalent in the business world as the 'block booking' of movies. According to Kenney and Klein [24], this bundling leads to economization on measurement costs and reduces time and resources spent on redundant sorting and repricing. As an equivalent, the bundling of agri-environmental measures in schemes or whole-farm approaches could also reduce the efforts of the responsible Administration. On the other hand, the tuning of the measures in a scheme could increase its design costs. Related to this is the concept of connectedness, which means that transactions can be linked to each other and this can influence the costs involved. Whether this connectedness leads to decreasing total TCs (e.g. because two regulations require the same administrative tasks) or increasing total TCs (e.g. because more coordination is required) depends on the situation [25].

Finally, different types of TC could be positively or negatively correlated with each other, such as high costs for stakeholder participation at an early stage could decrease monitoring and enforcement costs later [26].

From these literature results, some hypotheses can be derived which will serve as a basis for the research. These hypotheses, which will be explained in this paragraph, are schematically represented in Figure 1. First of all, the arrow from public TC towards the same box represents the hypothesis that TCs are interrelated. Behavioural characteristics of the actors influencing TCs are: the identity of the actors involved, the type of participation of the actors in the transaction, the number of actors involved, and the relationship (trust) between the actors. Attributes of the transaction influencing public TCs regarding AESs are: the number of AESs, the complexity or transparency of AESs, the precision of the schemes, their age, the time in the lifecycle of AESs and the observability of compliance by farmers. Institutional governance structures influence public TCs by the point of policy application of the schemes and the fact whether farmers can take up single measures, schemes, or there is a whole farm approach in place. Elements of the broader institutional environment having an influence are the (de)centrality of the Administration, EU regulations and the national administrative structures. Finally, an influence of the

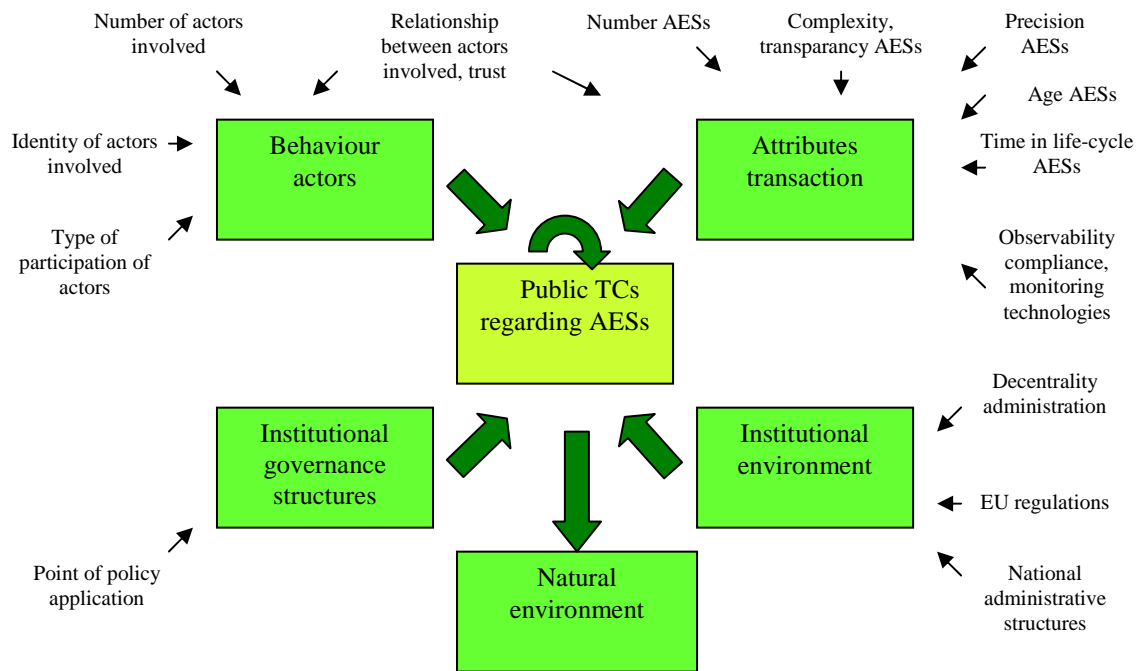


Fig. 1: Factors influencing public TCs

natural environment in which the AESs have to be designed is expected.

Much of the literature described above made use of primary or secondary data of public TCs regarding AESs to identify the influencing factors. Next section will describe how the methodology used in this research deviates from beaten paths and chooses an alternative approach.

#### IV. METHODOLOGY

Because of the scope of this study, which comprises a total of nine European countries, obtaining government figures on TCs and using secondary data to identify public TC influencing factors was a difficult task. Therefore a standardised face-to-face questionnaire was chosen with Likert scale variables and containing both closed and open questions. The advantage of this kind of structured interview is that it can be used to assess perception of TCs. Problems with this approach are the high costs and the fact that it's time-consuming. Moreover, respondents are asked to

estimate future costs or remember costs in the past, which could lead to less reliable results [10].

Table 1 depicts the obtained sample and shows that in general the Agricultural Administration is represented most in the sample, followed by the Environmental Administration and farmers associations. Environmental associations and researchers are represented to a smaller extent. Because of the purpose to interview all actors from all administrative levels who are or should be involved in the design of AESs, representatives from hunting, tourism, consumer or any other associations were also questioned. However, the number of respondents in these groups is too small to conduct reliable statistical tests. Therefore, all groups with less than ten members are summarised in a group 'Others'. The distribution of respondents over the different categories in all countries reflects somehow the structure of relevant and interested actors in the field of AESs in each country.

In identifying factors influencing public TCs, the first method used was to find a proxy for TCs involved in design and implementation of AESs, which could

Table 1. Number of respondents per type of organization by country

Region/Type	AgAd	EnAd	FaAs	EnAs	Res	Other	Total
Flanders (BE)	7	11	3	4	2	3	30
Czech Republic (CZ)	12	8	5	5	3	3	36
Finland (FI)	22	6	14	3	2	0	47
Basse-Normandie (FR)	18	8	10	1	3	1	41
Brandenburg (DE)	7	10	4	5	5	7	38
Ireland (IE)	1	0	1	2	3	2	9
Veneto & Emilia Romagna (IT)	8	3	9	2	5	3	30
Friesland (NL)	4	2	2	2	7	2	19
North England (UK)	6	7	2	9	2	3	29
Total	85	55	50	33	32	24	279

Legend: AgAd: Agricultural Administration    EnAd: Environmental Administration  
FaAs: Farmer Association    EnAs: Environmental Association  
Res: Research

then be used as a dependent variable in a statistical regression containing several explaining variables obtained through the questionnaire. The proxy for public TCs chosen in this research is the percentage of the working time the individual respondents, apart from the farmers, spent on AESs. The second method involves the perception of public TC influencing factors. The respondents were specifically asked to assess which factors they perceive to influence public TCs. These factors were given, based on the literature review, but the respondents could also give comments on them and add other factors in an open question. This yields important qualitative information, which can help with the interpretation of the statistically obtained results.

## V. RESULTS: FACTORS INFLUENCING PUBLIC TCs REGARDING AESs

### A. Finding public TC influencing factors through statistical analysis with a proxy

As mentioned in the methodological part, one approach in determining public TC influencing factors is to do a statistical analysis with a proxy for public TCs serving as a dependent variable. The proxy chosen here is the percentage of the working time spent on one particular activity in the spectrum of AES

related activities, namely the design of the contracts. Although information on the time spent on other tasks is also available, design is selected because other questions in the database are specifically related to this activity and can thus be incorporated in the statistical model. The implementation part was given less consideration in this research to avoid too long questionnaires, negatively influencing respondents' participation. Of course, only those respondents really involved in design were included in the statistical model.

First of all, since this proxy variable of the share of the personal working time spent on design of AESs is not normally distributed, the natural logarithm of the time is used as dependent variable. Because of multicollinearity, several variables had to be excluded from the model. The linear regression model obtained (see Table 2) shows a significant effect for the frequency of information exchange with farmers' associations: the more information the respondent exchanges with these associations, the less time spent on AES design. There was no influence of the actor group (Agricultural/ Environmental Administration/ Organisations, etc.) on AES design costs. A possible explanation for the decreasing effect on time spent on AES design of having frequent contacts with farmers' associations could be that these organisations provide information which simplifies AES design. An alternative explanation could be that current AESs

Table 2. Linear regression model on public TC influencing factors

Ln % of working time spent on AES design		
Variables	Coefficient	P
frequency information exchange with researchers	0.112	0.418
frequency information exchange with farmers' associations***	-0.497	0.001
influence Environmental Administration on design process	-0.028	0.864
influence environmental associations on design process	-0.068	0.723
opinion EU Administration trusts Administration NUTS 0&1	-0.186	0.212
opinion Environmental Administration trusts farmers**	0.373	0.044
importance objective reducing negative impacts of agriculture**	-0.266	0.049
NUTS0***	1.197	0.009
NUTS2	0.368	0.420
NUTS3	0.014	0.977
LAU	-1.602	0.136
seriousness environmental problems	0.042	0.320
heterogeneity problem soil quality	-0.182	0.236
heterogeneity problem water quality***	0.391	0.019
heterogeneity problem biodiversity	0.032	0.832
opinion agri-environmental problems interlinked	0.058	0.742
constant	0.877	0.548
Number of observations	84	
F-statistic	4.01	
Prob>F	0	
R <sup>2</sup>	0.489	

Significance level: \*\*\*= 0.01, \*\*= 0.05, \*= 0.1

comply with the wishes of these organisations and they have little to comment on or discuss about concerning the design process. The opinion of the respondent on the statement “The Environmental Administration trusts farmers” also has an influence on time spent on AES design. If this trust is assessed to be higher, then more time is spent on design, which contradicts theory. This statement could reveal the respondent’s own trust in farmers. If the respondent has trust in the farmer, he/she will be more motivated to create the best AESs for them which then takes more time. Or it could also be an effect instead of a cause: because so much time is spent on designing

good schemes, the respondent trusts that farmers won’t break the contracts. Less time is spent on AES design if the respondent believes that reducing the negative impacts of agriculture is an important objective of the AESs ( $p=0.050$ ), then when the AESs are believed to focus on stimulating positive externalities or adapting farming systems to the changing price and policy environment. The NUTS level also has an influence: the higher the level, the more time is spent on AES design which reflects the actual centralised situation in design of AESs. Finally, the model shows that the higher the perceived heterogeneity of water quality problems, the more time is spent on AES design.

To validate these results and get a better understanding however, further steps are needed. The next step consists of asking the stakeholders directly which factors they believe influence costs of AES design.

#### *B. Assessing the perception on factors influencing public TCs: quantitative approach*

In this part the question was posed which factors, which were predefined by the researchers, the respondents perceive to have an influence on AES design costs. Figure 2 gives the results for all the respondents together, with the mean level of agreement on the Y-axis, and shows that the complexity of the schemes is considered as the most important factor influencing AESs design costs. The number of measures and the precision of the measures are of almost the same significance. Thus, according to the respondents, public TCs are most strongly affected by the nature of the measures and the object of the transaction (the asset). Of lower importance are factors related to the institutional environment and governance structure, such as the (de)centrality of the Administration, EU regulations, and the national Administrative structure. Factors belonging to the category of the behaviour of the actors, as defined in the literature part, like the type of participation, the number of participants and the identity of the participants are perceived to have a lower influence. Also the heterogeneity of the natural environment is perceived not to influence public TCs too much.

Very important to note concerning the perceived influence of factors on AES design costs is the high

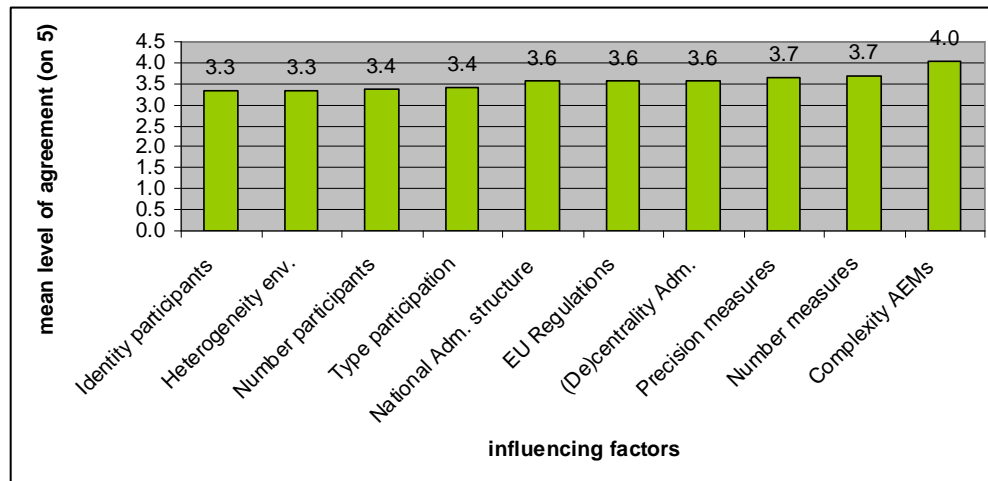


Fig. 2: Factors perceived as influencing public TCs

number of respondents with no opinion on the matter. For every factor taken into consideration, between 30 and 60 per cent of the respondents had no opinion. Especially the influence of the institutional structure on design costs was difficult to assess. The effect of the number of measures, their complexity and the heterogeneity of the natural environment was the easiest to evaluate. Detailed analysis reveals that especially the type of organisation a respondent belongs to is a determining factor for having an opinion on factors influencing design costs or not. Officers from the Agricultural Administration and researchers have significantly more often an opinion on the factors influencing AES design costs than other groups ( $p=0.000$ ). The fact that respondents from the Environmental Administration more often give no opinion answers than their colleagues of the Agricultural Administration may indicate their smaller involvement in the AES design process.

Respondents were also explicitly asked to assess the level of knowledge of the national Agricultural Administration on public TCs regarding AESs. The same question was asked concerning the level of knowledge on environmental utility losses caused by imprecise AESs, with the assumption behind it that the civil servants in the Administration have a better idea on the environmental effects of scheme design than financial aspects of the AES design and

implementation procedure. For both TCs and utility losses, there is a high number of no opinion answers, with respectively 28% and 27% of interviewees, which indicates that in general people might not be occupied much with these issues. If the respondent does have an opinion he tends to disagree more: the knowledge of the administration on these two topics is rather limited. For the statements that the Administration has a high knowledge on public TCs and utility losses, a mean level of agreement was found of respectively 2.6 (s.d.<sup>4</sup> 1.2) and 2.4 (s.d. 1.1) on a scale with 5 being the highest level of agreement. So, it seems that the interviewees estimate the knowledge of the Administration on TCs slightly higher than the knowledge on environmental utility losses. However, 29% of the interviewees see a difference between the different administrative levels of the Agricultural Administration (around 50% of the actors again had no opinion on this question). The open question related to this topic revealed that although the opinion on which administrative level has the greatest knowledge differs substantially between the respondents, knowledge on utilities losses due to imprecision are rather noticed at lower levels. The explanation that is often given is that persons at such levels are closer to the issue of concern. For public

<sup>4</sup> Standard deviation



TCs, the respondents perceive a higher knowledge on higher administrative levels, although several point out that knowledge on TCs is generally scarce.

Next to this quantitative approach on assessing the perception on public TC influencing factors, an open question allowed for a qualitative approach on this matter.

### *C. Assessing the perception on factors influencing public TCs: qualitative approach*

The open question on public TCs regarding AES design and implementation provoked a great diversity of additional comments on public TCs [for more detailed information, see 27]. Despite the fact that many respondents seem to find TCs an interesting issue, there seems to have been little reflection on this leading to diverse comments and a lack of overall structure. However, issues that gained particular attention were TCs in relation to regulations, effectiveness and costs of measures, continuity of AESs, distribution of cost components of AESs and knowledge and measurement of TCs.

Concerning the impact of regulations on TCs, there were complaints that EU regulations contribute to increased TCs, e.g. because of extensive reporting requirements. Some respondents suggest that abandonment of national co-financing would reduce TCs. Others point at the impact of national administrative procedures in the application process on TCs, and argue for the administrative pathway to be simplified/shortened to reduce TCs. IT-solutions were suggested as a possible way to achieve this. Simplification of the application process would also benefit farmers, because some respondents claim that many farmers don't have an overview anymore of the schemes and the Administrations responsible for them.

The relationship between the effectiveness of the schemes and public TCs is a major issue in most case studies. The overall opinion seems to be that TCs can be high, as long as they are compensated by a high effectiveness of the schemes. This however seems to be very difficult to determine. Several respondents believe that TCs for AESs are currently not in proportion to the minor effects of the schemes. Some respondents argue that AESs should actually be evaluated on the basis of their environmental effectiveness and TCs involved. In the opinion of

several respondents increased complexity of schemes increases their TCs, but will bring greater benefits.

Another answer coming back frequently is that continuity of AES policies could decrease TCs.

In relation to the distribution of cost components of AESs, several respondents claim that implementation of the schemes is a very costly matter. Some suggest that control is most costly and too costly, and other respondents mention costly design and communication of the schemes.

Several respondents believe that there is a lack of information and knowledge on TCs related to AESs, although some say this is because administrative work is difficult to value.

Trust was also an issue coming back often in the open question. Overall, respondents believe that trust in farmers can differ a lot between different Administrations (with a higher trust by Agricultural Administrations), political parties and finally also persons. A lack of trust would however increase control costs according to some respondents.

The qualitative analysis shows that opinions on TCs are diverse and rather detailed. This might be due to lacking discussions on TCs between and within all administrative levels and actor groups [27].

## VI. DISCUSSION AND CONCLUSIONS

In this paper different quantitative and qualitative techniques were combined to assess public TC influencing factors related to AESs and stakeholders' perception of them. Knowledge on public TC influencing factors is useful in order to take appropriate action to decrease these costs.

In the perception of the stakeholders involved in AESs, farmers not included, AES design costs are mostly influenced by factors related to the object and attributes of the transaction, which means factors related to the *schemes* themselves. The complexity of the schemes, the number of AESs that need to be designed and the required precision of the measures are perceived to be the factors with the highest influence. The open question however reveals that this doesn't necessarily imply a wish for a smaller number of homogeneous AESs: good functioning AESs may be costly. When judging TCs, costs of missing the target or environmental utility losses should indeed

always be taken into account. However, a number of stakeholders believe that the high TCs involved in current AESs don't weigh up to their environmental benefits.

Related to this, the statistical model shows a significant positive relationship between the heterogeneity of the environmental problems and AES design costs, which in the perception of people is a less important influencing factor. It also identifies another significantly influencing variable in this category, namely the objective of the scheme. The model predicted lower AES design costs if the main objective of AESs is only to reduce the negative environmental impacts of agriculture. An important reason why scheme-related factors are identified as most important could be related to the fact that they can be more easily pictured than for instance the effect of the institutional governance structure or environment. The high number of no opinion answers obtained within the latter category of influencing factors is striking.

In general, all questions related to TCs show a high number of no opinion answers, indicating *little knowledge* of the stakeholders on this topic. Stakeholders that do have an opinion assess the knowledge of the Agricultural Administration regarding TCs as rather low, especially at the lower Administrative levels. This is somehow compensated by a perceived higher knowledge on environmental utility losses at these levels. These results indicate that organising AESs on an intermediate Administrative level, like NUTS 2, could possibly lead to environmentally more effective AESs in a heterogeneous natural environment, without causing too high TCs.

In the perception of the stakeholders, who participates in the design process is not such an important influencing factor. However, the model suggests that if farmers' associations are more frequently heard, AES design costs are lower. This can be because they can provide useful information for AES design. Another explanation could be that current AESs comply with the wishes of these organisations and they have little to comment on or discuss about concerning the design process.

*Governance structures and the institutional environment*, such as the (de)centrality of the

Administration, the national Administrative structure and EU Regulations, are perceived as second most important factor influencing AES design costs. EU Regulations often come back in the open question too. In the case of more decentralised structures, the question arises whether the EU requirements could be fulfilled on all these lower Administrative levels. High TCs could possibly impede this, so more flexibility could be required from the Commission. On the other hand, the strict EU regulations could be understood as a conscious strategy to save on TCs at EU level, but investigating this didn't belong to the scope of this research.

*Trust* often comes back in the research as TC influencing factor. The model shows a significant influence of trust, with higher design costs if trust of the Environmental Administration in farmers is high. This result runs counter to what theory predicts, but it could be that high trust indicates good relationships with farmers which would result in higher efforts to design good measures. Or, the trust in farmers could be a cause of having well-designed measures. The open questions reveal that trust is a complicated issue, which can differ according to the type of Administration, the political party in charge and also between individual people. It is probably also more related to monitoring and control costs than design costs involved in AESs.

Finally, the *low knowledge on TCs in general* often comes back in the open question. These results prove again that TCs are a concept that cannot be easily grasped, belonging more to the intuitive knowledge of the stakeholders.

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<sup>5</sup> Integrated Tools to design and implement Agro Environmental Schemes

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