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**Assessing farmers' acceptance and perception of  
agri-environment schemes by ex-post application of the  
'Theory of Planned Behaviour' - A case study in England**

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# **Assessing farmers' acceptance and perception of agri-environment schemes by ex-post application of the 'Theory of Planned Behaviour' - A case study in England**

Lilli A. Schroeder

## *Abstract*

*A better understanding of farmers' behaviour regarding agri-environment schemes (AES) can be one step towards further improving the schemes. To assess farmers' acceptance and perception of AES, the 'Theory of planned Behaviour' (TPB) was applied to identify factors influencing farmers' willingness to join AES. In a region in England, standardized face-to-face interviews were conducted with 32 farmers already participating in AES. The results show that the general attitude and acceptance of the scheme were high. Biodiversity, landscape, and natural resources were perceived to be improved by the scheme and to be valuable. An increase in weeds was perceived as an undesirable outcome. Farmers' families were ranked to have the highest and most positive social pressure on farmers' decisions to join AES. More paperwork and higher prescriptions would make it much more difficult to join the scheme. Environmental advice and generally more consideration of environmental conservation in policy were perceived to make the joining easier.*

*Keywords: Agri-environment schemes, Theory of Planned Behaviour, Farmers' acceptance, Farmers' behaviour*

*JEL classification: Q57, Z1*

## **1. INTRODUCTION**

Because the availability and condition of public goods such as landscape, wildlife, nature or ecosystem functioning cannot be controlled by normal market mechanisms, it is the responsibility of the public authorities, such as the government, to provide access to and maintain the good condition of those goods (Koester, 2005). To address this responsibility, European politics have, since the 1980s, paid an increasing amount of attention to environmental conservation in general, and also to environmental friendly agricultural practices (Kirschke et al., 2004). With the 'McSharry reforms' of the Common Agricultural Policy (CAP) in 1992 it was first obligatory for the EU member states to develop and introduce AES (EC, 2010). The Commission's legislative proposals for a reform of the CAP after 2013 (EC, 2011), illustrate the further increasing importance of environmental aspects in Europe. Even though these issues are now also increasingly implemented in the first pillar of the CAP, agri-environmental measures are still destined to play a prominent role to protect public goods within rural development policy. However, the European Court of Auditors (2011) and the Commission criticise agri-environment schemes as not being efficient enough and demand further improvements. Since AES are voluntary for farmers, their acceptance is one essential requirement for the success of a scheme. Acceptance means participation by farmers, but also

including farmers in a more sustainable way in terms of awareness, attitudes, and perception of the aims behind AES. Therefore, and to address the above-mentioned challenge, this paper assesses farmers' acceptance and perception of AES. Here, the 'Theory of Planned Behaviour' is applied ex-post in a case study in England. Potential strengths and weaknesses of the English 'Environmental Stewardship' (ES) are to be identified. We want to find out what generally drives farmers to join AES, what influences their intentions, and which issues might make them insecure.

### ***1.1 Agri-Environmental Schemes in England***

The first AESs in England were the 'Environmentally Sensitive Areas' (ESA) established in 1987 and additionally the 'Countryside Stewardship Scheme' (CSS) from 1991. In consequence of a major review of these so-called 'classic schemes' in 2002 they were closed for new agreements in 2005 and a new AES named 'Environmental Stewardship' was set up. The ES is developed, administrated and evaluated by 'Natural England'<sup>1</sup> (NE) (Peel, 2010). The ES generally consists of two tiers: the 'Entry Level Stewardship' (ELS) together with the 'Organic Entry Level Stewardship' (OELS) and the 'Higher Level Stewardship' (HLS) (see Figure 3 in the annex).

The ELS as basis of the ES was actually designed as so-called 'hands off scheme': easy to understand, to implement and to perform for the farmers without any need for advice and open to all kind of farmers. Farmers can individually choose any management options out of a menu of over 60 options in order to achieve a certain point target to receive application allowance on a five-year term (annual payment = £30 per ha). The menu of options contains, e.g., boundary, historical or landscape features and arable or grassland options (Natural England, 2010).

NE allocates HLS agreements only where they are likely to achieve the greatest environmental benefit. The ten-year HLS agreements and the composition of options is drawn up in discussion with NE. HLS is not based on a direct payment system, each option is worth a certain amount of money per unit. The menu of HLS options has similar components to ELS' but on a higher level (e.g., habitats of higher ecological value) and with additional options especially designed for e.g., moorland, lowland heathland, coastal locations, wetland or for public access. Extra payments are offered selectively for required capital investments, e.g., wildflower seeds. One major characteristic of HLS is its high supply of support, advice and administration. Regular farm visits for example, prove, with help of 'Indicators of Success', the measurement suitability and detect potential need of agreement adjustments (Natural England, 2010b).

In August 2009 ES- and remaining ESA- or CSS-agreements covered in total an area of six million hectares in England, which is 66% of all English agricultural land. Within this, ELS uptake is remarkably higher than those of the others (Natural England, 2009). Spending on

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<sup>1</sup> Natural England is an independent public body and a government advisor, providing practical advice, grounded in science, to protect and improve England's environment

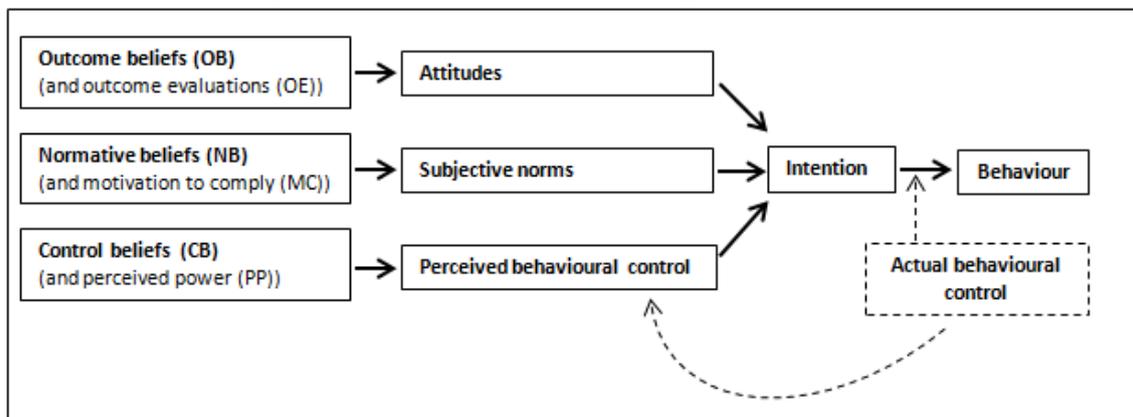
support and improvement of the environment and countryside with land management accounts for about 80% of England’s total share of the EU-second pillar funding (Peel, 2010). After the first programme term of five years, different studies confirmed that the ES regulation can be an appropriate tool to protect valuable ecological sites and to make progress in schemes’ environmental objectives (Peel, 2010; Tucker, 2010; Natural England, 2009; Natural England, 2008). The simple structure of ELS allows for a high scheme participation rate providing some environmental benefits over a large area with relatively low administrative costs. The more complex structure and support offered by HLS, in contrast, allows more flexibility in targeting, agreement set ups, and farmers’ management with a focus on the outcomes.

With regard to this innovative approach for an AES and the high effort which is put into it, it would be interesting to find out how farmers’ intention to join the ES is influenced and to assess how advantages and disadvantages of participation are perceived by farmers already attending the scheme. This could lead to findings helpful to further improve ES and AES in general and to gain knowledge about farmers’ behaviour regarding environmental measures. To address this challenge the 'Theory of Planned Behaviour' was chosen to serve as study construct.

**The Theory of planned Behaviour**

The TPB was set up by Ajzen in 1985. It was actually developed to predict human intentions to exhibit certain behaviour and is an extension to the ‘theory of reasoned action’ (Ajzen and Fishbein, 1980).

Figure 1. Conceptual Framework of the 'Theory of planned Behaviour'



Source: own compilation according to Ajzen (2002)

As Figure 1 shows, within the approach of the TPB, human behaviour is determined by the intention towards a certain behaviour and the actual behavioural control over this behaviour. The Intention in turn is a result of three determinants: the attitude towards the behaviour (favourable or unfavourable), subjective norms (social pressure through others), and the perceived behavioural control over certain behaviour. The source of these determinants and the basis of the whole theory are the related salient beliefs which are broken up into outcome beliefs (OB), normative beliefs (NB), and control beliefs (CB) and are to be multiplied by their

corresponding judgements: outcome evaluation (OE), motivation to comply (MC), and perceived power (PP). The products of these factors (outcome belief construct (OBC), normative belief construct (NBC), control believe construct (CBC)) reflect the whole range of personal experiences, varying influences or received information readily accessible in memory. Whereas the behavioural beliefs consist of the perceived personal outcomes of certain behaviour (advantages, disadvantages or other associations), the normative beliefs reflect other groups of people or individuals who are noticed to have influence or an opinion on the intention to perform the behaviour. The control beliefs are a perception of factors that may allow or facilitate certain behaviour but also factors that hamper or preclude somebody from this.

## **2. MATERIAL AND METHODS**

### ***2.1 Applying the ‘Theory of planned Behaviour’: Theoretical construct***

In this study, the TPB was not applied to predict a behaviour but to serve as construct for assessing aspects that influence the already performed behaviour 'joining the ES'. Figure 4 in the annex shows how the different elements of the TPB were defined in this case study and which items or questions were set to measure them. Since the interviewed farmers already performed the behaviour of 'joining the ES', the actual behaviour was already defined. Due to this it was moreover determined that they had actual control on this behaviour and that their intention in this theoretical construct was 'joining the ES'. This in turn means that the sum of attitudes towards the behaviour, the subjective norms and the perceived behavioural control towards joining the ES must be positive. To design questions assessing the different TPB elements not yet pre-defined, appropriate literature was reviewed. Subsequently, the content of behavioural beliefs likely to be shared by the target population was identified and potential influencing groups and other controlling factors were defined. The most often listed statements were selected and converted into a set of statements which should reflect the beliefs that might affect the behaviour of the target population. All questions regarding the TPB were designed in close connection to Ajzen (2002). Whereby questions regarding the personal beliefs are supposed to be relatively concrete, questions to assess farmers' attitudes, perceived subjective norms, and perceived control are asked more indirectly in order to obtain also subconscious perceptions and feelings of the farmers.

### ***2.2 Interview procedure, sample and data analysis***

Based on the above-described theoretical construct, interviews with farmers were conducted in England in Summer 2010 in the 'Yorkshire and The Humber' region of northern England. Interviewed farmers had to meet both of the following sample criteria: i) be located in one of the selected authority regions; ii) hold an HLS-agreement. In total, 32 face-to-face interviews with farmers were conducted on their holdings as investigative, individual interviews using a standardised questionnaire. The total area (summing up the area of all farmers interviewed) comprised 9,694 ha. The smallest farm in the sample was 10 ha, the largest

1,342 ha. 27 farmers (84%) ran their farm as their main business. Two farmers (6%) managed their land organically. All 32 farmers (100%) had permanent grassland and had HLS agreements, 28 farmers (88%) had ELS agreements. 17 farmers (53%) managed land that was identified as a ‘Site of Special Scientific Interest’ (SSSI<sup>2</sup>). The age of the farmers was between 29 and 75 years and interviewed farmers were mainly male (27 farmers = 84%).

The questionnaire contained questions about the general farm business structure, farming characteristics and ES-agreements, 23 items for beliefs (OB, NB, CB), each for ELS and for HLS, and 23 items for their evaluative components (OE, MC, PP). The questionnaire ends with demographic questions. Different scales were used to categorize the answers (nominal, ordinal, and interval). However, predominantly a five-point Likert scale was used. A pilot test served as proof of the questionnaire and its further development.

For description of the data obtained, frequencies, median, and inter-quartile range were calculated. The TPB belief constructs were calculated in order to obtain an overall level of a belief and the corresponding personal evaluation for each farmer (i). For example:

$$[1] \quad OBC_i = OB_i \times OE_i$$

Furthermore, a score was calculated summing up all these products for each farmer (i) of the whole sample (N), e.g.:

$$[2] \quad NBC_i \text{ Score} = \sum_{i=1}^N NB_i \times MC_i$$

To assess possible relations between two ordinal scaled variables, non-parametrical bivariate correlations were carried out according to Spearman (two-tailed).

### 3. RESULTS

In this section, the results of applying the TPB will be presented. This will be done by describing each of the three constructs with its elements separately. For example, first the results regarding farmers outcome beliefs, then the outcome beliefs multiplied by the corresponding outcome evaluation, and afterwards farmers general attitude towards ‘joining the ES’ will be presented. The same will be done for the normative construct and the control construct. For a better overview, only the figures regarding ‘joining ELS’ will be shown. The corresponding tables for ‘joining HLS’ are presented in the annex. For the questions regarding ELS, a sample of 28 farmers was interviewed, and for HLS, the sample was 32. This difference is due to the fact that all farmers interviewed had HLS agreements but four farmers had no ELS agreement, which is possible but relatively uncommon.

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<sup>2</sup> Areas of special nature value due to their flora, fauna, geological or physiographical conditions, protected by law (Natural England, 2011)

### **3.1 Behavioural beliefs, outcome evaluation and attitude towards the behaviour**

As Table 1 shows, farmers perceived ELS as positive. They saw the advantages and disadvantages also pointed out by former studies. The only neutral/uncertain result was obtained for 'ELS keeps farmers dependent on the government' and 'ELS leads to increase of weeds'. Both statements had high Inter Quartile Ranges (IQR). For HLS, the statements regarding outcome beliefs were rated similar to ELS (see Table 9 in the annex). Generally, the outcome of joining HLS was perceived even more positively than of joining ELS.

Table 1: Farmers' outcome beliefs (OB) concerning (joining) ELS

	<b>2</b>	<b>1</b>	<b>0</b>	<b>-1</b>	<b>-2</b>	<b>Median</b>	<b>Q1</b>	<b>Q3</b>	<b>IQR</b>	<b>No.</b>
<b>ELS leads to higher Biodiversity</b>	12	9	4	2	1	1.0	0.8	2.0	1.3	28
<b>ELS conserves natural resources</b>	12	5	6	5	0	1.0	0.0	2.0	2.0	28
<b>ELS leads to a more enjoyable landscape</b>	10	8	7	2	1	1.0	0.0	2.0	2.0	28
<b>ELS gives farmers the chance to contribute to society demands</b>	7	10	6	4	1	1.0	0.0	1.3	1.3	28
<b>ELS keeps farmers dependent on the government</b>	5	6	7	5	5	0.0	-1.0	1.0	2.0	28
<b>ELS makes farmland look untidy</b>	2	3	6	11	6	-1.0	-1.0	0.0	1.0	28
<b>ELS leads to increase of weeds</b>	5	7	3	9	4	0.0	-1.0	1.0	2.0	28
<b>ELS leads to increase of arable pests</b>	0	5	7	8	8	-1.0	-2.0	0.0	2.0	28
<b>ELS leads to better image of farming in society</b>	12	10	2	2	2	1.0	1.0	2.0	1.0	28
<b>ELS makes more people in the world suffer from hunger</b>	0	3	5	5	15	-2.0	-2.0	0.0	2.0	28
<b>ELS impedes/hampers good agricultural practice and food production</b>	0	3	8	9	8	-1.0	-2.0	0.0	2.0	28

2 = totally agree; -2 = totally disagree. Source: own calculations

Because the evaluation of the above listed statements can be very different between individual people and in order to interpret the results presented above correctly from the farmers' point of view, it was required to ask them about their general personal evaluation of aspects contained in the different outcome statements. Farmers judged the outcome as expected from literature and general values of the society (see Table 10 in the annex). The only relatively high IQRs were found for 'Keeping farmers dependent on the government' and 'Increasing of weeds'. However, the median for both statements was still -1.0. All evaluations of each farmer, in which 2 represented '(...) is generally very good', -2 '(...) is generally very bad' and 0 the neutral opinion, were multiplied by the given answer for the corresponding outcome belief (2 = 'totally agree'; -2 = 'totally disagree'). The results of this multiplication are shown in Table 2 for ELS. The only negative product (on average) was gained for the aspect 'increasing of weeds'. Neutral results (on average), meaning that one of the factors was 0 (evaluated neutrally), were calculated for 'Farmers contributing to society demands', 'Impede/hampers good agricultural practice and food production', 'Making more people in the world suffer from

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hunger’ and ‘Keeping farmers dependent on the government’. The outcome score (sum of all multiplications per farmer) was on average 7.5. The variation in results was relatively high for the majority of the statements.

For HLS, the results were on average very similar (see Table 11 in the annex) but for some statements, higher positive frequencies were obtained (e.g., regarding biodiversity, landscape, farming image in society).

Table 2: Product (OBC) of ELS outcome beliefs (OB) and outcome evaluation (OE)

	4	2	1	0	-1	-2	-4	Median	Q1	Q3	IQR	No.
<b>High Biodiversity</b>	8	8	4	7	0	1	0	2.0	0.0	4.0	4.0	28
<b>Conservation of natural resources</b>	9	6	1	8	1	3	0	2.0	0.0	4.0	4.0	28
<b>An enjoyable landscape</b>	9	6	3	7	1	2	0	2.0	0.0	4.0	4.0	28
<b>A good image of farming in society</b>	7	7	2	7	0	5	0	1.5	0.0	2.5	2.5	28
<b>Farmers contributing to society demands</b>	4	3	3	9	2	5	2	0.0	-1.3	1.3	2.5	28
<b>Impede/hamper good agricultural practice and food production</b>	1	5	5	12	2	3	0	0.0	0.0	1.0	1.0	28
<b>Making more people in the world suffer from hunger</b>	4	5	3	4	3	6	3	0.0	-2.0	2.0	4.0	28
<b>Keeping famers dependent on the government</b>	2	5	3	14	1	3	0	0.0	0.0	1.3	1.3	28
<b>Increasing of weeds</b>	3	1	0	8	4	8	4	-1.0	-2.0	0.0	2.0	28
<b>Increasing of arable pests</b>	9	4	4	8	2	1	0	1.0	0.0	4.0	4.0	28
<b>Untidy looking farmland</b>	2	7	5	10	1	3	0	0.5	0.0	2.0	2.0	28
<b>ELS OBC score</b> (Max = 44; Min = -44)								7.5	5.0	12.3	7.3	

Values are calculated by multiplying corresponding figures from Table 1 and 10 according to Formula [1]. Values can range from -4 to 4. ELS OBC<sub>i</sub> score is calculated according to Formula [2]. Source: own calculations

When farmers were asked to judge their joining the ES in very general terms, they gave a very positive feedback for joining ELS (see Table 3) as well as for joining HLS (see Table 12 in the annex) and did generally not distinguish between these two tiers. However, for the statements 'Joining ELS/HLS is pleasant - unpleasant' and 'Joining ELS/HLS is enjoyable - unenjoyable' their valuation was not as high as for the other statements.

Table 3: Farmers’ attitudes towards 'joining ELS'

	2	1	0	-1	-2	Median	Q1	Q3	IQR	No.
<b>Joining ELS is 2 = beneficial; -2 = harmful</b>	15	13	0	0	0	2.0	1.0	2.0	1.0	28
<b>Joining ELS is 2=pleasant; -2 = unpleasant</b>	13	14	1	0	0	1.0	1.0	2.0	1.0	28
<b>Joining ELS is 2 = good; -2 = bad</b>	16	11	1	0	0	2.0	1.0	2.0	1.0	28
<b>Joining ELS is 2=valuable; -2 = worthless</b>	18	9	1	0	0	2.0	1.0	2.0	1.0	28
<b>Joining ELS is 2= enjoyable;-2= unenjoyable</b>	11	15	0	1	1	1.0	1.0	2.0	1.0	28

Source: own calculations

### 3.2 Normative Beliefs, motivation to comply and subjective norms

As presented in Table 4, the highest level of agreement from other people for the farmer to join ELS was assigned to the family of the farmer with a very low IQR of 0.0. The highest undecidedness of the farmers in this context was obtained for estimating the opinion of their colleagues (mode = 0, median = 0.5, IQR = 2.0). The opinion of the adviser and the society was also judged as affirmative, but both with a relatively high IQR of 2.0.

Also for HLS the highest agreement for joining the programme was assigned to the family with a low IQR of 1.0 (see Table 13 in the annex). Farmers judged the opinion of colleagues as neutral/undecided, like they did also for ELS, with a low IQR of 1.0. Also the opinion of the farmer's adviser was judged undecided in total but two different bigger groups of farmers were observed: one group thinks advisers would strongly welcome farmers joining the HLS and one group being undecided. On average, the farmers thought that the society would relatively appreciate their joining HLS but also here two different groups of farmers were observed: one group thinking that the society would strongly welcome their joining the HLS and one being undecided about it.

Table 4: Farmers' normative beliefs (NB) regarding 'joining ELS'

	2	1	0	-1	-2	Median	Q1	Q3	IQR	No.
<b>ELS: Family thinks should/shouldn't join</b>	22	5	1	0	0	2.0	2.0	2.0	0.0	28
<b>ELS: Other farmers think should/shouldn't join</b>	9	5	13	1	0	0.5	0.0	2.0	2.0	28
<b>ELS: Farm adviser thinks should/shouldn't join</b>	14	5	6	2	1	1.5	0.0	2.0	2.0	28
<b>ELS: Society thinks should/shouldn't join</b>	14	4	8	2	0	1.5	0.0	2.0	2.0	28

2 = I should; -2 = I shouldn't. Source: own calculations

The motivation of farmers to generally comply with the opinions of other people was measured with a five-step Likert scale in which 1 represented 'not at all', 3 the neutral evaluation, and 5 'very much'. The highest motivation was observed with regard to their family, followed by their adviser (see Table 14 in the annex). Farmers were on average relatively undecided about their motivation to comply with the opinion of the society and of other farmers. Their motivation to comply with the opinion of their adviser was slightly higher but still relatively undecided. Table 5 shows the results of multiplying the motivation to comply by farmers' evaluation about the opinions of other people concerning 'joining ELS' (normative beliefs). This was done in order to interpret farmers' evaluation about the opinions of other people concerning 'joining ELS' more correctly. From the farmers' point of view, the highest (positive) social pressure comes from their families and the lowest from other farming colleagues. All potential influencing social groups were perceived to have a positive influence on the behaviour 'joining ELS'. For HLS, the social pressure is generally slightly lower (see Table 15 in the annex). For 'other farmers' and the farm advisor, the product was 0.

Table 5: Product (NBC) of ELS normative beliefs (NB) and motivation to comply (MC)

	Median	Q1	Q3	IQR	No.
<b>ELS: Family</b>	8.0	4.0	10.0	6.0	28
<b>ELS: Other Farmers</b>	1.5	0.0	6.0	6.0	28
<b>ELS: Farm adviser</b>	5.0	0.0	8.0	8.0	28
<b>ELS: Society</b>	4.0	0.0	6.5	6.5	28
<b>ELS NBC score</b>	17.5	10.8	25.3	14.5	28

Values are calculated by multiplying corresponding figures from Table 4 and 14 according to Formula [1]. Values can range from -10 to 10. ELS NBC<sub>i</sub> score: see Formula [2], values can vary from -40 to 40. Source: own calculations

As shown in Table 6, the majority of farmers perceived that it was generally expected for them to join ELS. For HLS, many farmers had a neutral opinion in this concern (see Table 16 in the annex). On average, farmers thought that most people who were important to them appreciate their joining the ELS. For HLS, many farmers thought similarly, but also many farmers had a neutral opinion on that. All farmers stated that people whose opinions are of high value for them approve their joining the ES.

Table 6: Farmers' evaluation about social pressure concerning their 'joining ELS' (subjective norms)

	2	1	0	-1	-2	Median	Q1	Q3	IQR	No.
<b>It is expected of me that I join ELS</b> <i>2 = Extremely likely; -2 = extremely unlikely</i>	11	7	7	1	2	1.0	0.0	2.0	2.0	28
<b>Most people important to me think I</b> <i>2 = should; -2 = shouldn't join ELS</i>	9	9	9	0	1	1.0	0.0	2.0	2.0	28
<b>People whose opinions I value</b> <i>2 = approve; -2 = disapprove my joining ELS</i>	18	10	0	0	0	2.0	1.0	2.0	1.0	28

Source: own calculations

### 3.3 Control beliefs, perceived power and perceived behavioural control

Table 17 in the annex shows farmers control beliefs and their perceived power regarding 'joining ELS' and 'joining HLS'. Farmers thought that paperwork is too much for ELS and HLS. If this would become even more, it would get much more difficult for them to join ES. There was a strong consistence between the different farmers for these statements (IQR = 1.0). The prescriptions of ELS were perceived as less constrictive as those for HLS. However, farmers thought their management flexibility to be reduced in both cases. If these restrictions were to increase, farmers assumed that it would become more difficult for them to join ES. Nevertheless, farmers expect additional environmental farming obligations to come along in the future. Too many of those obligations would make it more difficult for them to join ES. On the other hand, farmers think that in general, more consideration of environmental conservation in policy would make it easier for them to join ES. The vast majority of farmers thought that the quality and quantity of environmental advice have big impact on a better understanding of ecological processes and management effects and that this in return makes it easier to join ELS and especially HLS. Farmers were relatively undecided about the future development of food prices and also about potential influence of those developments on joining the ES. Farmers

expected climate change to carry on in the future but could hardly say if this would influence them in joining ES.

Table 7 shows the results of general perceived control for the behaviour 'joining ELS' (the corresponding results for 'joining HLS are shown in Table 18 in the annex). The vast majority of farmers had the feeling that it is definitely up to them whether they join ES or not. Furthermore, they find it easy to join ELS. Regarding HLS, this judgement differed greatly, all steps from 2 to -2 were named in comparable frequencies.

Table 7: Farmers' perceived behavioural control for 'joining ELS'

	2	1	0	-1	-2	Median	Q1	Q3	IQR	No.
<b>Joining ELS is up to me</b> 2= <i>definitely</i> ; -2= <i>def. false</i>	21	3	1	1	2	2.0	1.8	2.0	0.3	28
<b>For me joining ELS is</b> 2 = <i>easy</i> ; -2 = <i>hard</i>	10	14	1	2	1	1.0	1.0	2.0	1.0	28

Source: own calculations

#### 4. DISCUSSION AND CONCLUSION

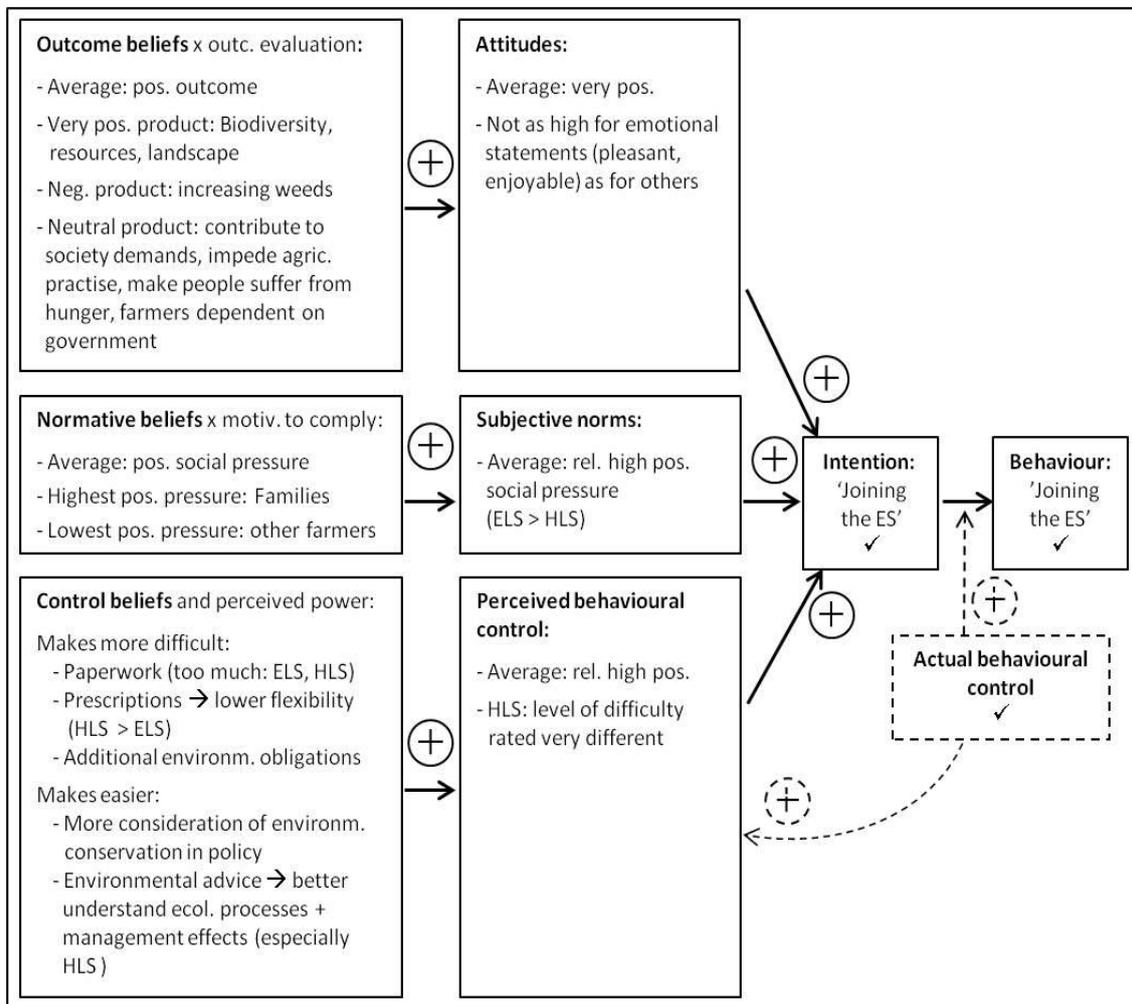
In this study, the TPB was applied not to predict a behaviour (for which it was actually developed) but to serve as construct for assessing influencing aspects on farmers' acceptance of AES, using the example of England. For this purpose, farmers who already performed the behaviour 'joining the ES' were interviewed. Many expectations based on the literature review were confirmed by the results of this study. However, unexpected results also emerged as will be discussed in the following section.

##### *Awareness, acceptance, attitudes, and perception of the aims behind AES*

As shown in Figure 2, the farmers link more positive than negative impressions with the outcome of 'joining the ES' (positive OBC score). This was more positive for HLS than for ELS. The highest OBCs were observed for the ES outcomes 'increasing biodiversity', 'conservation of natural resources', and 'enjoyable landscape'. It can therefore be assumed that the major aims of the scheme are recognized by the farmers and that they think the ES is generally achieving these targets. Regarding HLS, also the outcome 'good image of farming in society' resulted in a comparably high OBC, which can be attributed to the success and high acceptance of the 'public access' HLS-options. Nevertheless, it should be noted that also negative outcomes of 'joining the ES', i.e., 'increasing of weeds', were recognized by the farmers, which can have a negative impact on the acceptance of the scheme. Finally, the results for the items measuring farmers' actual attitude towards the behaviour 'joining the ES' were all very positive. Within these, the more emotional statements resulted in a slightly lower positive attitude. A possible explanation could eventually be that farmers perceive the material values or monetary advantages of 'joining the ES' as more positive than the emotional or ideological advantages.

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Figure 2: Summary of results of ex-post application of the Theory of Planned Behaviour regarding farmers' behaviour 'joining the ES'



Source: own compilation

***What drives farmers to join AES, what influences their intentions, and which issues might make them insecure?***

Of course, all three constructs of the TPB influence the intention of farmers to join the ES, but aim of this study was to identify single critical aspects out of these constructs. In this regard, it was found that the family is the social group which most influences the intention of a farmer. The acceptance of the family was found to be pro 'joining the ES' and therefore resulted in a high positive pressure for the farmer. Interestingly, the opinion of the other farming colleagues was judged as relatively irrelevant and also the opinion of the farm adviser was not ranked as to influence the behaviour of the farmer much. It was assumed that the farm adviser had a relatively neutral opinion whether farmers should join HLS. Hence, it is very important to include farmers' family and to work closer together with the farm advisers while promoting an HLS-option or conclude new HLS-contracts.

Regarding aspects that were perceived to have influence on the personal control of farmers to join the ES, paperwork, scheme prescriptions and environmental advice should be noted. More paperwork or more prescriptions were perceived to make farmers' 'joining the ES' much more difficult, which should be considered when a scheme is designed. The high load of paperwork was also underlined by many farmers during the interview before this question was actually asked. Aspects that were considered to make the joining of the ES easier were generally higher consideration of environmental conservation in policy in the future and good quality and quantity of environmental advice because this would lead to a better understanding of ecological processes and management effects which was assumed to be helpful, especially for joining HLS. However, ultimately, farmers perceived that it was within their control to join the ES or not and that joining ELS was relatively easy. For HLS, many different opinions regarding this concern were observed. Hence, it should be the aim for the future to make HLS more easily understandable for farmers and to ease the procedure in which the farmer is involved. Otherwise, the high complexity and difficulty could lead to a lower willingness of farmers to join HLS.

### ***Critical appraisal***

The results of this case study are based on the characteristics and behaviour of a group of farmers in 'Yorkshire and The Humber'. Since these results were gained from a non-probabilistic sample, and the sample size was relatively small, the potential for bias was relatively high. However, in order to test whether the sample actually reflects the region and to assess the potential transferability of the results, variables assumed to be relevant and for which data was available were compared to the corresponding averages of the region and for the whole of England. The mean farm size of HLS-agreement holding farms in the study area ('Yorkshire and The Humber') is 159.5 ha<sup>3</sup>, whereas the farm size median of the case study sample was 155.5 ha. The mean area of land in ES-grassland options in the sample (ELS = 16 ha; HLS = 11 ha) was relatively comparable to the region of 'Yorkshire and The Humber' (ELS = 15 ha; HLS = 14 ha<sup>3</sup>). 50% of farms in England had diversified activity in 2009/10 (Defra, 2011), compared to 41% in the case study. In 2007/08, 40% of farmers in England had a diploma in agriculture or similar and 10% of farmers had a degree in agriculture or related subjects (Defra, 2010b), compared to 50% and 9% in this case study, respectively. Since these tests resulted in comparable values, it can be presumed that the characteristics of the sample of farmers interviewed in this case study, and hence also their answers are relatively representative of the whole region and they could serve as orientation for further studies.

While interpreting the results of this study, it should, nevertheless, be noted that measuring opinions of people is a difficult task and that some unconscious opinions, personal values, or behaviour might not have been expressible by the farmers and hence not been measurable. For further studies, it could be an option to develop the questions or items on basis of a prior elicitation study in which a few number of farmers would be asked openly about their

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<sup>3</sup> own calculation on basis of data from 'Natural England', York

(TPB) beliefs. The most often stated beliefs could subsequently be listed for the questionnaire. Anyway, some given answers in this study were correlated to others, e.g., 'HLS leads to an increase in weeds' and 'HLS makes farmland look untidy', or 'Prescriptions of HLS lead to lower flexibility in farming' and 'HLS impedes/hampers good agricultural practice and food production' (data not shown). This shows the link between farmers' perceptions and the consistence of their evaluations gained in this case study.

For further research, it would be interesting to apply the TPB for farmers who are not joining the ES and subsequently compare the results in order to prove whether reasons for refusal might be in accordance with issues identified to be critical in this study.

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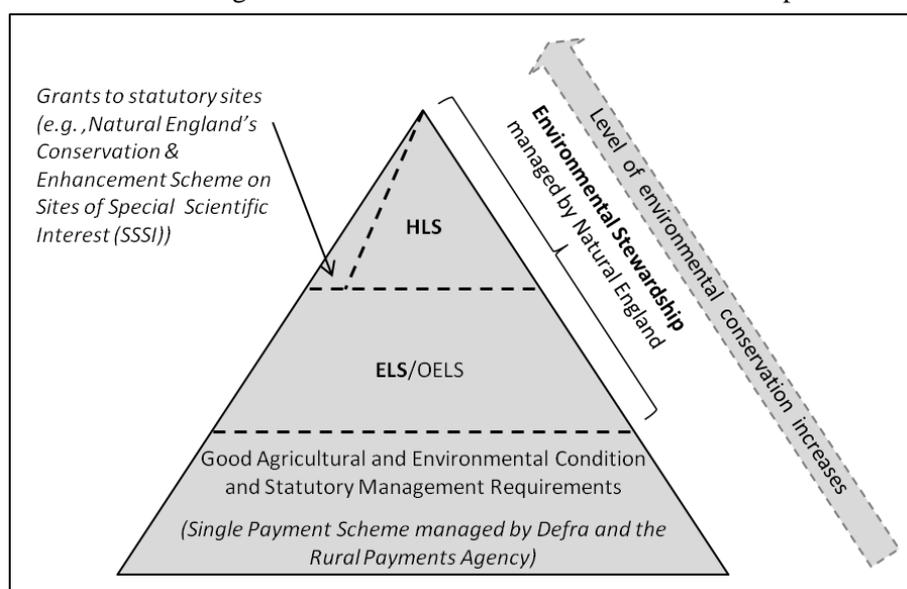
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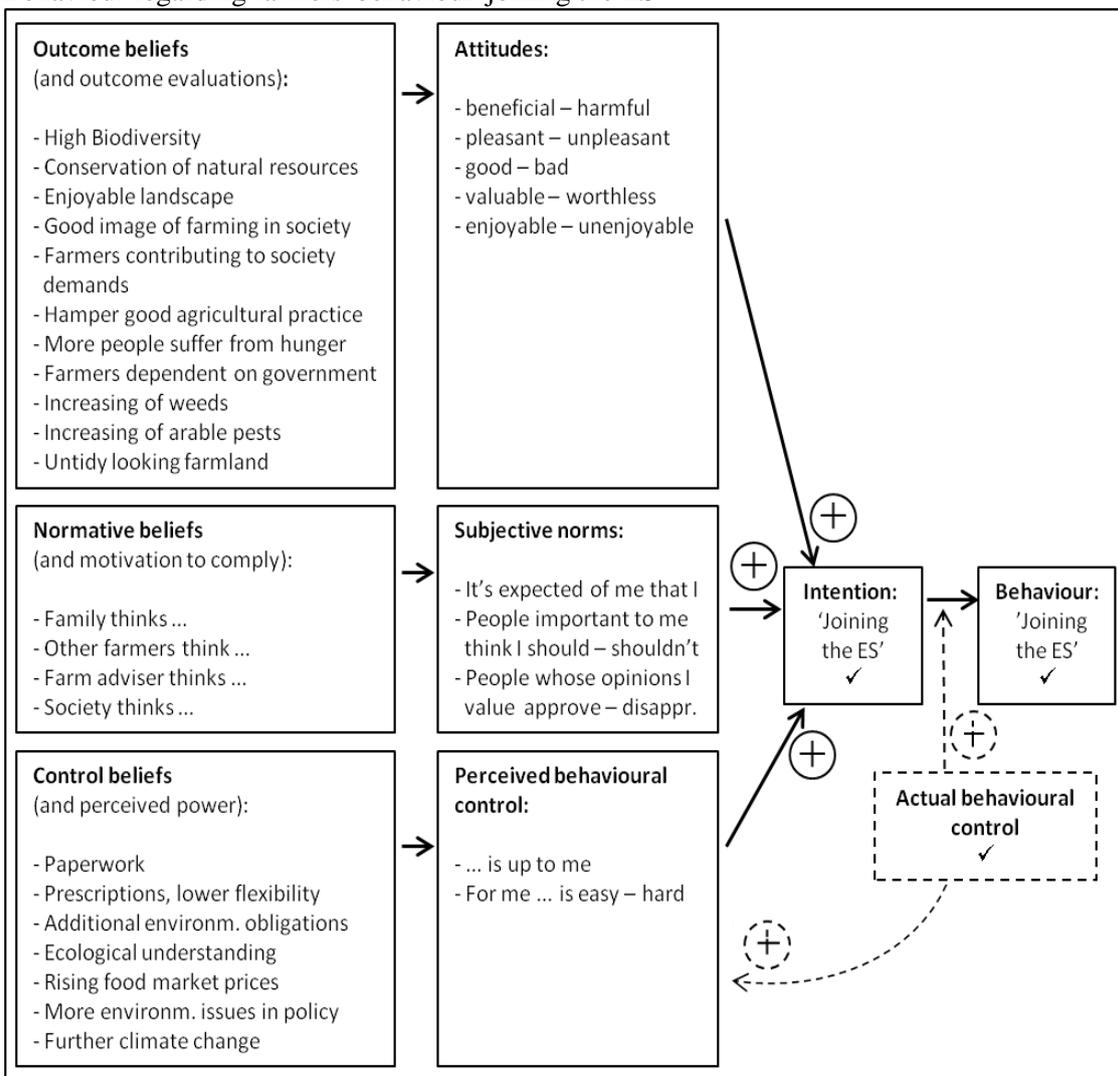
**ANNEX**

Figure 3. Structure of Environmental Stewardship



Source: own compilation according to Natural England (2010)

Figure 4. Theoretical construct for ex-post application of the Theory of Planned Behaviour regarding farmers' behaviour 'joining the ES'



Source: own compilation

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Table 7: Farmers' outcome beliefs (OB) concerning 'joining HLS'

	<b>2</b>	<b>1</b>	<b>0</b>	<b>-1</b>	<b>-2</b>	<b>Median</b>	<b>Q1</b>	<b>Q3</b>	<b>IQR</b>	<b>No.</b>
<b>HLS leads to higher Biodiversity</b>	21	5	6	0	0	2.0	1.0	2.0	1.0	32
<b>HLS conserves natural resources</b>	14	13	3	2	0	1.0	1.0	2.0	1.0	32
<b>HLS leads to a more enjoyable landscape</b>	17	8	7	0	0	2.0	1.0	2.0	1.0	32
<b>HLS gives farmers the chance to contribute to society demands</b>	12	9	9	1	1	1.0	0.0	2.0	2.0	32
<b>HLS keeps farmers dependent on the government</b>	8	9	8	4	3	1.0	0.0	1.3	1.3	32
<b>HLS makes farmland look untidy</b>	2	3	9	11	7	-1.0	-1.0	0.0	1.0	32
<b>HLS leads to increase of weeds</b>	4	9	7	7	5	0.0	-1.0	1.0	2.0	32
<b>HLS leads to increase of arable pests</b>	0	8	6	12	6	-1.0	-1.0	0.3	1.3	32
<b>HLS leads to better image of farming in society</b>	15	10	5	1	1	1.0	1.0	2.0	1.0	32
<b>HLS makes more people in the world suffer from hunger</b>	0	6	3	10	13	-1.0	-2.0	0.0	2.0	32
<b>HLS impedes/hampers good agricultural practice and food production</b>	0	5	10	10	7	-1.0	-1.0	0.0	1.0	32

2 = totally agree; -2 = totally disagree. Source: own calculations

Table 8: Farmers' outcome evaluations (OE)

	<b>2</b>	<b>1</b>	<b>0</b>	<b>-1</b>	<b>-2</b>	<b>Median</b>	<b>Q1</b>	<b>Q3</b>	<b>IQR</b>	<b>No.</b>
<b>High Biodiversity is</b>	16	11	5	0	0	1.5	1.0	2.0	1.0	32
<b>Conservation of natural resources is</b>	21	8	3	0	0	2.0	1.0	2.0	1.0	32
<b>An enjoyable landscape is</b>	22	10	0	0	0	2.0	1.0	2.0	1.0	32
<b>A good image of farming in society is</b>	23	6	3	0	0	2.0	1.0	2.0	1.0	32
<b>Farmers contributing to society demands is</b>	14	12	6	0	0	1.0	1.0	2.0	1.0	32
<b>Impede/hamper good agricultural practice and food production is</b>	1	0	12	14	5	-1.0	-1.0	0.0	1.0	32
<b>Making more people in the world suffer from hunger is</b>	0	0	3	8	21	-2.0	-2.0	-1.0	1.0	32
<b>Keeping famers dependent on the government is</b>	0	0	10	10	12	-1.0	-2.0	0.0	2.0	32
<b>Increasing of weeds is</b>	1	0	7	9	15	-1.0	-2.0	-0.8	1.3	32
<b>Increasing of arable pests is</b>	0	0	4	14	14	-1.0	-2.0	-1.0	1.0	32
<b>Untidy looking farmland is</b>	1	1	4	12	14	-1.0	-2.0	-1.0	1.0	32

Source: own calculations

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Table 9: Product (OBC) of HLS outcome beliefs (OB) and outcome evaluation (OE)

	4	2	1	0	-1	-2	-4	Median	Q1	Q3	IQR	No.
<b>High Biodiversity</b>	14	8	2	8	0	0	0	2.0	0.8	4.0	3.3	32
<b>Conservation of natural resources</b>	8	14	2	6	0	2	0	2.0	0.8	2.5	1.8	32
<b>An enjoyable landscape</b>	13	8	4	7	0	0	0	2.0	1.0	4.0	3.0	32
<b>A good image of farming in society</b>	11	7	1	11	0	2	0	2.0	0.0	4.0	4.0	32
<b>Farmers contributing to society demands</b>	5	4	6	11	1	4	1	0.0	0.0	2.0	2.0	32
<b>Impede/hamper good agricultural practice and food production</b>	1	6	3	19	0	3	0	0.0	0.0	1.0	1.0	32
<b>Making more people in the world suffer from hunger</b>	5	3	3	9	4	5	3	0.0	-1.3	1.3	2.5	32
<b>Keeping famers dependent on the government</b>	2	5	5	14	1	5	0	0.0	0.0	1.0	1.0	32
<b>Increasing of weeds</b>	2	0	0	12	4	9	5	-1.0	-2.0	0.0	2.0	32
<b>Increasing of arable pests</b>	7	7	6	7	3	2	0	1.0	0.0	2.0	2.0	32
<b>Untidy looking farmland</b>	3	6	6	12	0	5	0	0.0	0.0	2.0	2.0	32
<b>HLS OBC score</b> (Max = 44; Min = -44)								11.5	4.0	15.0	11.0	

Values are calculated by multiplying corresponding figures from table 9 and 10 according to Formula [1]. Values can range from -4 to 4. HLS OBC<sub>i</sub> score: see Formula [2], values can vary from -44 to 44. Source: own calculations

Table 10 Farmers' attitudes towards 'joining HLS'

	2	1	0	-1	-2	Median	Mode	Q1	Q3	IQR	No.
<b>Joining HLS is 2 = beneficial; -2 = harmful</b>	19	8	5	0	0	1.0	1	1.0	2.0	1.0	32
<b>Joining HLS is 2 = pleasant; -2 = unpleasant</b>	15	12	4	1	0	2.0	1	1.0	2.0	1.0	32
<b>Joining HLS is 2 = good; -2 = bad</b>	17	11	4	0	0	1.0	1	1.0	2.0	1.0	32
<b>Joining HLS is 2 = valuable; -2 = worthless</b>	19	9	2	2	0	1.0	1	1.0	2.0	1.0	32
<b>Joining HLS 2 = enjoyable; -2 = unenjoyable</b>	12	16	3	0	1	2.0	2	1.0	2.0	1.0	32

Source: own calculations

Table 11: Farmers' normative beliefs (NB) regarding 'joining HLS'

	2	1	0	-1	-2	Median	Q1	Q3	IQR	No.
<b>HLS: Family thinks should/shouldn't join</b>	23	2	5	2	0	1.0	1.0	2.0	1.0	32
<b>HLS: Other farmers think should/shouldn't join</b>	6	4	17	4	1	3.0	2.0	3.0	1.0	32
<b>HLS: Farm adviser thinks should/shouldn't join</b>	11	3	12	4	2	3.0	1.0	3.0	2.0	32
<b>HLS: Society thinks should/shouldn't join</b>	15	4	11	2	0	2.0	1.0	3.0	2.0	32

2 = I should; -2 = I shouldn't. Source: own calculations

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Table 12: Farmers' motivation to comply (MC) with opinions of others

	5	4	3	2	1	Median	Q1	Q3	IQR	No.
<b>Want to do what family thinks</b>	10	15	3	3	1	4.0	4.0	5.0	1.0	32
<b>Want to do what other Farmers think</b>	1	8	14	5	4	3.0	2.0	4.0	2.0	32
<b>Want to do what farm adviser thinks</b>	5	11	11	3	2	3.5	3.0	4.0	1.0	32
<b>Want to do what society thinks</b>	2	8	19	1	2	3.0	3.0	4.0	1.0	32

5 = very much; 1 = not at all. Source: own calculations

Table 13: Product (NBC) of HLS normative beliefs (NB) and motivation to comply (MC)

	Median	Q1	Q3	IQR	No.
<b>HLS: Family</b>	8.0	2.8	10.0	7.3	32
<b>HLS: Other Farmers</b>	0.0	0.0	3.3	3.3	32
<b>HLS: Farm adviser</b>	0.0	0.0	8.0	8.0	32
<b>HLS: Society</b>	3.5	0.0	6.5	6.5	32
<b>HLS NBC score</b>	11.5	4.0	22.5	18.5	32

Values are calculated by multiplying corresponding figures from table 13 and 14 according to Formula [1]. Values can range from -10 to 10. HLS NBC<sub>i</sub> score: can vary from -40 to 40. Source: own calculations

Table 14: Farmers' evaluation about social pressure concerning their 'joining HLS' (subjective norms)

	2	1	0	-1	-2	Median	Q1	Q3	IQR	No.
<b>It is expected of me that I join HLS</b> <i>2 = Extremely likely; -2 = extremely unlikely</i>	6	4	12	6	4	0.0	-1.0	1.0	2.0	32
<b>Most people important to me think I should; -2 = shouldn't join HLS</b>	9	8	13	2	0	1.0	0.0	2.0	2.0	32
<b>People whose opinions I value</b> <i>2 = approve; -2 = disapprove my joining HLS</i>	20	9	2	0	1	2.0	1.0	2.0	1.0	32

Source: own calculations

Table 15/1: Farmers' control beliefs (CB) for 'joining ELS/ES' and perceived power (PP)

	2	1	0	-1	-2	Median	Q1	Q3	IQR	No.
<b>Paperwork is too much for ELS</b> <i>2 = strongly agree; -2 = strongly disagree</i>	4	11	7	3	3	1.0	0.0	1.0	1.0	28
<b>Paperwork is too much for HLS</b> <i>2 = strongly agree; -2 = strongly disagree</i>	6	13	8	3	2	1.0	0.0	1.0	1.0	32
<b>More paperwork would make it easier/difficult join ELS</b> <i>2 = much easier; -2 = much more difficult</i>	0	2	4	2	20	-2.0	-2.0	-1.0	1.0	28
<b>More paperwork would make it easier/difficult join HLS</b> <i>2 = much easier; -2 = much more difficult</i>	1	0	5	5	21	-2.0	-2.0	-1.0	1.0	32
<b>Prescriptions of ELS lead to lower flexibility in farming</b> <i>2 = strongly agree; -2 = strongly disagree</i>	1	10	7	5	5	0.0	-1.0	1.0	2.0	28
<b>Prescriptions of HLS lead to lower flexibility in farming</b> <i>2 = strongly agree; -2 = strongly disagree</i>	3	14	4	7	4	1.0	-1.0	1.0	2.0	32
<b>Lower farming flexibility would make it easier/difficult join ELS</b> <i>2 = much easier; -2 = much more difficult</i>	0	1	9	15	3	-1.0	-1.0	0.0	1.0	28
<b>Lower farming flexibility would make it easier/difficult join HLS</b> <i>2 = much easier; -2 = much more difficult</i>	1	1	10	14	6	-1.0	-1.0	0.0	1.0	32

Source: own calculations

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Table 15/2: Farmers' control beliefs (CB) for 'joining ELS/ES' and perceived power (PP)

	2	1	0	-1	-2	Median	Q1	Q3	IQR	No.
<b>Expect additional environmental farming obligations for future</b> 2 = strongly agree; -2 = strongly disagree	9	16	5	1	1	1.0	1.0	2.0	1.0	32
<b>Too many environmental farming obligations would make it easier/difficult join ELS</b> 2 = much easier; -2 = much more difficult	1	1	7	12	7	-1.0	-1.3	0.0	1.3	28
<b>Too many environmental farming obligations would make it easier/difficult join HLS</b> 2 = much easier; -2 = much more difficult	1	4	8	11	8	-1.0	-1.3	0.0	1.3	32
<b>Quality &amp; quantity of environm. advice have big impact on better understanding of ecol. processes &amp; management effects</b> 2 = strongly agree; -2 = strongly disagree	16	11	5	0	0	1.5	1.0	2.0	1.0	32
<b>Better ecol. understanding &amp; management effects make it easier/difficult join ELS</b> 2 = much easier; -2 = much more difficult	6	14	7	1	0	1.0	0.0	1.0	1.0	28
<b>Better ecol. understanding &amp; management effects make it easier/difficult join HLS</b> 2 = much easier; -2 = much more difficult	8	18	5	1	0	1.0	1.0	1.3	0.3	32
<b>Expect food market prices to rise in next few years</b> 2 = strongly agree; -2 = strongly disagree	6	7	13	4	2	0.0	0.0	1.0	1.0	32
<b>Rising food market prices make it easier/more difficult join ES</b> 2 = much easier; -2 = much more difficult	2	5	12	8	4	0.0	-1.0	0.3	1.3	32
<b>Expect environm. policy consider more environm. conservation in future</b> 2 = strongly agree; -2 = strongly disagree	10	14	8	0	0	1.0	0.8	2.0	1.3	32
<b>Higher consideration of environm. conservation in policy would make it easier/more difficult join ES</b> 2 = much easier; -2 = much more difficult	4	11	11	6	0	0.0	0.0	1.0	1.0	32
<b>Expect climate change will carry on</b> 2 = strongly agree; -2 = strongly disagree	8	11	8	4	1	1.0	0.0	1.3	1.3	32
<b>Further climate change make it easier/difficult join ES</b> 2 = much easier; -2 = much more difficult	0	9	19	4	0	0.0	0.0	1.0	1.0	32

Source: own calculations

Table 16: Farmers' perceived behavioural control for 'joining HLS'

	2	1	0	-1	-2	Median	Q1	Q3	IQR	No.
<b>Joining HLS is up to me</b> 2= <i>definitely</i> ; -2= <i>definitely false</i>	23	4	3	1	1	2.0	1.0	2.0	1.0	32
<b>For me joining HLS is</b> 2 = <i>easy</i> ; -2 = <i>hard</i>	8	8	5	5	6	0.5	-1.0	1.3	2.3	32

Source: own calculations