Hum Ecol (2014) 42:951–963
DOI 10.1007/s10745-014-9701-5

Identifying the Factors That Influence Farmer Participation in Environmental Management Practices in Switzerland

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Published online: 17 September 2014

Abstract This paper identifies the factors that either constrain or facilitate farmer decisions to participate in environmental management practices in Switzerland. Semi-structured interviews were used to explore participation in agro-environmental schemes (AES) and the application of organic farming (OF) in the north of Switzerland. Seventeen factors were found to influence farmer decisions to participate in environmental management practices, demonstrating that their decisions were not solely driven by economic incentives. Social and political factors, household and individual profile characteristics as well as concern for the natural environment were all shown to affect the way in which farmers made decisions, but financial considerations remained important, suggesting that environmental participation resulted mainly from the need to adapt to recent agricultural policy reforms with associated subsidies. Although policy was shown to encourage environmentally-friendly farm management and the achievement of ecological benefits, there is no evidence to suggest that this reflects a long-term shift in 'green' farmer attitudes rather than short-term opportunism.

Keywords Farmers · Decision-making · Agro-environmental schemes · Organic farming · In-depth interviews · Switzerland

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Introduction

Swiss agricultural policy (SAP) has traditionally aimed to maintain both farm-income and self-sufficiency in food production (Curry and Stucki 1997). By the early 1990s, the dominance of production-led subsidies and the resulting intensive farming practices led to food surpluses and high production costs (Curry and Stucki 1997), and public concern about the environmental impact of agriculture. In response, the Swiss Federal Office for Agriculture (FOAG) proposed a shift in the objectives of the SAP to restructure the agricultural sector around a multi-functional model (Cretegny 2001) that emphasised the importance of agro-ecosystems in providing services in addition to food production whilst ensuring competitiveness of the agricultural sector and viability of farms.

Swiss cross-compliance is now one of the strictest agricultural regulatory mechanisms in the world (Mann 2005a). Direct payments (DP) are calculated based on farm area and/or livestock units. Further subsidies are available to farms with physical limitations (e.g., mountainous areas) and those that adopt management practices with high ecological benefits (e.g., organic farming). All payments are conditional on proof of compliance. Thus support is provided only when certain farm management requirements are met, for example, at least 7 % of the farm as an ecological compensation area, crop rotations with a minimum of four different elements, soil cover at certain reference dates, application of permitted pesticides, nutrient balances and others (Bötsch 2005; Mann 2005b). Additional eligibility criteria relate to farmer profiles, e.g., age, residency, education, training, with DP being reduced or even ceased in the event that these criteria are not met.

Although studies in the European Union (van der Ploeg *et al.* 2009; Espinosa-Goded *et al.* 2010) and other parts of the world (Kiptop *et al.* 2007) report that farmers are reluctant to commit themselves to environmentally responsible management plans, 90 % of Swiss farmers have met the requirements listed in the "Order of Direct Payments" (Mann 2005a) by

certifying their farms as integrated production (IP) systems. Moreover, 11 % of Switzerland's utilised agricultural area is now farmed organically (FOEN/FSO 2009).

Knowledge about the factors that influence farmer decisions is important (Duram 2000; Macé *et al.* 2007), especially in understanding how farmers adapt to changes in agricultural policy (Long and van der Ploeg 1994 cited by Darnhofer *et al.* 2005). A large body of literature exists about farmer decisions and farm management, e.g., diversification of cropping systems (Corselius *et al.* 2003), participation in agro-environmental schemes (Wilson 1997; Wilson and Hart 2000; Damianos and Giannakopoulos 2002; Herzon and Mikk 2007), application of organic farming (Dimara and Skuras 2003; Darnhofer *et al.* 2005) and conservation practices (Sattler and Nagel 2010; Jara-Rojas *et al.* 2012), and adoption of farm technologies (Aramyan *et al.* 2007; Noltze *et al.* 2012; Mariano *et al.* 2012). These studies have identified numerous factors that influence decisions including farmer age, education, perceptions, farm size, and access to information. Conclusions about how these factors affect decision-making are, however, often contradictory (Wilson and Hart 2000; Defrancesco *et al.* 2008), suggesting that generalising knowledge about farmer decisions among different regions might be limited and highlighting the importance of acquiring context-specific information, particularly in support of policy goals.

This paper contributes to this debate by identifying the economic and non-economic factors that form the basis for farmer participation in environmental management practices (agro-environmental schemes and organic farming) in a study area in Switzerland.[1] In contrast to extensively researched case studies in the EU, only a limited number of studies have explored farmer decision-making in Switzerland (Wilson and Hart 2000; Schenk *et al.* 2007; Karali *et al.* 2013; Celio *et al.* 2014). Hence, these findings are useful in comparing the factors that influence farmer decisions in Switzerland with other European countries, as well as in identifying whether the strict Swiss cross-compliance policy is a model to be imitated elsewhere. As a secondary aim, We explore the question of whether the wide acceptance of the SAP reforms indicate a shift in farmer attitudes toward environmental management or an opportunistic response to "green" incentives, as seen in other regions (Wilson 2001).

The study is based on in-depth, semi-structured interviews with 24 farmers, which were analysed thematically; an inductive approach allowing themes to emerge from the data without a priori knowledge of causal relationships. The paper identifies 17 factors influencing farmer decisions, which are grouped into six thematic categories: economy, society, policy, environment, household characteristics and farmer characteristics. The analysis also led to policy recommendations to facilitate farmer participation in environmental management practices.

[1] Participation in environmental management practices is defined here as participation in specific policy measures rather than the adoption of particular land management practices.

Study Area

The study area, located in the Canton of Aargau, in the northern part of Switzerland, covers 99 km^2, which extend from the more rugged first Jura chain, across the river Aare, to the Swiss plateau in the South. Forests account for 44 % of the total land area with 21 % occupied by the built environment (all figures from Swiss Statistics, www.bfs.admin.ch). The remaining 35 % is used for agriculture including dairy, meat production, wheat, maize, sugar beet, rape, vegetables, orchards and vineyards. As in other parts of Switzerland, agriculture in the region is highly mechanised because of the high cost of labour (Karali *et al.* 2013). Nearly all machinery is privately owned with little sub-contracting (Fig. 1).

During the period 1980–2009, the area of arable land and permanent cultivation, such as vineyards and orchards, decreased by 15 % and 42 % respectively, whereas the area of meadows and pastures increased by 2 %. During the same period, the total agricultural land area decreased by 4 %, primarily due to urbanization (e.g., new housing, industry and transportation infrastructure). At present, more than half the agricultural land is used for meadows and pastures (65 %) and almost one third is arable (33 %). A very small proportion of the area is used for permanent cultivation and other agricultural activities (2 %).

Since the agricultural policy reform in 1996, the number of conventional farms decreased by 26 % (to 2009), while organic farms increased by 78 % over the same period, representing respectively 91 % and 9 % of the current farms in the study area. Furthermore, land consolidation resulting in farm size increases has also taken place with the total number of farms decreasing by around 23 %.

Methodological and Analytical Approach

The study is based on a qualitative, thematic analysis of in-depth, semi-structured interviews. The approach was chosen for its potential in supporting an open, conversational exchange of information, allowing for the exploration of emergent themes (Sarantakos 2005). The use of guidelines in the interviews maintained focus, ensured consistency, limited human bias and increased the comparability of the collected data. As the majority of the interview questions were open-ended, the use of guidelines neither prevented respondents from expressing their own opinions nor directed them towards predefined choices. In common with other interview methods, the main problem of this approach is the potential difference between what people say they do and what they actually do in practice.

The approach used in this study draws on the principles of "Grounded Theory" (Glaser and Strauss 1967). Grounded

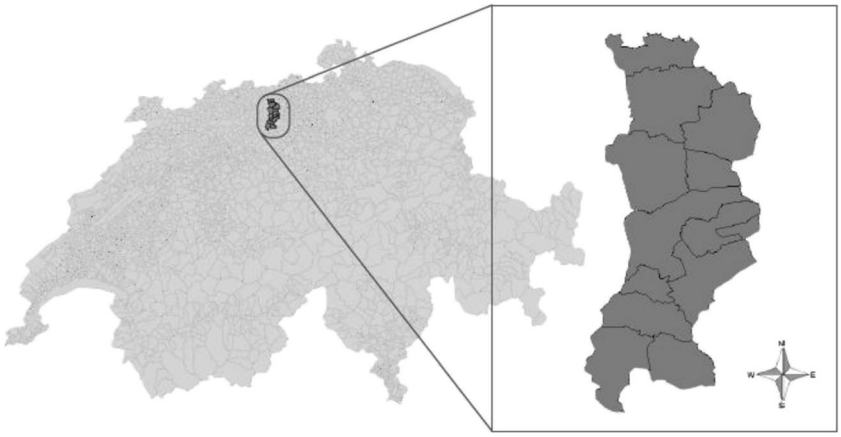

Fig. 1 Map showing the location of the study area

theory describes the inductive development of theories, rather than the testing of hypotheses. The inductive process begins from observation of specific cases and leads to the construction of general concepts, upon which theories are built (Scott and Marshall 2004; Hodkinson 2008). Factors and themes were identified through a three-step coding process. In the first phase (open coding) all interview texts were scanned in order to identify possible "first order" concepts (Sarantakos 2005). Interviews and coding of information were conducted in parallel. The end of the procedure is reached when all interview texts are scanned. The second phase (axial coding) aims to "pull the data together" (Sarantakos 2005). Statements referring to a common concept were grouped together to form factors. This is a dynamic procedure since the identified factors change as new, often relevant, "first order" concepts emerge. A similar approach was followed in the third phase (selective coding). General categories (henceforth called "themes") were identified to cluster relevant factors. In addition to the thematic analysis, basic quantitative methods were also used for the description of the sample and the farm characteristics.

A basic assumption of grounded theory is that the researcher has no prior knowledge of the research topic. In many cases, however, this is unrealistic (Schenk *et al.* 2007), meaning that many studies, including this one, are not inductive in the purest sense.

Data Collection

All 24 interviews were conducted in situ, by the same interviewer, in the local dialect. The familiar environment helped in establishing a feeling of mutual trust between the farmers and the interviewer, which facilitated discussion. Interviews commenced with a detailed mapping of the respondents' farming background, focusing on where, when and why they had decided to become involved in farming. Questions were then grouped into three parts: part I included questions about past and present farm status; part II focused on farmer decisions regarding participation in environmental policy measures: agro-environmental schemes (AES) and the application of organic farming (OF); and part III elicited a description of farmer socioeconomic profiles. Topographic variability in the study area is known to determine farm practice and so farm location was recorded. Farming system was also taken into account in order to explore whether this influences farmer decisions (Brodt *et al.* 2006). A ranking question was included in the questionnaire, in which respondents were asked to place profit, society, environment and tradition in order of importance in terms of influence on their decisions.

Sampling Method

In order to capture the maximum variation in opinions (Busck 2002; Davies and Hodge 2006; Schenk *et al.* 2007; Soliva 2007), respondents were selected using a theoretical sampling method from a purposeful sample (Macé *et al.* 2007), including available contacts of farmers from all municipalities in the study area. In line with the principles of grounded theory, the absence of new information signified the end of the interview process.

Ethical Considerations

The study followed guidelines for ethical research. Respondents were informed in advance of their participation in the survey about the nature and the aims of the study, the way the data would be used, the person responsible for it, and their benefits and rights as respondents. Confidentiality and anonymity of respondents were maintained at all stages.

Results and Discussion

The sample was dominated by male farmers. In many cases, the wives of the respondents were also present during the interviews, but in spite of being encouraged to participate in the discussion, they rarely did so. All of the respondents lived and worked in the study area. Their ages ranged from 35 to

65 years, with the upper age limit being determined by the cross-compliance requirement that registered farm managers must be less than 65 years old to be eligible for DP. The survey showed that 17 farmers owned their farms, three were co-owners and four were tenants, and that for 19, farming was the primary occupation. The majority of respondents came from a farming family, which is characteristic of Switzerland (Mann 2007). Many respondents had inherited farms from their parents. In some cases the parents still lived on the farm and actively participated in farm-management decisions, in spite of being officially retired. This often happens for practical reasons, such as the farm being the place of residence, especially for older farmers (Miljkovic 1999), or emotional or cultural reasons, such as the confidence that farmers feel when they maintain the farm ownership, their attachment to farming and/or the land or the symbolic role of the farm (Miljkovic 1999). Salamon *et al.* (1986) refer to the 'father-son operation' as a major mechanism for intergenerational succession. The transfer of managerial control and assets is not always an immediate process and usually passes through several phases, described by Errington (2002), citing Gasson and Errington (1993), as inheritance; the legal transfer of ownership, succession; the transfer of management and retirement; the transfer of active control, while Salamon *et al.* (1986) described these phases as testing, midway and takeover.

Haugen (1998), cited in Villa (Villa 1999:328), suggested that expectations regarding the roles of family members affect their behaviour and decisions, and in many cases this results in the "collective having precedence over the individual." This feeling of duty or obligation for young farmers, especially the males, to continue the family farming history, in conjunction with identity-related factors and other cultural factors (Emery and Franks 2012) such as autonomy, joy of working in nature and connection with the land, greatly influenced most respondents' occupational choice.[2]

The average size of farm holdings managed by respondents (24.4 ha, st.dev.=12.3 ha) was significantly higher than the Swiss national average of 16 ha (Mann 2005b; FOAG 2006). This difference might reflect the effects on farm size of regional variations in biophysical and topographical characteristics, but it might also indicate that farm structural changes are occurring at different rates across Switzerland (Mann 2007).

In terms of farming systems and practices, 29 % of the sample was involved in OF, which was higher than the percentage of organic farms present in the study area. It is expected that the proportion of the farming systems in the sample would have been closer to that of the case study if conventional farms had been included in the former. All respondents had joined the proof of ecological compliance, participating in a range of AES including meadow land, fruit trees, wooded river banks, field margins, hedges, copses, flowery meadows and rotational fallow. Each of these schemes has an associated and distinct set of requirements and restrictions, including, for example, the use of land prior to the application of the AES, the type, the amount and the dates of fertiliser and herbicide applications, the time and the frequency of mowing or grazing (if applicable), the structural characteristics of elements involved in certain schemes (e.g., the width of grassland buffer zones, such as extensive meadows and litter areas, to reduce residues by drift (i.e., nutrients) and to increase areas close to a natural state), and the duration of the schemes. The share of the farm that participants allocated to AES varied significantly from 7 %, the minimum required by law, to 67 %. However, farmers were observed to allocate more small parcels of land to AES (median=15 %). Similar findings in other studies have been interpreted as a sign of opportunistic behaviour, as farmers often allocate the minimum area that is required under policy guidelines to AES, and intensively manage the remainder (Herzog *et al.* 2005). Nevertheless, this could also suggest the adoption of a diversification strategy, an interpretation supported by 83 % of respondents who reported being involved in more than one farming activity (i.e., both crop and livestock activities). Moreover, results suggest that non-agricultural activities were well-established in farm management plans, as 63 % of respondents were involved in some form of direct marketing (e.g., a farm shop) and 8 % had on-farm sporting activities (e.g., horse riding).

Influential Factors

A wide range of factors influence farmer decisions to participate in AES or OF. In this section we discuss these factors in thematic categories, which reflect their common attributes (Table 1).

Theme 1: Economy

Financial Incentives The majority of farmers who certified their farms as IP systems indicated that their participation in AES was largely dependent on DP. This was not surprising since producer support in Switzerland accounts, on average, for 58 % of farmer income (OECD 2010). Evidence showing that DP exceeds the implementation costs of AES (Mann 2003) supports our hypothesis that farmer participation in these activities is driven primarily by financial rather than environmental incentives.

Two of the IP farmer responses represented a "higher yield, higher income" attitude, which explained why they decided not to apply OF. This is consistent with other studies that

[2] Two respondents initially viewed farming as a hobby rather than as a source of income. Burton and Wilson (1999) suggested that farmers with a non-farming background are more likely to apply non-productivist practices and should not be overlooked in studies of farmer decisions.

Table 1 Thematic classification of the factors influencing farmer decisions to participate in environmental policy measures in the study area

Themes	Factors
Economy	Financial incentives Non-farming income Farm size
Society	Customer preferences Social image
Policy	AES and OF characteristics AES and OF delivery Contract duration and guidelines Application process and control
Environment	Climate and biophysical characteristics
Household characteristics	Workforce Family cycle
Farmer characteristics	Health Lifestyle Risk aversion Environmental attitudes and perceptions Tenure-ownership status

concluded that farmers still favour traditional production despite the greening of agricultural policies (Wilson and Hart 2000; Burton *et al*. 2008). It could be argued that this arises from incentives and subsidies still being linked to productivity as they are calculated from farm area and/or livestock units, but also may be accounted for by the symbolism associated with production activities for many farmers who perceive them as "good farming" (Burton 2004; Burton *et al.* 2008).

Financial considerations were also identified by respondents who applied an OF system who referred to the necessity of subsidies to cover the cost of numerous controls and income loss arising from the restrictions it entailed. Many indicated that they would abandon OF if subsidies ceased: "If the level of payment is kept the same or increases, I will continue. Otherwise, I would have to stop immediately" [F.5] (cf. Offermann *et al.* 2009).

Although no test was performed to investigate if there is a statistically significant relationship between farm size and farming system, descriptive statistics show that the average size of the organic farms was smaller than non-organic farms within our study sample, while overall organic farms tended to be small-medium sized.

Non-Farming Income

Farmer descriptions of their activities illustrated a high level of both on- and off-farm diversification. Although on-farm diversification was expected, since historically farmers have engaged in a range of activities to meet household needs, its expansion off-farm is more recent, resulting from the influence of nearby urban centres as well as the availability of related part-time jobs in sectors such as gardening, construction, transport, fodder and fertiliser commerce, either for the whole year or seasonally. Farmer responses suggest that household dependence on off-farm income strongly influences land-use decisions and in some cases even their future in farming: "Provided that we still get good wages from the restaurant and my job as a fertiliser-consultant, we will be able to keep farming" [F.2]. This was especially evident when deciding about OF, which increases on-farm working hours and thus limits time available for off-farm activities.

In spite of the contradiction between diversification into non-farming activities and what farmers have traditionally described as a "real farmer" identity (Burton and Wilson 2006; Brandth and Haugen 2011), participants' responses agree with other studies describing the allocation of available resources and capital to on- and off-farm activities (Gorton *et al.* 2008) as affected by often uncertain income from agricultural activities and the recent decoupling of subsidies from production levels.

Farm Size

Participants often indicated farm size to be important especially with respect to farm income when applying OF. For small farms, they considered OF to produce insufficient yield levels to allow a cost-efficient distribution of expenses. Similarly, managers of large farms indicated that OF would not be cost effective as it requires a larger workforce (see also Wilson 1997; Damianos and Giannakopoulos 2002).

Theme 2: Society

Customer Preferences Participants' responses indicated that direct marketing was well-embedded in the majority of farm management plans. Many respondents stated that they had to be proactive in responding to customer preferences and this led to modifications in farm management, such as switching to IP or OF (e.g., "Consumers pushed us to go towards organic farming" [F.4]).[3] Farmers also indicated that the food industry required them to meet specific standards, relating not only to the nutritional value of produce, but also to its appearance.

[3] This is likely the result of the nutritional value of food becoming a key issue for some consumers (Grunert 2005), with some making food choices on the basis of environmental and food safety concerns. Contrasting evidence has been reported, however, where consumers were found to recognise conventionally produced food as "good enough" (Storstad 2001 as cited in Storstad and Bjørkhaug 2003), and also that the development and success of hard-discount in Europe has driven customers towards low price food despite the lower quality (Colla 2003).

Social Image

Direct marketing is a source of farm income, but respondents also indicated that the close customer-producer relationship was an enjoyable part of the job. Many farmers referred to the significance of "having satisfied customers" [F.14], and "being esteemed and trusted" [F.10], implying that potential changes on their farms were driven by customer expectations and the goal of achieving social recognition. Furthermore, social values, explained as "what my family and my community think is a good decision," were ranked as the most important, followed by profit, environment and tradition. Other studies have reported the importance that farmers attach to social acceptance, observing that farmers often apply environmentally-friendly practices without being aware of their ecological benefits to meet social expectations and thus to improve their image (Michel-Guillou and Moser 2006; Atari *et al.* 2009), or to be in accord with the practices of their neighbours.

Theme 3: Policy

AES and OF Characteristics The majority of respondents stressed that the extent of changes required on their farms to meet the requirements of AES and OF affected on their decision to adopt them (see Wilson and Hart 2000): "There was no need to make any changes on farm in order to meet the requirements of the schemes. AES matched more or less with the system in use at that time" [F.2]; "I have always been applying very extensive and low levels of manure and no fertilisers. So, in our case organic farming did not change much" [F.11].

Conversely, farmers who did not apply OF, although in some cases they acknowledged the direct and complimentary benefits of this farming system, indicated that the high degree of specialisation of OF would make interdependent activities (i.e., the cultivation of organic fodder to meet the livestock demands) incompatible (see Busck 2002): [4] "Organic farming has advantages but in my case it doesn't pay off. Plus I would have to change the whole management of my farm" [F.21]; "Organic farming is good for the animals, but I can't produce the amount of fodder that I need for the pigs" [F.3].

AES and OF Delivery

The respondents in this study were satisfied overall with the information available to them, but they identified some problems. Reference was made to being "bombarded" with large amounts of complex information that was difficult to understand and evaluate. The difficulty of translating science into practice created confusion and caused reluctance to trust and use this information: "I want to be able to come to a conclusion swiftly without too much studying and consulting" [F.21]; "Sometimes information is even too (!) much to keep track of it" [F.6].

Respondents also highlighted the importance of the format of available information. For example, the use of the internet and computers is not yet widespread in all farming communities. Many respondents were aware of information sources on the internet, but were unwilling and in many cases unable to access them: "We are too old to start learning how to use computer and internet" [F.16];"There are means [referring to electronic information, use of PC] to get the information but I don't know how to use them" [F.11] (see also Wilson and Hart 2000; Præstholm *et al.* 2006; Schenk *et al.* 2007).

Other respondents underlined the importance of information being synchronised with annual farm-management plans, since they require sufficient time to evaluate available options and to prepare for potential changes: "There is plenty of information. The problem is that courses at agricultural schools are relatively expensive and often organised at the wrong time" [F.17].

There were no clear trends regarding the efficiency of farmer social networks in disseminating information. Proximity of farmers to their social network to a great extent determined the level of information exchange as well as the expectations that farmers had from their network, and likely accounts for the observed difference in opinions. For example, some farmers sought only basic information concerning management practices or machinery, while others looked for more specialised advice. Extension officers and agricultural schools were mentioned as the main sources of information, while advisors in the private sector were to be contacted for specialist advice. Many respondents stated that they were willing to undergo training, i.e., attend courses, in order to gain additional knowledge. However, one-to-one delivery of information was still cited as the preferred approach (see Mattison and Norris 2007 for a similar result in the UK). This is because short channels based on personal relationships can create an environment of trust, but also because of the high cost of training courses. Overall, these outcomes agree with other studies that highlight the importance of farmer networks (Acosta-Michlik and Espaldon 2008) and their positive influence on the decrease of transactional costs related to participation in AES (Falconer 2000).

Contract Duration and Guidelines

The long duration of AES contracts, ongoing changes in their legal framework and the lack of clear guidelines were reported as fundamental reasons discouraging farmers from participation. Budget restrictions in the FOAG at the time of

[4] Mattison and Norris (2007), for example, found that one of the main concerns of farmers about biofuel production was its fit to their management plan.

introducing AES resulted in a decrease in the amount of money available for DP. Although, this reduction was not directly applied to farmer support, the FOAG increased the cross-compliance requirements, without providing additional financial support in order to fulfil the SAP aims. The uncertainty caused by such unexpected changes in the terms and conditions of AES contracts was perceived by farmers as a negative experience and resulted in their reluctance to endorse long-term contracts and scepticism in evaluating new measures (Schenk *et al.* 2007): "One year I had to plant hedges in order to meet the requirements (of the AES) and the following year they decreased subsidies by 50 %. There should be clearer prescriptive rules and good advice. Our financial ability for investments is on a bearable level. We can't really afford (making) mistakes" [F.10].

Farmers felt more comfortable with short-term rather than long-term farm-management plans since these are inherently more flexible (Hart and Wilson 1998; Darnhofer 2006). The limitations of long-term contracts were exacerbated when tenancy arrangements were seen as a cause of insecurity (Myyrä *et al.* 2007) or when farmers were close to retirement and did not have a successor.

Application Process and Controls

The bureaucratic application process for AES and OF, as well as the continuous and strict follow-up controls were also given as primary obstacles to participation. Some respondents were discouraged from registering for all eligible schemes, as the monetary compensation was considered too low compared with the time required to complete an application. Moreover, respondents stated clearly that they would like to see fewer coercive controls and restrictions, since these were regarded as an additional cost as well as a compromise to their autonomy and flexibility (see, e.g., Emery and Franks 2012):"I don't want to spend too much time with administration and that's why I do not apply to all schemes possible (even if this costs me about 200 CHF /ha)" [F.14].

Theme 4: Environment

Climate and Biophysical Characteristics Farmers referred to climatic conditions and the occurrence of extreme weather events (e.g., "Water availability is not sufficient and we have many droughts in the area, so organic farming would not work here" [F.10]), as well as more specific details about the biophysical features of their farms such as topography and soil quality (e.g., "The land is not suited for organic arable crops. It is too steep" [F.10]). The frequency of these responses was higher when farmers refer to their decisions not to apply OF than in reference to their participation in AES.

Theme 5: Household Characteristics

Workforce High labour requirements of OF (e.g., to manually remove weeds) were cited as the main reason why many farmers instead applied IP: "There are too many weeds on the land and this means a lot of handwork" [F.15]. Labour supply in farming families is usually fixed (Latruffe and Mann 2008), and many farmers' responses indicated that application of OF would make the management of the existing labour force inflexible. Moreover the need for hired labour was seen not only as an additional cost, but also as a decrease in the level of DP per family farm worker (Latruffe and Mann 2008; also see Defrancesco *et al.* 2008). On the other hand, where there was a surplus of family labour, farmers were more willing to apply OF: "Organic farming is best suited to our farm in terms of its characteristics and the amount of work that we can invest. We calculated the labour input and it was affordable" [F.4].

Family Cycle

Farmers who were close to the retirement age and did not have a successor were less willing to change their land-use or management style in practice. Conversely, farmers keen to pass on a successful farming business to their successors were more comfortable with decisions that would improve both the environmental status and the profitability of their farms, even if this required an increase in investment capital (see also Darnhofer 2006 on the influence of the farm family cycle and Potter and Lobley 1992 in particular on the existence (or absence) of a successor on farmer decisions): "I have done already enough. We are more than 50 years old already, who is going to take over the farm?" [F.10]; "Either our daughter will have to learn farming or we will have to look out for a tenant" [F.11].

Other studies have highlighted the benefits that farmers perceive in having their children working on the family farm both in terms of passing on skills, but also by increasing farm labour (Zepeda and Kim 2006). In our study, many respondents recognised the difficulties of farming, mainly the heavy workload and uncertainty, and stated that although they were keen to have successors, they preferred their children not to enter the farming sector even if this would jeopardise farm continuation. This relates to the effect of lifestyle (see below), and indicates that in the post-traditional era the agricultural sector is characterised not only by technological development, but also by changes in farmer attitudes (Villa 1999) that are expected to increase in the coming generation.

Theme 6: Farmer Characteristics

Health Farming activities are physically demanding and thus directly associated with health. Surprisingly little research has

considered the influence of health on farmer decisions (Hounsome *et al.* 2006; Cranfield *et al.* 2010). In our study, respondents made clear the importance of health considerations for themselves and their families mainly with respect to the level of physical effort that they were able or willing to make. Contrary to studies in developing countries where better health care for farmers was found to result in intensification of farming practices (Kiptop *et al.* 2007), participant responses suggested that a farmer in good health would be willing to take on more physically demanding, but less intensive, activities such as OF.

Lifestyle

Whilst many respondents made general comments about their way of life, only a small number referred to lifestyle explicitly as a factor influencing their land-use decisions.

This is linked to the difficulty in distinguishing personal life from work life. It appears that respondents who considered "quality of life" or "balance of time between work and personal life" important, either had a secure source of income that was not related to agriculture, or considered farming a hobby: "Quality of life is important to me. Conditions are okay now. I don't plan to increase production, rather the opposite…If I ever decided to make any changes in my farm, that would be only if they led to fewer working hours" [F.2] (see Villa 1999). Although this suggests that farmers have re-evaluated the priorities in their lives and do not value the success of their farms over their personal life, it does not mean that financial incentives are no longer an influential motivation.

Risk Aversion

Respondents reported the use of past experience, such as the selection of practices with known outcomes, short-term management plans or diversification of income sources, as strategies to cope with variability and uncertainty in the weather, the economy and government policy. Some of them strongly related the success of their farms to the decrease of risk: "If I had to define success…I would say that to me this means minimizing risks" [F.1].

However, others stated willingness to introduce new practices or even to change the overall strategy of their farms despite potential risks, which implies that risk is perceived and assessed differently among individuals (see Van Huylenbroeck *et al.* 2001; Ziervogel *et al.* 2005; Northcole and Alonso 2011). In our study, risk aversion appeared to be inversely related to the degree of financial security and the extent to which off-farm sources contribute to total farm income.

Environmental Attitudes and Perceptions

Switzerland has a long tradition of OF and other environmental farm management practices. Reference by the respondents to "eco-zones" and "sustainability" showed positive attitudes toward environmental protection not restricted to the farmers who already apply OF. Although there were fewer of these, some non-OF farmers acknowledged the environmental benefits of good farming practice associated with OF, implying that under different circumstances, the number of organic farms in the area could be larger.

Similar to other studies (e.g., Storstad and Bjørkhaug 2003) most of the respondents who did not apply OF did not identify OF as a more environmentally-friendly practice or did not recognise the environmental impacts associated with their current farming practice. Many had recently switched from conventional to IP farming practices and considered their current farming activities to be more environmentally-orientated compared with those applied before or with other non-agricultural uses e.g., industrial activities: "Corn and sugar beet wouldn't work with organic farming. Besides organic farming doesn't mean more environmental friendly" [F.22].

The likelihood of farmers acknowledging the benefits of these practices for the wider environment and developing positive environmental attitudes increases with familiarity (Wilson and Hart 2000). By not recognising the benefits of OF farmers are less likely to adopt this farming practice (Darnhofer *et al.* 2005). As noted above, however, heterogeneity in perceptions and judgement (Schenk *et al.* 2007) exist even among farmers applying similar practices.

Tenure-Ownership Status

Farmer responses indicated that farming practices applied by tenants often reflected their landlords' decisions (Wilson 1996). Some tenant-farmers reported that they felt constrained in maximising their income and using the farms at their full potential either because their decisions conflicted with those of their landlords, or because they were not willing to invest over the long-term: "[Applying organic farming] was the owner's decision, not mine. Contract as a tenant leaves you little space for your 'own' decisions" [F.13].

Even in cases where tenants are not obliged to follow their landlords' preferences, their insecurity as tenants increases risk aversion and decreases their willingness to engage in land improvements that require high investment, have a time-lagged pay-back period or reduce capital liquidity (Daskalopoulou and Petrou 2002; Myyrä *et al.* 2007; Calus *et al.* 2008).

Relationships Among Factors

There were few interactions among the identified factors. An exception was that many farmers who considered coercive controls and the bureaucracy of the application process to be the main barriers to their participation in AES/OF did not emphasise the practical constraints that limit their range of decisions (e.g., biophysical limits, labour availability). Although it was not possible to test the statistical significance of this relationship, it appears that a simpler and less time-consuming application process, as well as fewer controls would encourage more widespread participation in environmental management practices.

Policy Recommendations

Participation in AES/OF is still largely voluntary, so differences in farm areas managed conventionally or not are generally determined by attitudes of individual farmers (see Wilson 1996; Guillem *et al.* 2012). Intrinsic motivations such as appreciation, awareness and moral considerations of the environment often relate to positive farmer attitudes toward a long-term commitment to green farm management (see Sullivan *et al.* 1996; Atari *et al.* 2009).

Current participation in environmental policy measures in Switzerland is widespread and differs from other areas of Europe, where research has shown a mismatch between farmer decisions and policymaker expectations (Calus *et al.* 2008). Although high acceptance would be expected to reflect a shift in attitudes, in the case of Switzerland there is no evidence to suggest that farmers hold "greener" attitudes in support of the long-term application of environmentally-friendly farming practices (Karali *et al.* 2013). For many farmers the application of such practices results from their aim to conform to the requirements of the SAP reform and receive subsidies. Almost all respondents in our study indicated, for example, that they would switch to conventional farming practices if producer support were withdrawn. Although conservation benefits from certain management practices were considered an asset, it is evident that subsidies provide the main incentive for farmers to change management practices (Wilson and Hart 2000; Schenk *et al.* 2007).

A thorough understanding of the different attitudes held by land managers as well as the identification and assessment of other factors that encourage or discourage farmers from applying environmentally-friendly farming practices (Beedell and Rehman 1999) are necessary to support constructive policy (Guillem and Barnes 2013). It is important that information about farmer attitudes is taken into account when designing and communicating policy instruments (Damianos and Giannakopoulos 2002; Defrancesco *et al.* 2008). Indeed policymakers have expressed increasing interest in findings from participatory studies as a means of identifying and minimising policy pitfalls (Darnhofer 2006; Davies and Hodge 2006; Herzon and Mikk 2007; Kiptop *et al.* 2007).

To explore constraints on participation in environmental policy measures farmer responses were grouped using the themes identified in the selective coding process (Table 2). The strength of the effect of each factor on farmer decisions (weak, medium, strong) was defined by the frequency of occurrence in farmer responses. The theme "society" was excluded due to an absence of clear evidence that would allow us to identify specific constraints related, for example, to expectations of the farming community or the wider society. Cultural factors, however, do significantly influence farmer decisions and therefore more effort should focus on a better understanding of them. Classification shows that the effects of environment and household characteristics and the lack of sufficient support to innovation were the most frequently mentioned constraints. Overall, however, the number of constraining factors associated with the design, communication and implementation of policy was high compared to the other themes.

The bureaucratic application process, long-term contracts and changes in the legal framework of AES were perceived to be important constraining factors in policy design. Recent changes in the terms and conditions of AES have made farmers less trustful of the policy process. Farmer distrust in governmental schemes (Sullivan *et al.* 1996) and concerns about the legitimacy of regulations (Davies and Hodge 2006) or the details required to complete documentation (Atari *et al.*

Table 2 Evaluation of the importance of factors constraining farmer participation in environmental policy measures based on the frequency of responses

Theme	Constraining factors	Effect
Economy	Distribution of expenses	++
Environment	Biophysical and environmental characteristics	+++
Household	Labour force availability	+++
	Absence of successor	+
Farmer	Environmental attitudes	++
	Health	+
Policy	Bureaucratic application process	++
	Changes in the legal framework of AES/OF	++
	Long duration of schemes	++
	Rules that match with local conditions	+
	Accessibility to information	+
	Information format	++
	Timing of information distribution	+
	Limited support related to innovations	+++
	Weak social network and co-operatives	++
	Cost of training	+
	Numerous and coercive controls	++

(+: weak, ++: medium, +++: strong)

2009) were seen to create negative experiences and to lower farmer willingness to participate in schemes with long-term contracts. This seriously limits the capacity of agricultural policy to achieve the goal of delivering ecological benefits to society from farm management as most management practices cannot be implemented successfully over the short-term.

Farmer engagement in policy-making and the establishment of robust frameworks with clear terms and conditions that secure farmer rights, particularly for tenants, are needed to develop an environment of trust. Providing farmers with several alternatives such as contracts of different durations that offer incremental benefits would complement the current application process. Such an approach would avoid the sense among farmers that policy instruments were imposed externally or that they restricted independence and flexibility. This would encourage more farmers to participate in environmental policy measures with longer duration contracts.

More information based on scientific evidence is also needed to raise farmer awareness about environmental measures (Blackstock *et al.* 2009; Guillem *et al.* 2012). More effort is required, therefore, to translate science into practice and to build more efficient communication channels that bridge the gap between the producers and consumers of knowledge.

Strengthening of social networks within farming communities and restructuring the extension services is especially important for small-scale farmers because they usually are less well-served by social networks and often the first to withdraw from environmentally-friendly practices because of difficulties in distributing AES/OF expenses cost-effectively. Considering that 44 % of the farms in the study area are smaller than 10 ha (www.bfs.admin.ch), this becomes particularly relevant for this case study and other areas that resemble it.

The organisation of training events and exhibitions and the promotion of face-to-face communication mechanisms between extension officers and farmers could be expected to stimulate interactions and information exchange, and contribute to the strengthening of social networks. In addition to making good quality information available, especially with regard to the application of innovative practices, it is important that this information is made available at appropriate times within the farming calendar. Farmers need sufficient time to explore and evaluate the available options arising from a policy measure in order to shift from the status quo (Gintis 2000). Time and information are also critical for farmers to be better prepared for any statutory changes in the SAP and other agricultural policies.

Different types of financial aid could tackle some of the constraining factors that relate to household characteristics, namely labour and the availability of a successor. Financial aid could help farmers cover, for example, the costs of the high demand for labour at peak times, especially in the case of organic farming. The current strategy of the SAP to stimulate farm succession by restricting farmer eligibility for subsidies based on their age could be further supported if young farmers were provided with additional benefits. Providing sufficient land to young farmers, for example, was suggested as a measure to increase investments in energy-saving installations in the Netherlands (Aramyan *et al.* 2007). Such a measure is not feasible in Switzerland as most land suitable for farming is already under use. However, additional financial incentives or lower taxes would encourage young farmers to stay in the sector (Aramyan *et al.* 2007).

Integration of policies from different sectors is needed to tackle some of the constraints for the "Environment" theme. Ensuring water availability during dry periods, for example, requires the co-operation of several sectors and the design of a management plan at a regional level. This issue becomes more pressing under the uncertainties of climate change. Flexibility in policy implementation would also support opportunities or mitigate the negative impacts arising from climate change. Nevertheless, constraints are not always directly related to agricultural practices. Some farmers, for example, mentioned their health as a factor that affects decision-making. Such responses indicated the importance of ensuring access to health insurance and thus the need to consider policies that extend beyond the agricultural sector.

Conclusions

Thematic analysis of in-depth interview texts identified 17 influential factors for farmer participation in AES/OF that were grouped within six thematic categories; economy, society, policy, environment, household and farmer characteristics. The presence of a range of non-economic factors in farmer responses suggests that decisions cannot be explained by economics alone. Participant responses showed that profit making and positive environmental attitudes are not necessarily mutually exclusive (Wilson and Hart 2000) but can co-exist and co-shape farmer decisions, rebutting the traditional concept of the profit-oriented farmer as a "polluter" or the environmentally-oriented farmer as uninterested in materialistic benefits. Farmer responses illustrated large differences in perceptions and evaluation pathways, with some farmers considering the same factors, but making different decisions. Lifestyle, quality of life and health are factors emerging from this analysis that have not been adequately discussed in the literature, although they are strongly related with farmers' willingness and capability to continue farming. Overall participant responses still reflected the financial imperatives that underpin their decisions. Given the high level of subsidies currently provided for extensive and organic farm management in Switzerland, it is likely that acceptance of the SAP

reform is opportunistic in response to the economic incentives of environmental farming practices, rather than arising from farmer "green" attitudes. Further increases in subsidies for societal and environmental services are expected to result in the expansion of extensive farming practices without necessarily changing farmer attitudes toward a long-term commitment to green farm management. Although the economic incentives provide a more straightforward explanation, the effect of cultural factors, the traditional notion of a "good farmer" and issues related to intergenerational farm transfer should not been overlooked. Furthermore, farmer decisions are not only linked to proximal but also to global factors. Economic constraints, notably globalization of agricultural exchanges and market forces might be implicit, but influential drivers urging farmers towards intensification, labour force reduction and optimisation of production and thus preventing them from applying environmental management practices.

As with agricultural policy in other OECD countries, the SAP has managed to embed environmental protection into farmland management (Herzog *et al.* 2005) mainly through farmer training and education, subsidies and regulatory mechanisms. The underlying principle supporting this approach is that strict regulation is expected to lead to a change in farmer attitudes (see Davies and Hodge 2006). Moreover, the likelihood of farmer acceptance is expected to increase if they understand the reasons why certain practices are being proposed and the benefits arising from them (Wilson and Hart 2000; Falconer 2000). The persistence of the constraining factors, however, in spite of high financial incentives, suggests that more innovative policy measures are needed to tackle these constraints.

Tailoring policy instruments to farmer needs and capabilities as well as the attributes of their farms will better reflect real-world conditions, and assist farmers in seeing the applicability of specific policy measures for their farms (Solano *et al.* 2001; Guillem *et al.* 2012; Karali *et al.* 2013). The design and implementation of reforms in the SAP will require a long-term perspective. Nevertheless, it is argued that further reform would contribute substantially to the acceptance and enduring commitment of farmers to environmental management practices that would maximise the ecological benefits that society derives from farmland. Although the relevance of the issues discussed here goes beyond the Swiss agricultural sector, further studies could usefully explore the longevity of policy implementation and uptake.

Acknowledgments The research presented in this paper was conducted under the EU-FP6 Ecochange project GOCE-036866. Eleni Karali was funded also by the Torrance Bequest, The University of Edinburgh. The authors would like to thank all the farmers in the study area who agreed to participate in the survey and the anonymous reviewers whose constructive comments improved this article.

References

Acosta-Michlik, L., and Espaldon, V. (2008). Assessing Vulnerability of Selected Farming Communities in the Philippines Based on a Behavioural Model of agent's Adaptation to Global Environmental Change. Global Environmental Change 18: 554–563.

Aramyan, L. H., Oude Lansink, A. G. J. M., and Verstegen, J. A. A. M. (2007). Factors Underlying the Investment Decision in Energy-Saving Systems in Dutch Horticulture. Agricultural Systems 94: 520–527.

Atari, D. O. A., Yiridoe, E. K., Smale, S., and Duinker, P. N. (2009). What Motivates Farmers to Participate in the Nova Scotia Environmental Farm Plan Program? Evidence and Environmental Policy Implications. Journal of Environmental Management 90: 1269–1279.

Beedell, J. D. C., and Rehman, T. (1999). Explaining Farmers' Conservation Behaviour: Why do Farmers Behave the way They do? Journal of Environmental Management 57: 165–176.

Blackstock, K. L., Ingram, J., Burton, R., Brown, K. M., and Slee, B. (2009). Understanding and Influencing Behaviour Change by Farmers to Improve Water Quality. Science of the Total Environment 408: 5631–5638.

Bötsch, M. (2005). Modern Swiss agricultural policy. The new role of agriculture. Congress Switzerland 2005 retrieved on 23/02/12 from www.ifaj2005.ch/_aktuell/referate/boetsch_manfred/20050901_boetsch_speech_e.pdf

Brandth, B., and Haugen, M. S. (2011). Farm Diversification into Tourism – Implications for Social Identity? Journal of Rural Studies 27: 35–44.

Brodt, S., Klonsky, K., and Tourte, L. (2006). Farmer Goals and Management Styles: Implications for Advancing Biologically Based Agriculture. Agricultural Systems 89: 90–105.

Burton, R. J. F. (2004). Seeing Through the 'Good Farmer's' Eyes: Towards Developing an Understanding of the Social Symbolic Value of 'Productivist' Behaviour. Sociologia Ruralis 44: 195–215.

Burton, R. J. F., and Wilson, G. A. (1999). The Yellow Pages as a Sampling Frame for Farm Surveys: Assessing Potential Bias in Agri-Environmental Research. Journal of Rural Studies 15: 91–102.

Burton, R. J. F., and Wilson, G. A. (2006). Injecting Social Psychology Theory into Conceptualisations of Agricultural Agency: Towards a Post-Productivist Farmer Self-Identity. Journal of Rural Studies 22: 95–115.

Burton, R. J. F., Kuczera, C., and Schwarz, G. (2008). Exploring Farmers' Cultural Resistance to Voluntary Agri-Environmental Schemes. Sociologia Ruralis 48: 16–37.

Busck, A. G. (2002). Farmers' Landscape Decisions: Relationships between Farmers' Values and Landscape Practices. Sociologia Ruralis 42: 233–249.

Calus, M., Van Huylenbroeck, G., and Van Lierde, D. (2008). The Relationship Between Farm Succession and Farm Assets on Belgian Farms. Sociologia Ruralis 48: 38–56.

Celio, E., Flint, C. G., Schoch, P., and Grêt-Regamey, A. (2014). Farmers' perception of their decision-making in relation to policy schemes: A comparison of case studies from Switzerland and the United States. Land Use Policy 41: 163–171.

Colla, E. (2003). International Expansion and Strategies of Discount Grocery Retailers: The Winning Models. International Journal of Retail & Distribution Management 31: 55–66.

Corselius, K. L., Simmons, S. R., and Flora, C. B. (2003). Farmer Perspectives on Cropping Systems Diversification in Northwestern Minnesota. Agriculture and Human Values 20: 371–383.

Cranfield, J., Henson, S., and Holliday, J. (2010). The Motives, Benefits, and Problems of Conversion to Organic Production. Agriculture and Human Values 27: 291–306.

Cretegny, L. (2001). The Agricultural Policy Reform in Switzerland: An Assessment of the Agriculture Multifunctionality. Paper presented at the 4th Annual Conference on Global Economic Analysis, Purdue University, 2001 and at the 75th International Conference on Policy Modeling for European and Global Issues, Free University of Brussels, 2001.

Curry, N., and Stucki, E. (1997). Swiss Agricultural Policy and the Environment: An Example for the Rest of Europe to Follow? Journal of Environmental Planning and Management 40: 465–482.

Damianos, D., and Giannakopoulos, N. (2002). Farmers' Participation in Agri-Environmental Schemes in Greece. British Food Journal 104: 261–273.

Darnhofer, I. (2006). Can Family Farmers be Understood as Adaptive Managers? In Langeweld, H., Langeweld, H., and Röling, N. (eds.), Changing European Farming Systems for a Better Future. New Visions for Rural Areas. Wageningen Academic Publishers, Wageningen, pp. 232–236.

Darnhofer, I., Schneeberger, W., and Freyer, B. (2005). Converting or not Converting to Organic Farming in Austria: Farmer Types and Their Rationale. Agriculture and Human Values 22: 39–52.

Daskalopoulou, I., and Petrou, A. (2002). Utilising a Farm Typology to Identify Potential Adopters of Alternative Farming Activities in Greek Agriculture. Journal of Rural Studies 18: 95–103.

Davies, B. B., and Hodge, I. D. (2006). Farmers' Preferences for new Environmental Policy Instruments: Determining the Acceptability of Cross Compliance for Biodiversity Benefits. Journal of Agricultural Economics 57: 393–414.

Defrancesco, E., Gatto, P., Runge, F., and Trestini, S. (2008). Factors Affecting Farmers' Participation in Agri-Environmental Measures: A Northern Italian Perspective. Journal of Agricultural Economics 59: 114–131.

Dimara, E., and Skuras, D. (2003). Adoption of Agricultural Innovations as a two-Stage Partial Observability Process. Agricultural Economics 28: 187–196.

Duram, L. A. (2000). Agents' Perceptions of Structure: How Illinois Organic Farmers View Political, Economic, Social, and Ecological Factors. Agriculture and Human Values 17: 35–48.

Emery, S. B., and Franks, J. R. (2012). The Potential for Collaborative Agri-Environmental Schemes in England: Can a Well-Designed Collaborative Approach Address farmers' Concerns With Current Schemes? Journal of Rural Studies 28: 218–231.

Errington, A. (2002). Handing over the reins: A comparative study of intergenerational farm transfers in England, France and Canada. Xth EEA Congress "Exploring Diversity in the European Agri-Food System" Zaragoza (Spain), 28-31 August 2002.

Espinosa-Goded, M., Barreiro-Hurlé, J., and Ruto, E. (2010). What do Farmers Want from Agri-Environmental Scheme Design? A Choice Experiment Approach. Journal of Agricultural Economics 61: 259–273.

Falconer, K. (2000). Farm-Level Constraints on Agri-Environmental Scheme Participation: A Transactional Perspective. Journal of Rural Studies 16: 379–394.

FOAG-Swiss Federal Office for Agriculture. (2006). Swiss Agricultural Policy. Objectives, tools, prospects. Retrieved on 25/06/09, www.blw.admin.ch/org/00022/index.html?lang=en

FOEN/FSO (2009). Environment Switzerland 2009. Retrieved on 15/09/09 www.bfs.admin.ch/bfs/portal/en/index/infothek/publ.Document.120739.pdf

Gasson, R., and Errington, A. J. (1993). The Farm Family Business. CAB International, Wallingford, p. 304.

Gintis, H. (2000). Beyond Homo Economicus: Evidence from Experimental Economics. Ecological economics 35: 311–322.

Glaser, B. G., and Strauss, A. L. (1967). The discovery of Grounded Theory: Strategies for Qualitative Research. Aldine, Chicago.

Gorton, M., Douarin, E., Davidova, S., and Latruffe, L. (2008). Attitudes to Agricultural Policy and Farming Future in the Context of the 2003 CAP Reform: A Comparison of Farmers in Selected Established and new Member States. Journal of Rural Studies 24: 322–336.

Grunert, K. G. (2005). Food Quality and Safety: Consumer Perception and Demand. European Review of Agricultural Economics 32: 396–391.

Guillem, E. E., and Barnes, A. (2013). Farmer Perceptions of Bird Conservation and Farming Management at a Catchment Level. Land Use Policy 31: 565–575.

Guillem, E. E., Barnes, A., and Rounsevell, M. D. A. (2012). Refining Perception-Based Farmer Typologies with the Analysis of Past Census Data. Journal of Environmental Management 110: 226–235.

Hart, K., and Wilson, G. A. (1998). UK Implementation of Agri-Environment Regulation 2078/92/EEC: Enthusiastic Supporter or Reluctant Participant? Landscape Research 23: 255–272.

Haugen, M. S. (1998). The gendering of farming. The case of Norway. The European Journal of Women's Studies 5: 133–153.

Herzog, F., Dreier, S., Hofer, G., Marfurt, C., Schüpbach, B., Spiess, M., and Walter, T. (2005). Effect of Ecological Compensation Areas on Floristic and Breeding Bird Diversity in Swiss Agricultural Landscapes. Agriculture, Ecosystems & Environment 108: 189–204.

Herzon, I., and Mikk, M. (2007). Farmers' Perceptions of Biodiversity and Their Willingness to Enhance it Through Agri-Environment Schemes: A Comparative Study from Estonia and Finland. Journal for Nature Conservation 15: 10–25.

Hodkinson, P. (2008). Grounded Theory and Inducting Research. In: Gilbert, N. (2008). Researching Social Life. SAGE. Third Edition.

Hounsome, B., Edwards, R. T., and Edwards-Jones, G. (2006). A Note on the Farmer Mental Health on Adoption: The Case of Agri-Environmental Schemes. Agricultural Systems 91: 229–241.

Jara-Rojas, R., Bravo-Ureta, B. E., and Díaz, J. (2012). Adoption of Water Conservation Practices: A Socioeconomic Analysis of Small-Scale Farmers in Central Chile. Agricultural Systems 110: 54–62.

Karali, E., Brunner, B., Doherty, R., Hersperger, A. M. and Rounsevell, M. D. A. (2013). The effect of farmer attitudes and objectives on the heterogeneity of farm attributes and management in Switzerland. Human Ecology 41: 915–926.

Kiptop, E., Hebinck, P., Franzel, S., and Richards, P. (2007). Adopters, Testers or Pseudo-Adopters? Dynamic of the use of Improved Tree Fallows by Farmers in Western Kenya. Agricultural Systems 94: 509–519.

Latruffe, L., and Mann, S. (2008). Labor constraints on choosing profitable products for part-time farmers in Swiss agriculture Working Paper SMART – LERECO N°08-03. Retrieved on 04/09/09, www.rennes.inra.fr/smart_eng/publications/working_papers

Long, N., and van der Ploeg, J. (1994). Heterogeneity, actor and structure: towards a reconstitution of the concept of structure. In Booth, D. (ed.), Rethinking Social Development. Theory, Research & Practice. Addison, Weley, Longman, Harlow, Essex, pp. 62–89.

Macé, K., Morlon, P., Munier-Jolain, N., and Quéré, L. (2007). Time Scales as a Factor in Decision-Making by French Farmers on Weed Management in Annual Crops. Agricultural Systems 93: 115–142.

Mann, S. (2003). Doing it the Swiss way. Eurochoices 2: 32–35.

Mann, S. (2005a). Different perspectives on Cross-Compliance. Environmental values 14: 471–482.

Mann, S. (2005b). Farm Size Growth and Participation in Agri-environmental Schemes: A Configural Frequency Analysis of the Swiss Case. Journal of Agricultural Economics 56: 373–384.

Mann, S. (2007). Tracing the process of becoming a farm successor on Swiss family farms. Agriculture and Human Values 24: 435–443.

Mariano, M. J., Villano, R., and Fleming, E. (2012). Factors Influencing farmers' Adoption of Modern Rice Technologies and Good Management Practices in the Philippines. Agricultural Systems 110: 41–53.

Mattison, E. H., and Norris, K. (2007). Intentions of UK Farmers Toward Biofuel Crop Production: Implication for Policy Targets and Land-use Change. Environmental Science & Technology 41: 5589–5594.

Michel-Guillou, E., and Moser, G. (2006). Commitment of Farmers to Environmental Protection: From Social Pressure to Environment Conscience. Journal of Environmental Psychology 26: 227–235.

Miljkovic, D. (1999). Optimal Timing in the Problem of Family Farm Transfer from Parent to Child: An Option Value Approach. Journal of Development Economics 61: 543–552.

Myyrä, S., Pietola, K., and Yli-Halla, M. (2007). Exploring Long-Term Land Improvements Under Land Insecurity. Agricultural Systems 92: 63–75.

Noltze, M., Schwarze, S., and Qaim, M. (2012). Understanding the Adoption of System Technologies in Smallholder Agriculture: The System of Rice Intensification (SRI) in Timor Leste. Agricultural Systems 108: 64–73.

Northcole, J., and Alonso, A. D. (2011). Factors Underlying Farm Diversification: The Case of Western Australia's Olive Farmers. Agriculture and Human Values 28: 237–246.

OECD (2010). Agricultural Policies in OECD Countries: At a glance. OECD, Paris.

Offermann, F., Niberg, H., and Zander, K. (2009). Dependency of Organic Farms on Direct Payments in Selected EU Member States: Today and Tomorrow. Food Policy 34: 273–279.

Potter, C., and Lobley, M. (1992). Ageing and Succession of Family Farms. Sociologia Ruralis 32: 317–334.

Præstholm, S., Reenberd, A., and Kristensen, S. P. (2006). Afforestation of European Landscapes: How do Different Types Respond to EU Agri-Environmental Schemes? GeoJournal 67: 71–84.

Salamon, S., Gengenbacher, K. M., and Penas, D. J. (1986). Family Factors Affecting the Intergenerational Succession to Farming. Human Organisation 45: 24–33.

Sarantakos, S. (2005). Social Research, Palgrave Macmillan, 464 pp.

Sattler, C., and Nagel, U. J. (2010). Factors Affecting Farmers Acceptance of Conservation Measures-A Case Study from North-Eastern Germany. Land Use Policy 27: 70–77.

Schenk, A., Hunziker, M., and Kienast, F. (2007). Factors Influencing the Acceptance of Nature Conservation Measures-A Qualitative Study in Switzerland. Journal of Environmental Management 83: 66–79.

Scott, J., and Marshall, G. (2004). Oxford Dictionary of Sociology. Oxford University Press. Third Edition.

Solano, C., León, H., Pérez, E., and Herrero, M. (2001). Who Makes Farming Decisions? A Study of Costa Rican Dairy Farmers. Agricultural Systems 67: 181–199.

Soliva, R. (2007). Landscape Stories: Using Ideal Type Narratives as a Heuristic Device in Rural Studies. Journal of Rural Studies 23: 62–74.

Storstad, O. (2001). The impact of consumer trust in the norwegian food market. In Tovey, H., and Blanc, M. (eds.), Food, Nature and Society. Rural Life in Late Modernity. Ashgate, Aldershot, UK.

Storstad, O., and Bjørkhaug, H. (2003). Foundations of Production and Consumption of Organic Food in Norway: Common Attitudes Among Farmers and Consumers? Agriculture and Human Values 20: 151–163.

Sullivan, S., McCann, E., de Young, R., and Erickson, D. (1996). Farmers' Attitudes About Farming and the Environment: A Survey of Conventional and Organic Farmers. Journal of Agriculture & Environmental Ethics 9: 123–143.

van der Ploeg, J. D., Laurent, C., Blondeau, F., and Bonnafous, P. (2009). Farm Diversity, Classification Schemes and Multifunctionality. Journal of Environmental Management 90: S124–S131.

Van Huylenbroeck, G., Campos, E. M. U., and Vanslembrouck, I. (2001). A (Recursive) Multiple Objective Approach to Analyse Changes in the Utility Function of Farmers due to Policy Reforms. Applied Mathematics and Computation 122: 283–299.

Villa, M. (1999). Born to be Farmers? Changing Expectations in Norwegian Farmers' Life Courses. Sociologia Ruralis 39: 328–342.

Wilson, G. A. (1996). Farmer environmental attitudes and ESA participation. Geoforum 27: 115–131.

Wilson, G. A. (1997). Factors Influencing Farmer Participation in the Environmentally Sensitive Areas Scheme. Journal of Environmental Management 50: 67–93.

Wilson, G. A. (2001). From Productivism to Post-Productivism…and Back Again? Exploring the (un)Changed Natural and Mental Landscapes of European Agriculture. Transactions of the Institute of British Geographers 26: 77–102.

Wilson, G. A., and Hart, K. (2000). Financial imperative or conservation concern? EU farmers' motivations for participation in voluntary agri-environmental schemes. Environmental Planning A 32: 2161–2185.

Zepeda, L., and Kim, J. (2006). Farm parents' Views on Their Children Labor on Family Farms: A Focus Group Study of Wisconsin Dairy Farmers. Agriculture and Human Values 23: 109–121.

Ziervogel, G., Bithell, M., Washington, R., and Dowing, T. (2005). Agent-Based Social Simulation: A Method for Assessing the Impact of Seasonal Climate Forecast Applications Among Smallholder Farmer. Agricultural Systems 82: 1–26.