# From individual behaviour to social learning: start of a participatory process towards sustainable agriculture

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**Abstract:** *When striving to make farming more sustainable, farmers need to acquire new skills and competencies in order to stay competitive while producing in a sustainable way. Trial and error learning by the individual can be greatly improved by social learning, which is a combination of constructive, contextual and reflective learning from other people. Many authors have stressed the potential effectiveness of integrated sustainability assessment models in social learning, provided that these models are used in combination with participatory approaches. We set up discussion groups between farmers using an indicator-based assessment model for integrated farm sustainability called MOTIFS. In this paper, we analyse the motivations on which the farmers base their decisions to implement changes or innovations, before they take part in the discussion groups. This provides us a reference base for evaluation of the further social learning process. The factors of motivations included are mainly attitudinal factors and external conditions. Attitudinal factors ranged from negative to moderate to positive, depending on the type of measure farmers are discussing. Economic factors and also legislation constraints were mentioned as important external conditions in their decision making. Literature and interview analysis leads to a proposal of a methodology to detect social learning aspects by farmers once they have used the Monitoring Tool for Integrated Farm Sustainability (MOTIFS) in discussion groups during one year. This implies a second-step interviewing of the farmers to explore whether the motivations for change mentioned by the farmers have changed and whether this change moves in the direction of more sustainability.*

***Keywords:*** *social learning, farmer groups, sustainability, integrated sustainability assessment (ISA), participatory approach, qualitative methodology*

## Introduction

Today, 'sustainability' has rightfully gained its place in the mission, vision, and strategy of companies, organisations and governments. It also has found its place in agriculture. However, putting the theoretical concept into practice, namely actual measures and actions, often proves to be very difficult. To increase the sustainability and competitiveness of their farms within an ever-changing socio-economic and natural environment, farmers need to be engaged in a continuous process of learning in order to acquire the necessary skills and competencies and constantly increase their knowledge base (Bergevoet et al., 2004).

A diversity of learning processes can be identified through which farmers can acquire new knowledge, skills or attitudes, ranging from various forms of individual learning on the one hand (e.g., through trial and error) to ways of social learning on the other hand. In social learning, people learn by observing and interacting with other people (Bandura, 1977). Farmers can thus learn from each other when participating in a social learning process.

Integrated sustainability assessment (ISA) models are believed to have the capacity to support social learning processes on sustainability (Rotmans, 1998; Siebenhüner and Barth, 2005; Sterk, 2007; Van Paassen, 2004). These models are developed to learn about integrated solutions to persistent problems of unsustainable development (Bohunovsky and Jäger, 2008). However, evidence on the

usefulness of ISA models in social learning processes is scarce (De Kraker et al., 2009). Our research aims to contribute to resolving this "paradox of model-supported social learning" (Armitage et al., 2008) and test the supporting value of an existing ISA model in a process of social learning about farm sustainability.

To achieve this aim, we set up a study in which 19 Flemish dairy farmers take part in discussion groups, where an existing ISA model, the Monitoring Tool for Integrated Farm Sustainability (MOTIFS), is used to support the social learning. Description and evaluation of the value of MOTIFS in this social learning process happens in two steps. The first step is addressed in this paper, while the second step is the subject of research to come:

- First, we analyse the motivations on which the 19 participating farmers base their decisions to implement innovations plus their knowledge about sustainability, before they take part in the discussion groups. The information of the first step serves as a reference base to later evaluate the usefulness of MOTIFS in the learning process in the second step.
- In research to come, we will evaluate the supporting value of MOTIFS in the discussion groups. To this end, we will examine whether social learning actually took place in the discussion groups – i.e., have the motivations for innovation of the farmers changed towards higher sustainability after they participated in the discussion groups – and to what extent was MOTIFS useful to this process.

The following section elaborates on the types of learning processes and the importance of participatory approaches. It further describes the existing ISA model, MOTIFS, used in this study. We focus on its design, special characteristics and results from a first implementation (Meul et al., 2008; Meul et al., 2009; De Mey et al., submitted). The methodology section gives the outline and the qualitative methods used in the first step of the study. The results section presents the analysis of the farmers' motivations to make decisions on innovations. In the discussion, we compare our results with literature and discuss the methodology we will use in the second step of the study. Finally, we discuss some important conclusions from the first step of the research and for further research, in particular for the second step of the study.

## Learning for innovation: a literature review

### Type of learning processes for innovation

Formal school education only enables farmers to acquire some of the competencies needed to produce competitively and in a sustainable manner. Other competencies must be learned through practice. Trial and error is one of the basic elements of learning; we learn what to do (and what not to do) by experiencing positive (and negative) reinforcements (rewards or penalties) of our behaviours (Jackson, 2004). However, this is a time-intensive and costly approach for acquiring knowledge, skills, or understanding. When individuals engage in the process of learning, different strategies (a.o. observation, imitation, modelling, conversation and mentoring) are used all resting on some interaction with living beings (Glasser, 2009). Therefore, this 'learning by doing' can be greatly improved by social learning. According to Bandura (1977), the social learning theory stipulates that people learn through observing others' behavior, attitudes, and outcomes of those behaviors. From observing others, one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action (Glasser, 2009). We learn most from 'models' who are attractive to or influential for us, or from people who are simply 'like us'. Because of internal relationships between participants when engaged in a process, learning can be more than only individual learning (Siebenhüner, 2005). First, individual farmers usually have expertise that could be relevant to other farmers, stimulating constructive learning on farm-related topics. Second, contextual learning - being in the same situation - takes place. People imitate what they see in others, which can be explained by invoking the efficiency of social norms or aspects of social identity. Finally, reflective learning occurs through exchanging the evaluation of experiences (Bandura, 1977; Guijt and Proost, 2002). As a result, social learning is a higher form of learning occurring in a social context for the purpose of personal and social adaptation (Goldstein, 1981).

Learning always implies change and ideally generates improvement in knowledge and/or behaviour (van de Kerkhof, 2006). Through the different aspects of social learning (constructive, contextual, reflective), not only new knowledge can be acquired (first order learning), but also changes in attitudes, norms, perceptions and behaviours concerning a certain situation/issue can take place (second order learning) (Argyris and Schön, 1996). The latter is likely to occur only in those situations where a person is no longer able to avoid unwelcome information or when one deliberately wishes to reflect on one's professional practices. As an acting individual, we generally have the tendency to avoid fundamental reflection on the implicit assumptions that underlie common patterns of behaviour. Moreover, it can create discomfort to be confronted with information that does not match one's understanding of a situation. Therefore, we need others to help us notice not only what we fail to observe because of practical reasons, but also because of 'what we avoid seeing'. Consequently, a setting (e.g., a social learning setting) in which one is stimulated by others to take into consideration new and possibly counter-intuitive information may encourage and accelerate the learning required for stimulating changes (second order learning) (Loeber et al., 2004). Hence, social learning is potentially a means to more general outcomes that are of a 'transformative' nature, since these involve changing the wider context for the development and implementation of new behaviour (Tuinstra et al., 2008).

**Participatory approaches: an advantage in advance?**

One way to encourage this social learning is bringing farmers together in study or discussion groups. In the study of Guijt and Proost (2002), farmers mentioned many reasons to participate in discussion groups: almost all were related to the learning aspect. Participants see each other as colleagues (people 'like us') and not as competitors, which allows social learning to take place. Farmers are gaining in skill through the aforementioned aspects of social learning. Very important is that farmers will widen their 'evaluative frame of reference' (Leeuwis and Van den Ban, 2004). Furthermore, farmers in a discussion group meet and work with colleagues who may have a different learning style than themselves. Kolb et al. (1984) identified four learning styles and Senge (1990) stated that integrating persons with a different learning style also enhances the learning process.

During recent years a variety of sustainability assessment models are increasingly being used in participatory processes involving stakeholders, in order to learn about integrated solutions to persistent problems of unsustainable development (Bohunovsky and Jäger, 2008). Some authors (e.g., Rotmans, 1998) have recognised the important role these models can have in supporting social learning. However, until now, the effectiveness of such models on social learning has not been thoroughly evaluated and evidence is scarce (De Kraker et al., 2009). Studies of Siebenhüner and Barth (2005), Van Paassen (2004) and Sterk (2007), only suggest the need to involve stakeholders in model development and production of model results to make the models more effective as social learning tools. The learning processes as such need to be examined more critically. The aim of this study is to contribute to resolving this "paradox of model supported social learning" (Armitage et al., 2008) and test if an integrated assessment model, MOTIFS, used in discussion groups can support social learning.

**The MOTIFS case**

This study uses the ISA-model MOTIFS, an indicator-based sustainability monitoring tool for Flemish dairy farms. It allows us to monitor farm progress towards integrated sustainability, using a set of relevant indicators. The tool offers a visual aggregation of indicator scores into an adapted radar graph, considering ten sustainability themes related to ecological, economic and social aspects (Fig. 1). To aggregate the indicators for different sustainability themes, we defined benchmarks to rescale indicator values into scores between 0 (indicating a worst-case situation) and 100 (indicating assumed maximum sustainability). This allows for a comprehensive overview and mutual comparison of the indicators for different sustainability themes. MOTIFS is a visual multi-level monitoring tool. Level 1 gives an overview of the farm's overall sustainability (Fig. 1). Level 2 gives an overview of the

sustainability themes within a specific sustainability dimension. In level 3, the indicator scores for a specific theme are visualised. So, starting from an overall view of his farm's sustainability, a farmer can zoom in on the underlying themes and indicators into as much detail as desired. The aim of MOTIFS is to guide farmers' management towards a higher level of sustainability. A detailed description of MOTIFS and its underlying methodology is provided by Meul et al. (2008).

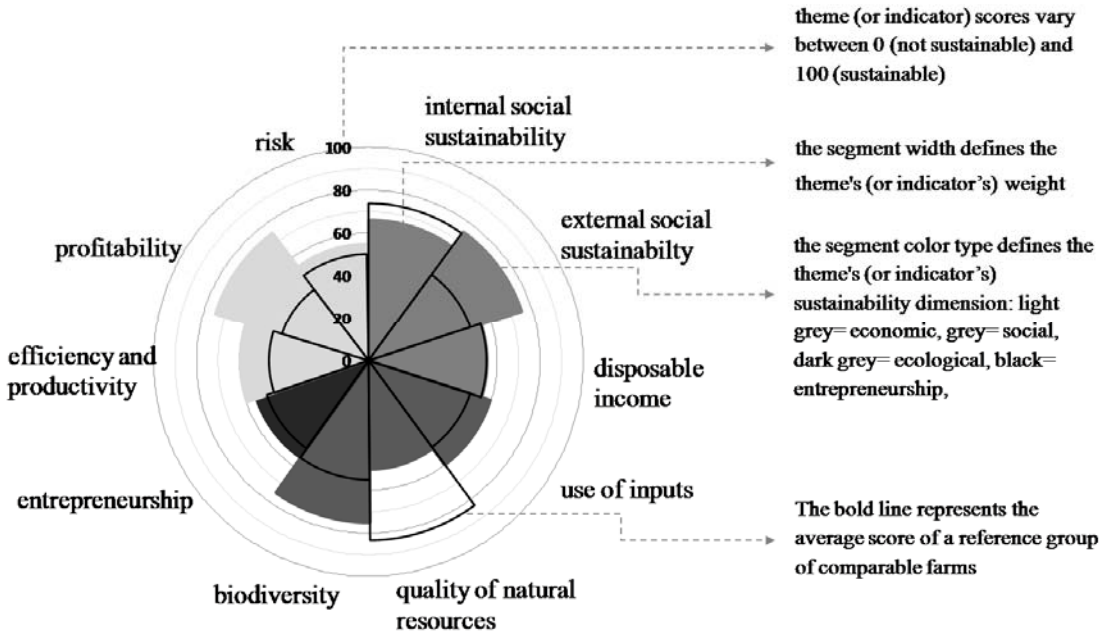


**Figure 1.** MOTIFS, level 1 graph and instructions on the reading and interpretation (after Meul et al., 2008).

During the validation phase of the tool, we observed that MOTIFS was very important in discussion groups, and farmers appreciated the learning aspect highly (Meul et al., 2009). Meul et al. (2009) recommended to structurally include a learning process for farmers by feedback, analysis and reflection in the practical application of MOTIFS. Therefore, MOTIFS has been used in discussion groups during the following implementation phase (Meul et al., 2009; De Mey et al., submitted).

We have distinguished two learning cycles in this implementation phase. The first learning cycle occurred between model developers (scientists) and model users (farmers and advisors) in which the ability to learn refers mostly to the developers of MOTIFS. They can adjust the model, while the feedback comes from the model users. This learning contributes to methodological learning about the assessment model MOTIFS (De Mey et al., submitted). As MOTIFS is used in discussion groups of dairy farmers guided by an advisor and assisted by an expert, a second learning cycle takes place with the model users. Consequently, the question arises whether social learning takes place in this second learning cycle. Do the model users acquire new knowledge? Do they experience a change in attitudes and values on sustainability? Can this lead towards a change in the behaviour of farmers on the sustainability aspect?

## Methods

### The overall methodological framework

In this study, we use MOTIFS in discussion groups with the attendance of an expert on the topic discussed. Two groups of dairy farmers of the public farm accountancy data network (FADN) met four times to discuss MOTIFS results. Except for the first launch session, the other three sessions dealt with one of the three aspects of sustainability. They specifically discussed the indicators water and energy efficiency, alternative water and energy use and nitrogen/phosphor surplus and efficiency as ecological indicators, labour/capital/land productivity, labour profitability, return on

equity and return on assets as economic indicators and last, farmer's pride and landscape management as social indicators.
In the past, the FADN farmers have used a limited amount of accountancy data to gain insight into their farm's performance. In this study, MOTIFS provides them a different, more visual aggregation of sustainability indicator scores, and allows for holistic interpretation of the farm's overall sustainability and the farm's strengths and weaknesses. The participation in discussion groups is also new to the farmers. As a result, through setting up these discussion groups, we create a stimulating environment for social learning to take place.

**Interviews with participating farmers**

The overall emphasis of this study is to detect aspects of social learning, which can include both cognitive and affective reactions. Therefore, a qualitative research approach was most suitable.

In this first step, we interviewed the farmers a first time before they took part in the discussion groups and before they used MOTIFS or any other integrated assessment model. At that time, their knowledge, motivations and behaviour were based on the information they got in the past through regular canals (e.g. informal contacts, media, school education, through advisors...) (Leeuwis and Van den Ban, 2004). As social learning potentially involves acquiring new knowledge (first order learning) but also a change in attitudes, perception, motivations and behaviours on a certain issue/situation (second order learning), we needed to explore these factors in particular among the participants. Through the use of semi-structured interviews are, we specifically asked for farmers' motivations of their behaviour in the past. This included asking on which grounds they have based their decisions in the past: decisions to implement a major change, innovations or concrete actions carried out on the farm. We also asked for their knowledge and attitude on the sustainability concept, as sustainability forms the central theme of the discussion groups. All 19 farmers could be interviewed before participating in the discussion groups. The first discussion group had eight participants while the second group had 11.

We analysed four aspects: i) the decisions/changes the farmers made/implemented in the past, ii) the sources for their information gathering so far, iii) their knowledge on the definition of sustainability and iv) the motivations of the farmers to decide and implement changes, as linked to sustainability when possible. Through the methodology of grounded theory, we mapped the specific motivations of the farmers and their knowledge about the concept of sustainability. We used this theory as a way to understand the research situation. Grounded theories are likely to offer insight, enhance understanding and provide a meaningful guide for action (Strauss and Corbin, 1998). Although grounded theory may deviate from traditional research design, it is a systematic research method with a well-described procedure for data gathering and analysis. The interviews were analysed in Nvivo 8 (QSR International, 2008), using the method of open coding as described by Strauss and Corbin (1998). The large amounts of interview data were conceptualised into smaller pieces of data and labelled as concepts when a certain phenomenon was mentioned by two or more farmers. After coding five interviews, we discussed the preliminary results in a group of three researchers for triangulation. This ensured a further logical and objective determination of concepts and categories. After coding all data, the concepts were further analysed and grouped into categories again after a profound discussion by a group of three researchers. As a result, we know on which grounds these farmers make decisions for change or innovations before using an ISA in discussion groups. Furthermore, we gained insight into their knowledge of and their attitude about sustainability.

In the discussion, we framed these results into theories or models from previous studies. In particular, we carried out a literature study especially to find out the links or relations between the different concepts or categories found in our results through grounded theory. The results of this first step is the reference base for the further research.

We need this information to carry out the second step in which we will try to detect changes in the knowledge, attitude, motivations and behavior of the farmers, and explore whether these changes

are in the direction of more sustainability. This will allow us to detect social learning aspects. In the discussion section, we also discussed the methodology for this second step on the basis of our results of the first step.

## Results

Participants were questioned about the main innovations or changes they implemented during the last decade. The majority of changes were related to new or modified infrastructure, such as new or larger stables, new types of animal pens, and floor mats. Other included modified feeding rations, crop rotation, green manure, grass strips, and changes in water use and recycling. Participants were also asked on which information they based their decision, and what sources they consulted. These sources were quite diverse and included meetings, specialised press, courses, trade fairs, advisors, and the internet. However, one source was constant for all participants: their colleagues (Quotes a – c).

*'There are quite a lot of dairy farmers within this region, all at the same level, which makes it easier to ask something. There is a quite good rapport between colleagues'* (Quote a)

*'Colleague farmers, you learn the most from them'* (Quote b)

*'That to me is the most important, the contact with other farmers'* (Quote c)

Finally, the participants were also asked about their knowledge of the concept of sustainability and sustainability measures. Results varied greatly between farmers, ranging between an almost complete lack of knowledge, often combined with a disinterest in the subject (Quote d), to farmers who have a more profound knowledge, and often interest, in the subject. They more often link several distinct aspects to sustainability (Quote e). The majority of farmers is situated between these two extremes.

*'Sustainability is just a word, a very general term. People accept something because it's 'sustainable', but what does it mean, sustainable? Something that has a longer lifespan, maybe?'* (Quote d)

*' We have to earn a living in a sustainable way, now, but also in 20 years. What else does sustainability mean? That we find a way to keep on farming like we are doing today. So don't exhaust the soil, try to suppress certain diseases in a natural way, and avoid the overuse of antibiotics and pesticides. Also towards our cows, try to feed them and take care of them in a good fashion, so that we don't have to slaughter them next year, but can keep them a year or two longer, for instance. Anything that contributes to an agriculture that allows us to keep on farming in the future. … And perhaps also something about society, I always try to be as acceptable as possible towards society, have a clean farm, etc..'* (Quote e)

After analysing the first 5 interviews, we developed a preliminary and simplified model to explain how the motivation for decision making was formed (Fig. 2). Knowledge acquired over the years through different sources (upbringing, education, colleagues, etc.) has a profound influence on a person's values and attitude. However, these attitudes and values were not the sole driving force to motivate a certain decision, as several external factors, or the view of the farmer on these external factors, also contributed to this motivation and the resulting behavior.

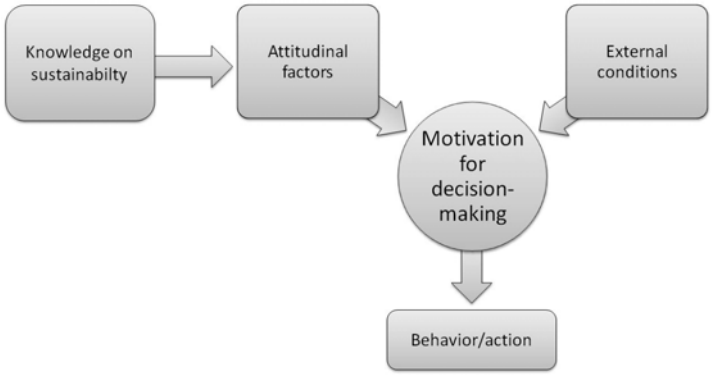


**Figure 2.** Preliminary model (by authors).

Armed with this knowledge, we then analysed the other 14 interviews. As a result, we obtained 51 concepts mentioned by more than one participant that were related to motivations for actions/behavior on the farm. According to our preliminary model, we tried to assign them, if possible, to either attitudinal factors or external conditions. Some of these concepts could also be further grouped into categories.

Of the 51 concepts, 23 could be described as attitudinal factors. They ranged from extremely negative attitudes, (Quote f) to being more moderate, (Quote g), or more positive attitudes, (Quote h).

*'We see all those ecological things as a direct nuisance. We wouldn't opt for grass strips on arable land or things like that'* (Quote f)

*'You can work in a sustainable manner, but if you don't have a good yield, or you can't get a decent income, it's no use. That is the most important for me, that's why we work'* (Quote g)

*'In earlier days, when I still lived at home, when you had a maize crop and it didn't grow enough, you just added another handful of fertiliser, so to speak. I don't do that anymore, and my colleagues neither. I just want to work as well as possible.'* (Quote h)

The attitudes were strongly dependent on the type of measure or innovation which is discussed, and this differs quite strongly between individual farmers. An example was the installation of grass strips on arable land to reduce contamination of the water. Some farmers considered this to be a positive measure, and even believe this can be profitable for the farm in the long run, while others saw the benefits for the environment, but don't believe it can be profitable, while still others claimed such measures go directly against the profitability of the farm, and didn't even mention other benefits that can be associated with such measures.

Nevertheless, as seen from the preliminary model, motivation was not steered by attitudinal factors alone, but also by a wide range of external conditions. Of the 51 concepts, 21 could be classified as external conditions, which were further divided into three categories, i.e., ecological, social and economic conditions. The main concepts that influenced the motivation for behavior were classified under economic conditions, i.e., labour efficiency, resource prices; investment cost, increased productivity, and profitability. Almost equally important was animal welfare and lifespan, which also had an economic side. Although farmers care directly about the welfare of their animals, they often linked it to increased productivity in one and the same sentence (Quote i). Finally, another main external condition that influenced motivation was legislation. Even if combined with a strongly negative attitude, legislation is a powerful external condition that obliges farmers to implement innovations (Quote j). However, it is possible that an innovation or change, originally considered an obligation, has over the years changed the attitude of the farmers towards a more positive view (Quote k).

*'For our cows we would do anything, we would pamper them, so that they also would have a good production'* (Quote i)

*'It now runs off to the surface water, but if someone would say that we would have to install a reed bed, than we just have to do it. It just depends on the legislation. I make changes, but simply because it's legally required'* (Quote j)

*For instance, on ecology, if you see now what has changed with the legislation on fertilisation. I no longer see it as a huge disadvantage, at least with some minor changes. It made us think about how we still can have a good yield with fewer resources, and that can only be considered a benefit.'* (Quote k)

Last, six concepts (legislative obligation, old or inadequate infrastructure/assets, lack of support, time investment, wanting/needing to evolve - improve, habits) could not be immediately classified using our preliminary model. Furthermore, all concepts need to be sorted out further to get a view on the factors that generate the human behavior before we can look for social learning.

## Discussion

### Understanding the factors influencing the human behavior on the sustainability issue

A literature study was carried out to get more insight into the factors and the relation between the factors involved. During the data handling, we noticed that when asked for reasons of their actions, farmers mentioned both internal as external motivations. One of the most significant efforts to overcome the internalist-externalist dichotomy in the social psychology literature is the attempt by Stern (2000) to develop integrated "attitude-behaviour-constraint" (ABC)-models of environmentally significant behavior. Namely, behavior (B) is an interactive product of personal sphere attitudinal variables (A) and contextual factors (C).

Attitudinal variables considered in such theories might include a variety of specific beliefs, norms and values as well as general 'pre-dispositions' to act in certain ways. Contextual or external factors can potentially include a wide variety of influences such as: monetary incentives and costs, physical capabilities and constraints, institutional and legal factors, public policy support, interpersonal influences or influence by stakeholder groups (e.g., social norms) . In this model, the role of habit is absent. In addition, we could not catalogue habit under the attitudinal or external factors. However, this is an important factor in the behavior. Stern (2000) acknowledges this and proposes that an integrated model of environmentally significant behavior would consist of four factors: attitudinal factors including norms, beliefs and values, external factors, personal capabilities and habits.

When we look into our data, we indeed notice that beside attitudinal and external factors, certain habits and personal capabilities also influence the farmer's decision making and behavior. Furthermore, some of the concepts are clearly a mix of attitudinal and external factors. We, therefore, used this framework to further sort out the data and related concepts. As certain concepts could not be unequivocally attributed to a single category (indicated in bold, Table 1), we referred to these concepts in all relevant categories. For instance, 'legislation unrealistic or to strict' can be considered both a external factor or an attitude, depending on the legitimacy of this statement. If the legislation has in fact become more strict this can be an important external factor in the decision-making process. On the other hand, if this is an exaggeration of the reality, it rather reflects a more negative attitude of the farmer.

**Table 1.** List of attitudes, external factors, habits and personal capabilities influencing the decision making of 19 farmers before they used MOTIFS in discussion groups.

| ATTITUDES | | | HABITS |
|---|---|---|---|
| *Positive* | *Moderate* | *Negative* | |
| Sustainable measures are | Loss of self-regulation | Conflict economy-ecology | Habits |
| Increased awareness on sustainability (present/future) | Prefer to have cows in the meadow | **Legislation unrealistic or too strict** | |
| Wanting to be a good farmer | Content with current situation | **Unfair competition from abroad** | |
| Prefer to have a farm open to visitors | Sustainable measures are good as long as they are | Sustainable measures are not useful | |
| Sustainable measures can be profitable | Sustainability is a shared responsibility | Annoyance about attitude-behavior of colleagues | |
| **Improved water quality** | Contact with nature (animals) | Profit too low for the work that is invested | PERSONAL CAPABILITIES |
| **Improved soil quality** | | Lack of awareness on sustainability | |
| **Reduced energy consumption** | | **Sustainable measures are more labour intensive** | Lack of support |
| **Improved environment** | | **Sustainable = more laws and regulations** | Knowledge on sustainability |
| **Animal welfare – lifespan** | | **Administrative burden** | Budget |
| **Landscape management** | | (Dairy) farmer as scapegoat | Investment of time |
| | | Ecological aspects are a nuisance | **farm-region-situation not suitable** |
| | | **Own farm-region-situation not suitable** | |
| EXTERNAL FACTORS | | | |
| *Economic factors* | *Ecological factors* | *Social factors* | *Other factors* |
| Labour efficiency | **Improved water quality** | **Animal welfare – lifespan** | Legislative obligation |
| **Sustainable measures are more labour intensive** | **Improved soil quality** | Acceptance by society | **Legislation unrealistic or too strict** |
| Resource prices | **Reduced energy consumption** | **Landscape management** | **Sustainable = more laws and regulations** |
| Investment cost | **Improved environment** | Respect from society | Old or inadequate infrastructure/assets |
| Productivity | | Good combination work – family | **Wanting/needing to evolve - improve** |
| Subsidies | | Help from family – social | **Administrative burden** |
| Profitability | | Generation conflict | **Own farm-region-situation not suitable** |
| Yield | | | |
| Expansion of the farm | | | |
| Uncertain market | | | |
| **Unfair competition from abroad** | | | |

A similar reasoning also applies to 'sustainable measures are more labour intensive', 'sustainable = more laws and regulations', 'administrative burden', and 'unfair competition from abroad'. For the concept 'wanting/needing to evolve – improve' the situation is slightly different. During the coding process, quotes reflecting this were grouped under a single concept, while in fact 'wanting to evolve' reflects a positive attitude from the farmer, while 'needing to evolve' reflects a external factor, where the evolution or improvement is felt more like an obligation, driven by policies, legislation, or society. An analogous interpretation can be given to the concepts classified as ecological factors and the concepts 'animal welfare – lifespan' and 'landscape management'. If the underlying reason is a personal belief that it is actually important to for instance improve the environment, this can be considered a more positive attitude of the farmer towards sustainability. On the other hand, if these actions are steered more by legislation, society, or monetary incentives, it is more accurate to consider this as a external factor. As the reason is not always mentioned explicitly during the interview, these concepts are again listed both under external factors and attitudes.

Finally, a single concept, i.e. 'own farm-region-situation not suitable' can, depending on the exact context, be considered a external factor, an attitude or referring to a personal capability. If the statement does not accurately reflect the actual situation, it again reflects a more negative attitude

of the farmer. However, if for instance the soil type in a particular region is unsuitable for certain changes, it represents an external factor. Finally, several farmers feel they lack the personal capabilities to have 'green care' on their farm: they lack time, or infrastructure, or the right people to support that on their farm, even when they have a more positive attitude towards such measures.

In this study, we will not link these four factors or search for the relation between them leading towards behavior, as this requires a quantitative study using for example the theory of planned behavior (Ajzen, 1991). However, to understand the possible relations between factors leading towards behavior, we searched for a model which could provide us a certain insight in our results. We found the motivation-opportunity-ability model proposed by Ölander and Thøgersen (1995) (Fig. 3) being relevant. In this model, similar factors are included and the relation between the factors is presented. External factors are recognised in the situational conditions or opportunities. Habit and personal capabilities are included in the ability, which also contains the task knowledge. Both the opportunity and ability influence the motivation of which attitude is an important factor, leading towards behavior.

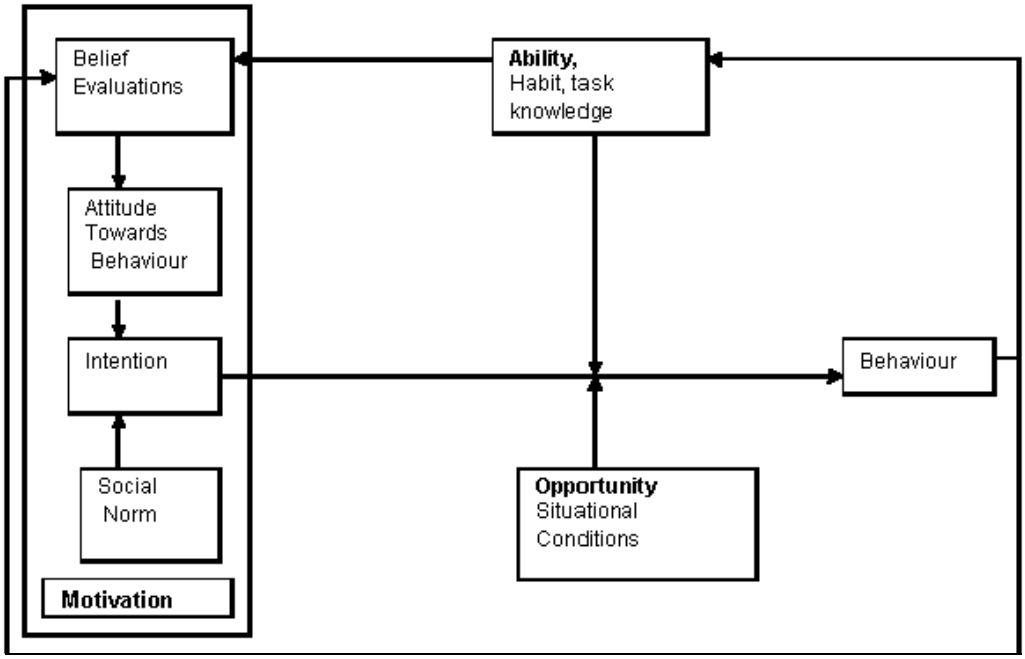


**Figure 3.** The motivation-opportunity-ability model (Ölander and Thøgersen, 1995).

## Evaluation of social learning

Once we understand the factors influencing the behaviour of farmers, we can now look at the different aspects of social learning that possibly take place after participation in discussion groups and the use of MOTIFS. The question that arises is: What tools are available to assess learning processes and how can we link them to the aforementioned models?

Kirkpatrick's four-step hierarchy of evaluation provides a useful framework for tracing a consistent sequence of effects from a learning intervention (Table 2) (Loevinsohn et al., 2002). However, Van der Veen (2000) points out that it has been used for the most part in relation to reproductivist-oriented learning, but there appear to be no insuperable methodological obstacles for using it in constructivist and transformative contexts and in assessing the outcomes and impacts of a certain approach (Loevinsohn et al., 2002). As a result, we consider this framework as a useful tool for detecting aspects of social learning of an ISA model in discussion groups.

However, our focus is on the social learning aspect as it relates to decision making. Therefore, we suggest to expand the indicators for this second level by attitudes, habits and personal capabilities in

addition to knowledge. It is clear that the combination of the three elements of social learning (constructive, contextual and reflective learning) should be able to induce a change in all these factors. For example, the constructive and reflective learning might responsible for a knowledge change, while both contextual and reflective learning can be triggers for a change in attitudes and habits. External conditions themselves cannot be changed by using MOTIFS in discussion groups. However, the knowledge of these external conditions can be changed. Therefore, we also suggest to take them into account, because the farmer can mention a change in his view on these external conditions. In fact, using the technique of semi-structured interviews, this study measures the view of the farmer on his knowledge, the external conditions, his attitude, his habits and his personal capabilities on the sustainability issue.

**Table 2.** Kirkpatrick's hierarchy of evaluation (modified from Van der Veen, 2000).

| Level of evaluation | Key indicator | Indicators in this study |
|---|---|---|
| **1. Reaction** | Participants express satisfaction with the learning process | Satisfaction |
| **2. Retention (Learning)** | Participants remember and explain context | Knowledge<br>External conditions<br>Attitude<br>Habits<br>Personal capabilities |
| **3. Application (Behaviour)** | Participants use what was learned in actual practice | Planned actions<br>Completed actions |
| **4. Impact (Result)** | Participants gain benefit, e.g., social, economic and/or environmental | Benefits (social, economical and environmental) |

To be able to evaluate social learning in the second step, the same 19 farmers will be interviewed after they took part in the discussion groups (four sessions). At that time, their knowledge on sustainability and attitude and behaviour on decision making can have changed. As MOTIFS aims to guide farmers towards more sustainability, we are particularly interested whether their knowledge about sustainability has improved and whether their decision making is based on more sustainable grounds. The evaluation will therefore focus on change related to the sustainability concept. As a result, we will test the effectiveness of the tool MOTIFS together with the participation in discussion groups. However, if changes are perceived, the following questions arise. Did the changes occur through social learning and through the use of MOTIFS in these discussion groups? Or were there other triggers? Does the tool MOTIFS has an added value above the discussion group itself? In the first instance, these two parts of the model (MOTIFS tool and use in discussion groups) seem to be inseparable in the evaluation of their effectiveness in social learning. However, in order to answer the aforementioned questions, we will divide the second interview into two parts. In the first part, we will not refer to MOTIFS and will only try to ask for and detect changes in knowledge on sustainability and motivations, attitudes and behavior on decision making. The perceived changes at that time will highly probably be the result of social learning through the use of MOTIFS in discussion groups. To further confirm this and to search for the added value of MOTIFS as a tool, a second part is needed in the interview. The farmers will be asked if and where MOTIFS used in discussion groups had an influence according to themselves and if MOTIFS as a tool was perceived as valuable.

## Conclusion

This paper presents the results of a first step of a broader study that will contribute to resolving the paradox of model supported social learning, namely do ISA models support social learning as supposed in literature. This first step serves as a reference base for the second step, where we will evaluate if social learning actually took place when MOTIFS is used in discussion groups. To this end, we searched for a methodology of evaluation of social learning. The second step of this study will be based on the insights from this first step.

From the results of this first step, we can conclude that the participation in discussion groups is appropriate for these dairy farmers, as their colleagues are their most important information source.

Furthermore, the main concepts that influenced the motivation for behaviour were classified under economic external conditions. Also legislative constraints were mentioned as very important in their decision making. A question that arise is: Will participation in discussion groups using MOTIFS change these motivations towards more sustainable motivations? We will evaluate this through the use of Kirkpatrick's hierarchy of evaluation (Table 3), in which factors that influence behaviour on decision making are added. We will evaluate only the first three levels, as level four cannot be reached in one year. Measuring effects in terms of completed actions in the third level may be unrealistic within the time span of one year, given the long-term aspect of sustainability. However, planned actions that possibly lead to more sustainability might be detected within a year.

We see differences in response between farmers in this first step of the study, namely differences in knowledge on the sustainability aspect, differences in attitudes, etc. The latter strongly depends on the type of measure or innovation they are discussing. Therefore, we can expect also a range in responses in the second step, namely, after their participation in the discussion groups, and thus potentially a range in achieved changes through social learning. Therefore, we will probably not be able to draw conclusions for all 19 farmers at the same time. This differentiation between farmers will probably have various causes, for example their learning style, their potential to learn or to adapt. However, since drawing conclusions for each farmer separable is also not possible, there will probably be a need to classify the farmers according to the results.

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