Social psychology and biodiversity conservation in agriculture

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Abstract

We investigate farmers' intentions to apply biodiversity conservation practices from psychological perspective, using an adapted version of the theory of planned behaviour (TPB), including group norms and putting emphasis on moral norms and self-identity. The study is based on a quantitative survey (n = 106) in Belgium, analyzed using confirmatory factor analyses and path analysis. Results show that the impact of attitudes, social norms and perceived behavioural control on intentions is almost fully mediated through moral norms and self-identity. To have a sustained impact, change actions should strive to embed biodiversity conservation into the social norms and into the good farmer identity of the farming community.

1. Introduction

Today, it is commonly acknowledged that the eco-systemic, and the inter- and intra-specific diversity of natural life is under threat of being irremediably lost (Negri, 2005). There exists several policy instruments as well as public and private outreach programs to introduce biodiversity-enhancing practices into the dominant farming systems. The success of such strategies, however, remains critically dependent on the factors that induce farmers to respect and foster biodiversity. Perrings et al. (2006) and Norris (2008) state that in order to enhance biodiversity conservation, we need to integrate conservation science with agricultural and social sciences. Mascia et al. (2003) point out that "conservation interventions are the product of human decision making processes and require changes in human behavior to succeed" (Mascia et al., 2003, p. 649). Factors affecting farmers' intentions to use practices for biodiversity conservation have been investigated in many countries and across scientific disciplines. Siebert et al. (2006) provide an overview of the state of knowledge. They reviewed about 160 publications and research reports from about 20 mainly European countries. Altogether, they found a mixture of theoretical, conceptual and empirical studies, with 15 scientific disciplines represented in the sample. Our study adopts the behavioural approach (Burton, 2004) that investigates the psychological characteristics of farmers that influence their behavior. We use an adapted version of the theory of planned behavior (Ajzen, 1991). The TPB has been used quite a lot to study farmers' behaviour (e.g., Fielding et al., 2005; Wauters et al., 2010; Wauters and Mathijs, 2013The single most important shortcoming of the TPB as a comprehensive model is the fact that, for a lot of contexts and behaviours, it insufficiently incorporates concepts from social theory. Indeed, meta-analyses have shown that among the TPB concepts, subjective norms are the weakest predictors of intentions (e.g. Blue, 1995; Armitage and Connor, 2001). Therefore, this study extends the TPB with concepts from social theory. More specifically, we extend the model with (i) group norms (the subjective norm of the group to which the respondents belong), inspired by social identity theory; (ii) moral/personal norms, inspired by norm activation theory; and (iii) self-identity (the degree to which the behaviour fits with the self-concept of the respondents), inspired by identity theory.

2. Abstract

The study was performed on a cross-sectional sample of farmers in Flanders, the northern region of Belgium. A pre-survey was conducted on a purposive sample of 12 farmers, consisting of face-to-face interview, based on a loose set of open question relating to: (i) (dis)advantages of the respective biodiversity practices; (ii) perceived barriers to adoption of these practices and (iii) groups or individuals from whom the respondents perceived pressure

to apply – or not – these practices. This information is used to assess the underlying belief structure of A, SN and PBC. The actual survey consisted of a postal questionnaire distributed to an initial random sample of 520 respondents. After a few weeks, a reminder was set, resulting in a 20% response rate (106 respondents). However, after data cleaning and missing value analysis, we had to delete 7 cases due to a too large proportion of missing values. Hence, our final sample had 99 respondents. Attitudes, different types of norms, perceived behavioural control and intention towards biodiversity conservation practices were measured in our survey using slightly adapted version of existing measurement items. All items were 7-point items, were arranged in a random order and a number of items was reverse scored. All constructs and their intended indicators are presented in Table1.

Table 1. Latent constructs and hypothesized item structure.

Construct	Items
Attitude (A)	Applying practice x is very unimportant – very important
	Applying practice x is very bad – very good
	Applying practice x is very unpleasant – very pleasant
	Applying practice x is very useless – very useful
	Applying practice x is very negative – very positive
Subjective norm (SN)	Most people whose opinions I value think I should apply practice x
	Most people who are important to me think I should apply practice x
	It is expected of me that I apply practice x
Perceived behavioural control (PBC)	It is mainly up to me whether I apply practice x
	For me, it is almost impossible – very possible to apply practice x
	I have very little control – very much control over the decision to apply practice x
Self-identity (SI)	I am not the kind of person that applies practice x
	Applying practice x is an important part of who I am
Group norm (GN)	Many farmers that I know think I should apply practice x
	Most farmers from my village are applying practice x
	Most farmers that I know are applying practice x
Moral norm (MN)	How obliged do you feel to apply practice x
	I would feel guilty if I would not be applying practice x
Intention (I)	I plan to apply practice x in the near future
	I am resolved to apply practice x in the near future
	I intend to apply practice x in the near future

Last, the survey consisted general questions relating to farm and farmer characteristics such as age, education, tenure, size, farm activities. We also added several questions related to farmers general knowledge, awareness and opinions on biodiversity, biodiversity conservation and the bi-directional link between farming and biodiversity.

Structural equation modeling allows investigating the validity of the reflective measurement model and the structural model simultaneously. However, for complex models, this requires large sample sizes. We use a two-step procedure in our study (see e.g., Mastrangelo et al., 2013) that allows to test more complex models in cases where sample sizes are typically lower. First, we performed a series of confirmatory factor analyses, to check whether we can retain the hypothesized item structure. The CFA's goodness-of-fit was evaluated using different goodness-of-fit measures. Items with loadings smaller than 0.50 were excluded. To validate the results of the CFA, item-to-item and item-to-total correlation

and Cronbach's alpha's of the eventual measurement scales were calculated. Second, we tested the fit of the overall model and investigated the relationships between the different psychological constructs using path analysis on composite scores of all constructs calculated as the average of the individual item scores. The validity of our models were evaluated based on a variety of goodness-of-fit indices. Upon approval of the overall model, we examined the sign and significance of the relationships between the variables. All analyses were carried out using the AMOS program from SPSS.

3. Results

All summary statistics of our final sample, including farm and farmer characteristics are shown in table 2. The farmers in our sample are on average 53 years old, cultivate 34 ha of land of which they rent slightly less than half. The farmers judge their knowledge about the impact of biodiversity on farming and vice versa as medium good. Although the differences are small, farmers, on average judge the state of biodiversity to be better the closer to their own farm.

Table 2. Summary statistics of the sample (n = 99)

Characteristic	Statistic
Farm and farmer characteristics	
Age (years)	53.19 (10.42)
Farm size (ha)	34.39 (31.52)
Percentage leased land (%)	46.07 (31.60)
Farm type	
Arable farming	24.2%
Mixed farming	31.3%
Horticultural farming	22.3%
Livestock farming	22.2%
Perceived knowledge[a]	
Perceived knowledge about the impact of biodiversity on farming	4.00 (1.51)
Perceived knowledge about the impact of farming on biodiversity	4.05 (1.48)
Perceived state of biodiversity[b]	
Globally	3.94 (1.57)
In my country	3.58 (1.57)
In my region	3.44 (1.54)
On my farm	3.08 (1.48)
Amount of 'nature' in the farm's surroundings	3.56 (2.11)

[a] Average on a scale from 1 (very little knowledge) to 7 (very knowledgeable)
[b] Average on a scale from 1 (very bad state) to 7(very good state)

The results of the confirmatory factor analysis are presented in table 3 (buffer strips) and 4 (small landscape elements). Overall, the confirmatory factor analysis confirmed the hypothesized item structure. A few items with insufficient loadings were excluded. For the practice buffer strips, we had to delete one item in the measurement scale PBC and GN because of a too small loading. Deletion of these items improved the overall fit of the measurement model. Goodness-of-fit measures, item-to-total correlations, item-to-item correlations and Cronbach's alpha's for all constructs were calculated. Overall, the fit of our measurement models is acceptable, although some item-to-total correlations are below the cut-off value of 0.40 (Hair et al., 2010) and some item-to-item correlations are below the cut-off value of 0.30 (Hair et al., 2010). However, given the goodness-of-fit statistics and the theoretical support for our hypothesized measurement item structure, we consider both final

measurement models acceptable. Hence, we then proceed to calculate the composite variables as the average of all items for each respective latent construct.

The results of the structural model for small landscape elements are shown in figure 1. Numbers above arrows are standardized regression coefficient, numbers close by a rectangle are squared multiple correlations (R^2). All regression coefficient are highly significant and the model explain 68% of the variation in intention. The results of the structural model for buffer strips are shown in figure 2. Analogous to the previous model, all regression coefficients are significant and the model explains 72% of the variation in intention. Goodness-of-fit measures for both model are shown in table 3. Both models show that the influence of both subjective norms and group norms is mediated through farmers' personal moral norms. The influence of attitudes is mediated by both moral norm and self-identity. Perceived behavioural has a direct influence on intention, but part of its influence is mediated though self-identity.

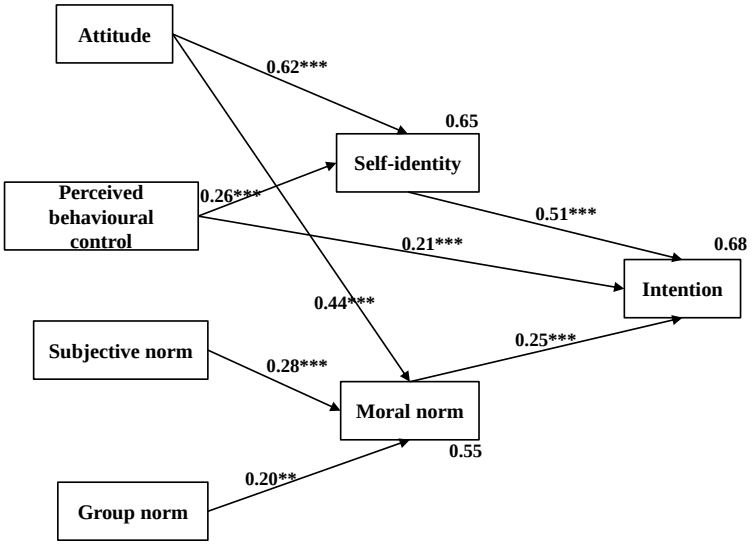

Figure 1. Graphical output of the structural model explaining the intention to implement small landscape elements (* and ** represent significance with p < 0.001 and p < 0.05 respectively)**

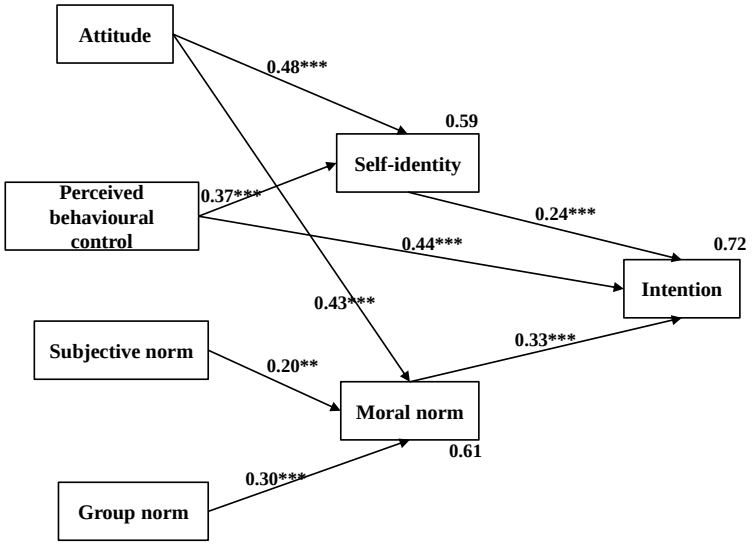

Figure 2. Graphical output of the structural model explaining the intention to implement buffer strips (* and ** represent significance with p < 0.001 and p < 0.05 respectively)**

Table 3. Model fit indices of the structural models

Model	Cmin	Df	Cmin/df	NFI	CFI	RMSEA
Small landscape elements	23.772	7 (p=0.001)	3.396	0.941	0.955	0.156
Buffer strips	7.614	7 (p=0.368)	1.088	0.982	0.998	0.030

4. Discussion

This study used an adapted version of the TPB, including concepts from norm activation heory and identity theory to explain how underlying psychological constructs influence farmers' intentions to apply biodiversity conservation practices. The results show that the underlying psychological constructs play a very significant role in farmers' intentions. Further, the results show that the impact of psychological construct can best be understood as being mediated through self-identity and moral norms. Our paper advances the psychological study of farmers' behaviour by using an adapted version of the theory of planned behaviour, that assumes a central role for self-identity and moral norm. As such, in order to encourage more environmentally farming practices, policy makers and extension agents should strive to influence and activate farmers' moral norms and self-identity. The latter should be seen as a psychological construct that captures the degree to which the practice of farming that included taking care of biodiversity is embedded in the good farmer identity. Our results show that unless policy mechanisms of other actions succeed in changing the good farmer identity, their impact is likely to end when the policy mechanisms or actions end (De Snoo et al., 2013).

The activation of moral norms means the degree to which farmers want to apply biodiversity conserving practices because they think that this is the right way to farm. Moral norms stem from social and group norms, and thus the practice of conserving biodiversity should be bred into the social norms of the farming community. New social norms should become embedded in the peer group in order to generate lasting changes to the common farming practices. Pretty (2003) notes that people often revert to their old way of doing things unless there have been accompanying changes in social norms.

Yet, an important remark is the fact that not all responsibility should be pushed towards the farmers. Policy makers and the research community have an important role to fulfil as well, for instance in trying to design, together with the farming community sustainable solution to biodiversity problems that fit better into the current farming systems.

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