



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

**Contributed paper prepared for presentation at the 81th Annual Conference of the
Agricultural Economics Society (AES), 02th - 04th April 2007, Reading, Great Britain**

**Changing Attitudes: Does Personal Experience Matter?
A Structural Equation Modeling Approach with Panel Data**

Aysel Tutkun

Email: atutkun@ethz.ch

Swiss Federal Institute of Technology Zurich ETH, School Domain for Environment and
Natural Resources S-ENETH, Institute for Environmental Decisions (IED)
Agricultural Economics – Agri-food & Agri-environmental Economics Group
Sonneggstrasse 33, 8092 Zurich, Switzerland

Abstract:

Conversion to particularly animal-friendly stabling (PAFS) is one of the programs for which Swiss farmers receive direct payments from the government. This conversion to PAFS is analysed within a structural equation model in order to 1) review the link between intention to convert and observed conversion behavior, 2) prove the influence of personal experience on changing attitudes and norms, after having converted.

The behavior model encompasses three theoretical constructs which influence the Behaviour: *Attitude* toward PAFS and *Subjective Norm* regarding PAFS, which both affect *Intention* to perform PAFS. Lastly, *Intention* influences the *Behavior*, i.e. observed conversion to PAFS. These variables are available for two time points, so one can differentiate between *Conversion1* and *Conversion2* and so on. In addition, *Behavior1* influences *Attitude 2* and *Subjective Norm 2* of the second time point so one can investigate if there is any effect of personal experience on these variables.

All in all the models have good fit, but results cannot be seen as supporting the underlying theory. At least the results indicate the weakness of the Theory of Reasoned

Action regarding the intention-behavior-relation, which has already shown in other behavior domains. But also the effect of personal experience on attitudes and subjective norm cannot be confirmed.

Keywords: attitudes, subjective norm, personal experience, observed behavior, conversion to particularly animal friendly stabling, theory of reasoned action

JEL classification: C8, D1, Q12, Z13

Copyright 2007 by Aysel Tutkun. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Introduction

In 1996 the Swiss population voted in favor of a sustainable agriculture when they employ environmentally friendly methods of farming with financial support (direct payments). Particularly Animal-friendly Stabling (PAFS) is one of the programs for which farmers get direct payments from the government, because it is seen as one of the existing alternatives for animal-friendly farming. However, up until 2004 only 41% of all Swiss farmers have converted to PAFS (BLW, 2005). In this study, this conversion is analyzed within a structural equation modeling (SEM) framework with panel data.

The application of SEM requires a well-defined theoretical framework, as it takes a confirmatory approach to the analysis of a given structural theory. The Theory of Reasoned Action (ToRA) is taken as the theoretical basis. This theory, developed by FISHBEIN & AJZEN (1975), is used in various studies of behavioral research, but rarely in the agricultural context.

The aim of this study is to examine the feedback loop assumed within ToRA which indicates that individuals may change their attitudes and subjective norms towards a given behavior after having experienced it, i.e. effect of personal experience on attitudes and subjective norm regarding the conversion to PAFS.

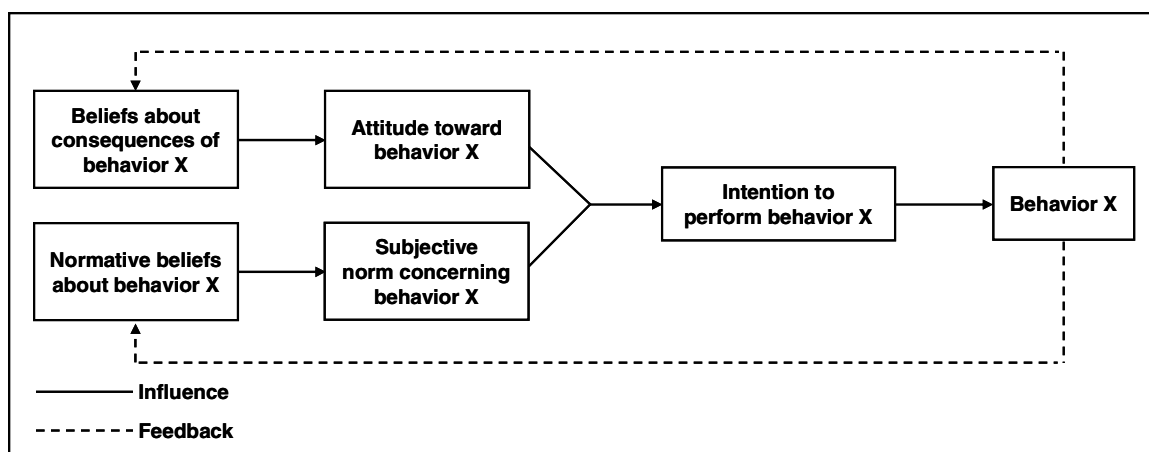
In fact, to examine this assumption panel data is required for at least two time points. Therefore two surveys were conducted, first in May 2003 and second in November 2004. In addition observed conversion data from December 2003 as well as from December 2005 is provided from the agricultural ministry of Obwalden so that it is possible to include variables before and after having converted. Swiss farmers can convert to PAFS step by step, e.g. first for their cattle, then for their pork and lastly for their poultry. So with this data set one can prove, if farmers did the second conversion step after having converted for the first time, i.e. after having personal experience with PAFS.

1. Theoretical background

Theory of Reasoned Action (ToRA)

The Theory of Reasoned Action (ToRA) (FISHBEIN & AJZEN 1975) is a general theory of every kind of social behavior. It encompasses three theoretical constructs (see Figure 1): the attitude towards a certain behavior and the subjective norm which both influence the intention to perform the behavior directly. The intention is the only one variable, which has a direct effect on behavior. Attitude and subjective norm are formed by two different kinds of beliefs¹, namely consequence beliefs and normative beliefs. Consequence beliefs influence the attitudes towards the behavior. These are subjective evaluations of the consequences of performing the given behavior. Normative beliefs cause the subjective norm with regard to the given behavior. The subjective norm shows the perceived social pressure to perform the behavior.

Figure 1: Theory of Reasoned Action (ToRA)



Source: Adapted from AJZEN & FISHBEIN 1975: 16

The more favorable the attitude toward a given behavior and the subjective norm, the stronger should be the person's intention to perform the behavior in question. Once an intention is formed, people are expected to carry out their intentions when the opportunity

¹ These different beliefs are influenced by individual and social background factors such as age, gender, culture and information; but these influencing factors are not considered in the theory.

arises (AJZEN 1985). After performing a behavior people can revise and change their beliefs, because personal experience is seen as one of the important factors for changing attitudes. Therefore, there is a feedback between the performance of the behavior and the beliefs. When beliefs are changed, a change in attitudes and subjective norm will also follow.

The foundation of the ToRA is the subjective expected utility theory (SEU) and, like the main assumption of the SEU, persons are assumed to behave in a rationally way. It means that persons are systematic information processors and they behave in accordance with their subjective expected or perceived utility (FISHBEIN & AJZEN 1975).

Diffusion Theory (DT)

The Diffusion Theory is used as another theoretical background as it is very similar to the ToRA and also assumes feedback loop between experiencing a behavior and the evaluation of the behavior. The Diffusion Theory has been mainly developed to explain the farmers' adoption of innovations (LEEUEWIS 2004). According to the Innovation Theory (ALBRECHT 1992; ROGERS 1995, 2003; VAN DEN BAN & HAWKINS 1996), the adoption of an innovation depends on the attributes of the innovation, social norms and communication channels which are used as information sources to reduce uncertainty about the innovation.

The attributes of the innovation are the relative advantages, the compatibility, the complexity, the trialability and the observability.

Social norms are established behavior patterns within a social system. Not to follow the norms will cause some kind of consequences.

Uncertainty about an innovation exists because not all persons have the same information or understanding of the innovation. Information sought through different communication channels can reduce uncertainty. Mass media channels are relatively more effective in creating general knowledge about the innovation and can therefore reduce uncertainty. However, interpersonal channels are relatively more effective in forming and changing

attitudes toward the innovation and thus influence the decision to adopt or reject the innovation. After having implemented the innovation individuals should have the best information about the innovation and should be able to prove it by themselves.

The adoption of an innovation is seen as a process and follows five main phases (ROGERS 1995, 2003):

- 1) **knowledge** about the innovation, to become aware of the innovation; in this phase, mass media plays an important role as a source of information;
- 2) **persuasion**, evaluation of the attributes of an innovation, i.e. formation of attitudes regarding the innovation, comparing its advantages and disadvantages; and friends and neighbors are the most important sources of information at this stage;
- 3) **decision** to adopt the innovation or not; this stage is described as an active information seeking and processing phase, the aim is to reduce uncertainty about the advantages and disadvantages of the innovation; important sources of information again are friends and neighbors;
- 4) **implementation** of the innovation; sometimes an adaptation of the innovation to the own farm environment may be necessary and personal experience is very important at this stage of the adoption process;
- 5) **confirmation**, i.e. the individual seeks reinforcement for the innovation-decision already made.

One of the most important assumptions within both theories is that people can change their attitudes towards a certain subject after gaining personal experience with that subject.

2. Methods of data collection and data analysis

To measure the theoretical constructs of ToRA a questionnaire was prepared and two surveys were conducted with all the farmers (May 2003: 804 farmers and November 2004: 782 farmers) in Canton Obwalden. All theoretical constructs are assessed by means of indicator variables, graded on a seven-point scale. In contrast, the conversion variable is graded on a four-point scale and indicates observed behavior, which was provided from the agricultural ministry of Obwalden. The return rate of the survey was good for the first survey (498=62%) and moderate for the second survey (266=34%). The survey data is divided into PAFS- and Non-PAFS-farmers because of the causal direction of the theories' constructs. The PAFS-farmers who are already practising a particularly animal-friendly stabling system were not included in the analysis. The analysis is conducted only with the 167 farmers who were Non-PAFS-farmers at the time of the first survey and who responded to both surveys.

All variables in the model are latent variables, which cannot be measured directly. Therefore they need to be operationalized through indicator variables (see Table 1). Unfortunately there are only single indicators for each latent variable available as it was not possible to conduct the same survey for two time points. Though it would be helpful to have multiple indicators for each latent variable, especially for attitudes and subjective norm.

Table 1: Operationalization of the latent variables

Latent variables	Code ^a	Indicator variables and their wording
Attitudes towards PAFS	Atti 1 / 2	With regard to income and amount of work for conversion to PAFS would be: very profitable (=7) – not profitable (=1)
Subjective norm regarding to PAFS	Norm 1 / 2	If I convert to PAFS, people in my own social environment would: favor it (=7) – not favor it (=1)
Intention to convert to PAFS	Int. 1 / 2	For me, the conversion to PAFS within the next two years is: highly probable (=7) – not probable (=1)
behavior	Conv. 1 / 2	Observed conversion data: 0 = no conversion, 1 = first conversion, 2 = second conversion, 3 = third conversion

^a 1 or 2 for survey variables indicate results from May 2003 and November 2004; 1/ 2 for conversion indicate data from December 2003 and December 2005.

The Structural Equation Modeling (SEM) used in the current study is a statistical method that takes a confirmatory approach to the analysis of a structural theory bearing on some phenomenon. It is a technique available to specify and to estimate models of linear relationships among measured variables (MV) and latent variables (LV). LVs are hypothetical constructs that cannot be directly measured like all the variables of the behavioral model. Therefore, each construct has to be represented by MVs that serve as indicators of them. A SEM model is a hypothesized pattern of directional and nondirectional linear relationships among a set of MVs and LVs. Directional relationships imply directional influence of one variable on another (regression paths), whereas nondirectional relationships are correlational and imply no directed influence (BOLLEN 1989; BYRNE 2001).

3. Results

The following results are calculated with SPSS 13 and AMOS 7 is used for SEM. The SEM-estimations are based on the Maximum Likelihood Method.

Though model calculations are made only with Non-PAFS farmers, it is interesting to look at the mean differences between PAFS and Non-PAFS farmers. In Table 2, it is clear that all mean differences are highly significant except the difference in Atti2, which is only significant at the 5%-level. Therefore the accuracy of discrimination of the variables between PAFS and Non-PAFS farmers is very high. It is also remarkable that the means of all variables of Non-PAFS farmers are less than the means of PAFS farmers. As expected, the Non-PAFS farmers have less favorable attitudes and norms about particularly animal-friendly stabling system than the PAFS farmers themselves.

Table 2: Mean differences between PAFS- and Non-PAFS-farmers 2003 - 2005

Variables	Mean		Standard deviation		Standard error of mean		Significances of the differences
	Non-PAFS	PAFS	Non-PAFS	PAFS	Non-PAFS	PAFS	
Atti 1	4.63	6.06	2.01	1.36	0.11	0.12	***
Norm 1	5.29	6.46	1.84	1.08	0.10	0.09	***
Atti 2	3.95	4.51	1.90	2.18	0.15	0.22	*
Norm 2	4.75	5.79	1.78	1.45	0.14	0.15	***

* = 5%-significance level, ** = 1%-significance level, *** = 0,1%-significance level

In Table 3, means and standard deviations of the variables for Non-PAFS farmers of the two surveys are presented. One can see that there are slight to moderate differences between the surveys. Remarkable is that observed conversion in both time points is rather less, especially the first conversion.

Table 2: Descriptives of Non-PAFS-farmers 2003-2005

	Descriptives	Attitudes	Subjective Norm	Intention	Conversion
1. Survey (May 2003)	Mean	4.71	5.44	3.23	0.09
	Standard deviation	2.07	1.74	2.44	0.36
2. Survey (November 2004)	Mean	4.59	4.86	2.35	0.24
	Standard deviation	1.97	1.79	1.94	0.51

In Table 4 the Pearson correlations are given. In both surveys, the norm indicators have the highest correlations with the attitude indicators (0.52 and 0.49). However, correlations between conversion 1 and other variables within the first survey are poor, in comparison to the second survey where these correlations increased, but not much. Problematic is the correlation between intention 1 and conversion 1 within the first survey, as it indicates no correlation at all. In contrast, correlations between the variables of the first and the second survey are more reasonable. In both surveys, the correlations between attitude and conversion as well as between norm and conversion are higher than between intention and conversion.

Table 4: Pearson Correlations of Non-PAFS-farmers 2003-2005

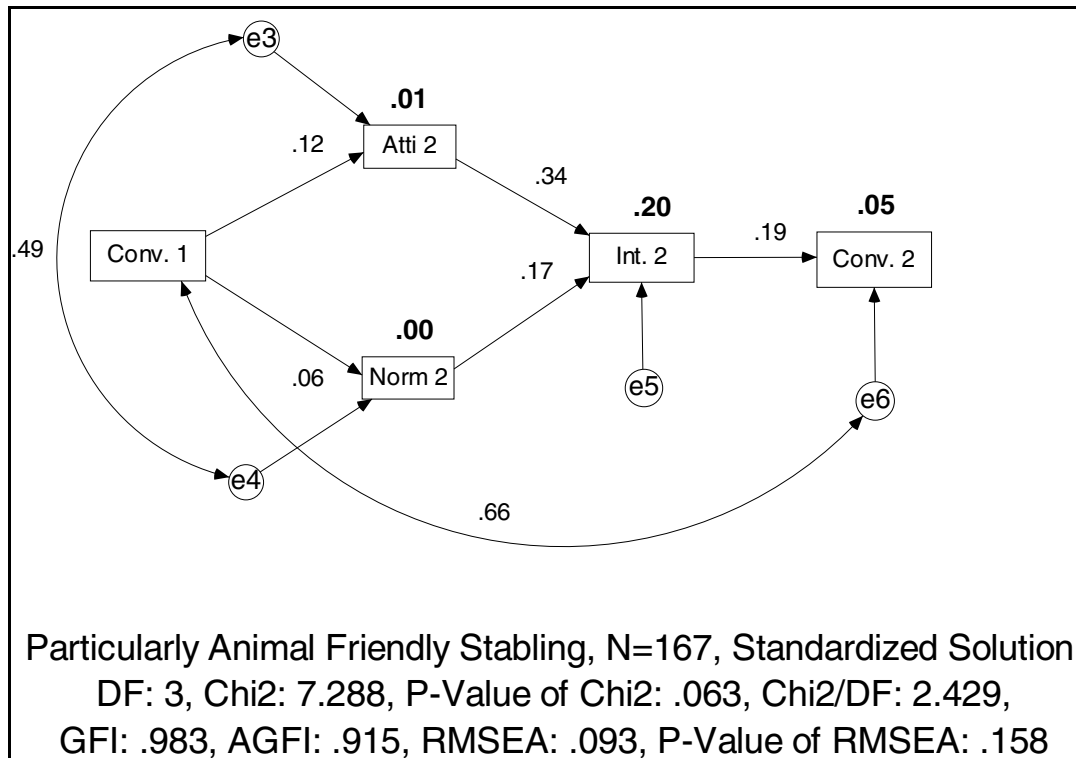
Correlations		Atti 1	Norm 1	Int. 1	Conv. 1	Atti 2	Norm 2	Int. 2	Conv. 2
1. Survey	Atti 1	1.00							
	Norm 1	0.52	1.00						
	Int. 1	0.38	0.37	1.00					
	Conv. 1	0.15	0.12	-0.01	1.00				
2. Survey	Atti 2	0.55	0.40	0.38	0.12	1.00			
	Norm 2	0.35	0.33	0.39	0.06	0.49	1.00		
	Int. 2	0.21	0.19	0.48	-0.05	0.42	0.34	1.00	
	Conv. 2	0.24	0.25	0.31	0.64	0.23	0.22	0.16	1.00

In Figure 2, the path diagram of the personal experience model of Non-PAFS farmers is shown. In this diagram, measured or indicator variables are symbolized as rectangles. The circles symbolize the measurement errors (associated with rectangles). The bold numbers above the rectangles show the explained variances of the measured variables. The numbers close to the arrows show the regression coefficients of each causal relationship. The numbers close to the double headed arrows show the correlations of modeled non-causal relationships.

Following results are divided in three models: the first one show only the relationship from the first conversion to the results of the second survey. The second model show the stability of the survey variables of two time points and the third model show the whole relationships between all available variables.

Figure 2 shows the personal experience model of Non-PAFS-farmers where only the variables from the second survey are included and related to the first conversion.

Figure 2: Personal Experience Model of Non-PAFS Farmers



The standardized effect of *Conversion1* as personal experience is 0.12 on *Attitude2* and 0.06 on *Norm2*, which are rather low and not significant at the 5%-significance level. So personal experience seems not to have an effect on these variables. However, both coefficients are positive, which indicate that the more the first conversion, the more favorable attitudes and norms will result.

The standardized effect of *Attitude2* on *Intention2* is 0.34 and of *Norm2* is about 0.17. The explained variance (R^2) in *Intention2* to perform PAFS is about 20%. *Intention2* has an effect on *Conversion2* of 0.19. The explained variance in *Conversion2* is 5%. These effects are highly significant.

The model has a good fit according to the considered measures of fit (see Figure 2). The ratio of Chi2 to the Degrees of Freedom (Chi2/DF) indicates an acceptable fit. The Root Mean Square Error of Approximation (RMSEA) is also acceptable with 0.093, like its P-Value. The Goodness of Fit Index (GFI) as well as the Adjusted Goodness of Fit Index

(AGFI) indicate a relative good fit. All in all, the model cannot be seen as supporting the underlying theoretical structure regarding the effect of personal experience.

Figure 3: Stability Model of Non-PAFS Farmers

In this model (see Figure 3) a one headed arrow between a variable assessed in two time points (e.g. Norm1 and Norm2) can be seen as a stability index rather than a regression coefficient (REINECKE 2005, URBAN 2002). In general, the stability of the variables between the first and the second survey (0.47 for Attitudes, 0.20 for Norm and 0.35 for Intention) is

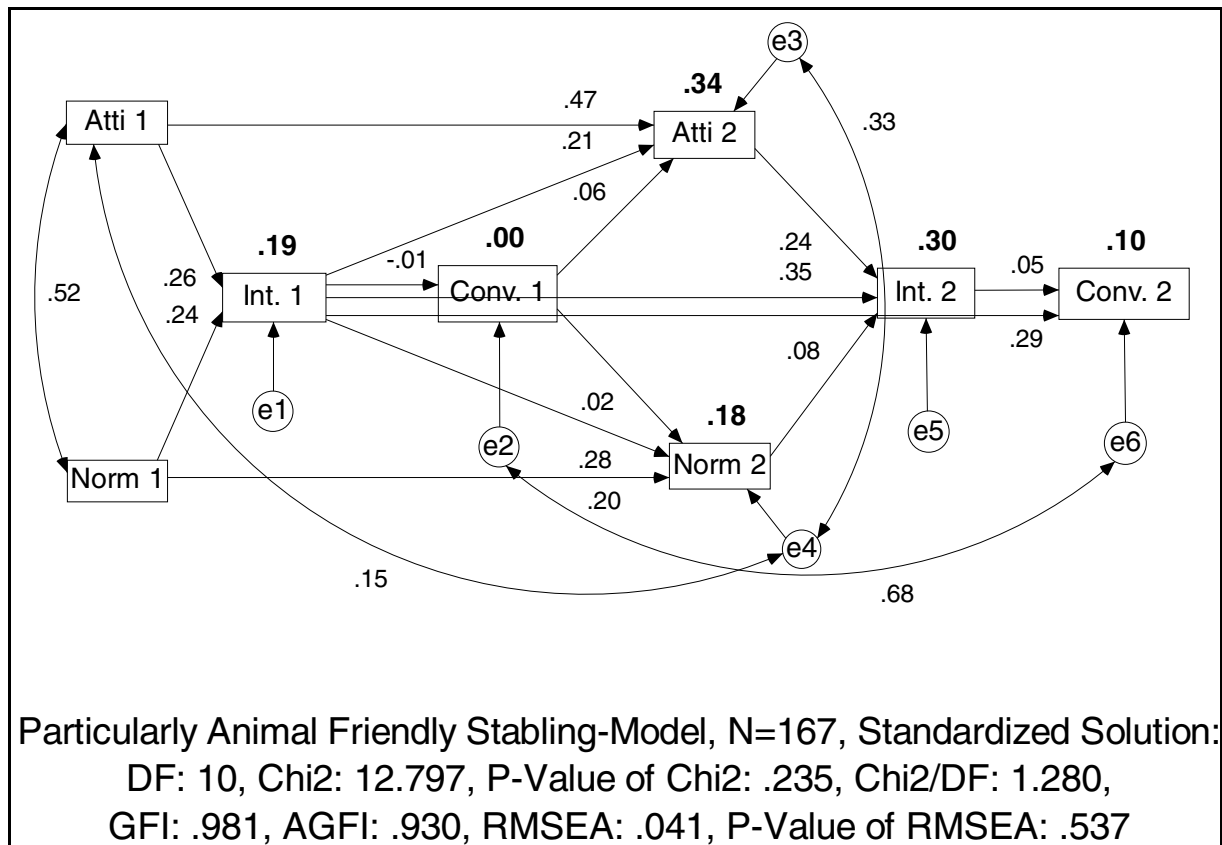
poor but significant. That means, there must be other influencing factors, which have lead to less stable attitudes and norms.

Besides the stability coefficients there are significant (regression) effects from *Intention1* to *Attitude2* (0.2) and *Norm2* (0.28). In contrast, these effects are significant. However, *Attitude2* and *Norm2* have differing effects on *Intention2* compared to the effects of *Attitude1* and *Norm1* on *Intention1* and the effect of *Norm2* on *Intention2* is not significant. Explained variance in *Intention2* is now 30%.

In comparison to the first model (see figure 2), the model fit of the stability model rose from acceptable to a good fit according to the considered measures of fit (see Figure 3). The ratio of Chi2 to the Degrees of Freedom (Chi2/DF) indicates a very good fit. The Root Mean Square Error of Approximation (RMSEA) is also good with 0.059, like its P-Value. The Goodness of Fit Index (GFI) as well as the Adjusted Goodness of Fit Index (AGFI) are relative good.

Figure 4 presents the complete model with all survey and all conversion variables.

Figure 4: Complete Model of Non-PAFS Farmers



The results of the complete model (see Figure 4) show that the first conversion to PAFS cannot be explained: the explained variance of *Conversion1* is 0.0 and there is no effect of *Intention1* to *Conversion1*. But *Intention1* is explained by *Attitude1* and *Norm1*. Both have a reasonable and significant effect on *Intention1*. Though, the second conversion to PAFS can be explained. The explained variance in *Intention2* and in *Conversion2* increased from 19% to 30% and from 0% to 10%.

Again, the effect of *Conversion1* on *Attitude2* (0.06) and *Norm2* (0.02) is neither high nor significant. However, *Intention1* has a significant effect on *Attitude2* (0.21), *Norm2* (0.28) and on *Conversion2* (0.29).

The model has a good fit according to the considered measures of fit (see Figure 4). The ratio of Chi2 to the Degrees of Freedom (Chi2/DF) indicates a very good fit. The same for the

Root Mean Square Error of Approximation (RMSEA) and its P-Value. The Goodness of Fit Indices (GFI and AGFI) are also relative good.

4. Discussion and conclusions

To summarize, the results indicate that, overall, the models have a good fit to the data but the assumed relationship between Personal Experience, i.e. the first Conversion, and Attitudes and Norm after the conversion to PAFS is neither high nor significant. Therefore, it is questionable if Personal Experience does matter by changing or influencing Attitudes and Norm after having converted.

Also the relationship from Intentions to Behavior, conversion to PAFS, seems rather poor: for the first survey and the first conversion data there is no significant effect. For the second survey and the second conversion data there is a significant effect from *Intention2* to *Conversion2* only in the first model. In the other models, this effect disappears. Reasons may be that at least some important conditions have changed, e.g. presence of environmental constraints, which have a negative effect on conversion or there is some lack of skills of the respondents.

Problematic for such an analysis are not stable Attitudes and Subjective Norms like in this case. The weak stability can be caused by external factors. In fact, other influencing factors have to be identified and taken into account for the conversion to particularly animal-friendly stabling, such as uncertainties about interest rates which may be reasonable as in many cases farmers need to build a new stable to fulfill the requirements for the conversion to PAFS. In contrast, the amount of the direct payments for PAFS or requirements to get them have not changed. Farmers' capital resource may be an additional influencing factor which should be considered in further research.

References

- AJZEN, I. (1985, Reprinted): Attitudes, personality, and behavior. Milton Keynes : Open University.
- AJZEN, I. (2002): Residual Effects of Past Behavior on Later Behavior: Habituation and Reasoned Action Perspectives. *Journal of Personality and Social Psychology Review*, Vol. 6, No. 6, pp. 107-122.
- ALBRECHT, H. (1992): Die Verbreitung von Neuerungen – Der Diffusionsprozess. In: HOFFMANN, V. (Hrsg.) (1992): *Beratung als Lebenshilfe: humane Konzepte für eine ländliche Entwicklung*. Margraf Verlag, Weikersheim.
- BAMBERG, S., AJZEN, I., SCHMIDT, P. (2003): Choice of Travel Mode in the Theory of Planned Behavior: The Roles of Past Behavior, Habit, and Reasoned Action. *Journal of Basic and Applied Social Psychology*, Vol 25, No. 3, pp. 175-187.
- BOLLEN, K. (1989): *Structural Equation Models with Latent Variables*. New York.
- BYRNE, B. (2001): *Structural Equation Modeling with AMOS. Basic Concept, Applications, and Programming*. Lawrence Erlbaum Associates, Publishers: London.
- COOKE, R., SHEERAN, P. (2004): Moderation of cognition-intention and cognition-behavior relations: A meta-analysis of properties of variables from the theory of planned behavior. *British Journal of Social Psychology*, Vol. 43, pp. 159-186.
- DAVIDOV, E., SCHMIDT, P., BAMBERG, S. (2003): Modeling Longitudinal Data on Travel Mode Choice – Latent Growth Curves or Autoregressive Models? Results of an Intervention Study.
- FISHBEIN, M. & AJZEN, I. (1975): *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Addison-Wesley: Reading.
- FISHBEIN, M., HENNESSY, M., YZER, M., DOUGLAS, J. (2003): Can we explain why some people do and some do not act on their intentions? *Journal of Psychology, Health and Medicine*, Vol. 8, No. 1, pp. 3-17.
- LEEUWIS, C. (2004): *Communication for Rural Innovation. Rethinking Agricultural Extension*. 3. Edition, Blackwell Publishing: Oxford.
- REINECKE, J. (2005): *Strukturgleichungsmodelle in den Sozialwissenschaften*. Oldenbourg Verlag, München.
- RHODES, R.E., COURNEYA, K.S. (2003): Modelling the theory of planned behavior and past behavior. *Journal of Psychology, Health and Medicine*, Vol. 8, No. 1, pp. 57-69.
- ROGERS, E.M. (1995): *Diffusion of Innovations*. 4. Auflage, Free Press, New York, London.
- ROGERS, E.M. (2003): *Diffusion of Innovations*. 5. Auflage, Free Press, New York, London.
- URBAN, D. (2002): Prozessanalyse im Strukturgleichungsmodell: Zur Anwendung latenter Wachstumskurvenmodelle in der Sozialisationsforschung. In *ZA-Information* 51.
- VAN DEN BAN, A.W.; HAWKINS, H.S. (1996): *Agricultural Extension*. 2. Auflage, Blackwell Science, Oxford.