Factors influencing young farmers' intention to adopt organic farming

Marius Michels, Vanessa Bonke and Oliver Musshoff[1]

***Abstract* – The main goals of the European Union's agricultural policy are to promote young farmers (≤ 40 years) and organic farming. The promotion of young farmers and organic farming are among the main goals in the agricultural policy of the European Union. Yet, no study has exclusively focused on young farmers' attitudes and perceptions towards organic farming. Hence, the aim of this study is to investigate factors influencing young farmers' intention to adopt organic farming in an extended Unified Theory of Acceptance and Use of Technology (UTAUT) framework. The study is based on a data set with 359 young German farmers collected in 2021. The UTAUT model explains 60 % of the variation in young farmers' intention to adopt organic farming. The results imply that ecological and economic expectations have a statistically significant effect on young farmers' intention to adopt organic farming. Surprisingly, the influence of policy measures was not statistically significant.**

Introduction

The main goals of the European Union's agricultural policy are to promote young farmers (≤ 40 years) and organic farming. Subsidy programs to promote both of these objectives have been in place for several years, however the set goal in Germany of reaching 25% by 2030 is far from being reached. Considering the relatively long-time availability of financial incentives and the empirical literature that shows the importance of farmers' attitudes and perceptions with respect to the adoption of more sustainable practices, focusing on (young) farmers behavioral factors can offer additional insights to promote the conversion to organic farming. A technology adoption model which exclusively focusses on farmers' perceptions, motives and attitudes is the (UTAUT) (Venkatesh et al., 2003). The UTAUT considers four core constructs: performance expectancy, effort expectancy, social norm and facilitating conditions which influence an individuals' behavioral intention (Int) to adopt a technology. Hence, the aim of this study is to investigate farmers' intention to adopt organic farming by applying the UTAUT framework. Furthermore, this study focusses on young farmers, as the conversion to organic farming is associated with high (learning) costs. As younger farmers have longer business horizons, it is worthwhile to focus on their attitudes and motives to promote the adoption of organic farming. This study contributes to literature by expanding the understanding of factors influencing farmers' adoption of organic farming by focusing explicitly on young farmers. The results are therefore of interest for policy makers and extension services.

Material and Methods

The online survey was conducted from June 2021 to July 2021. Farmers were invited to take part in the survey via social-media, agricultural online newspapers and websites dedicated to agriculture. The survey can be divided into three parts. In the first part, farmers were asked to provide socio-demographic and farm-related information. In the second part, they were asked to state what they believe motivates or keeps other farmers to or from switching to organic agriculture. In the last question of the second part, farmers were asked if they have seriously considered switching to organic farming in the last 5 years. If they answered the dichotomous question with "yes", they were forwarded to the third part of the survey. In this part, the farmers were asked to evaluate 19 randomized indicator statements on a 5-point Likert scale. The indicator evaluations are then used to estimate the proposed extended adaptation of the UTAUT model (Figure 1) via partial least squares structural equation modelling (PLS-SEM) (Hair et al., 2021).

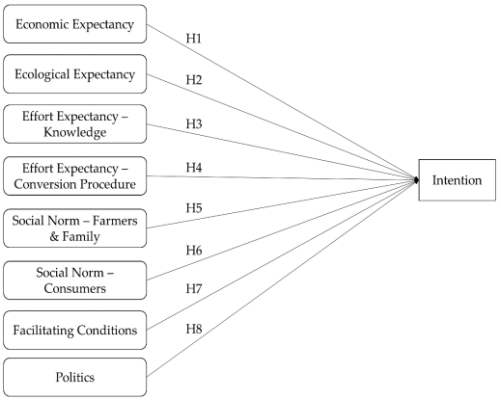

Figure 2: Proposed UTAUT model

Results, Discussion and Conclusions

Descriptive Results

498 farmers participated of which 139 farmers were deleted or excluded due to being older than 40 years of age or provided unreasonable or incomplete answers. Hence, 359 young farmers remain for the analysis. 42 % of the farmers in the sample answered the question if they have seriously considered switching to organic farming in the last 5 years with "yes" (N = 150). Based on this variable we have sub-divided the sample. The average farmers in the sub-sample of interest are 25 years old. 74 % of the farmers work as full-time farmers and 75 % of the farmers are male. The average farmer cultivates 172 hectares of arable land and 33 % hold a university

[1] Marius Michels is from the Georg-August-University Goettingen, Department of Agricultural Economics and Rural Development (DARE), Goettingen, Germany (marius.michels@agr.uni-goettingen.de).
Vanessa Bonke works at the DARE, Georg-August-University Goettingen (vanessa.bonke@agr.uni-goettingen.de).
Oliver Musshoff works at the DARE, Georg-August-University Goettingen (oliver.musshoff@agr.uni-goettingen.de).

degree. The majority of farmers in the subsample (42 %) reside in the southern region of Germany. The average farmer in the sub-sample is slightly risk-seeking (mean = 6.01) based on a 11-point scale (Dohmen et al., 2011). Lastly, the sub-samples differ statistically significantly in terms of several characteristics. Farmers who have seriously considered to adopt organic farming are relatively better educated, more risk-seeking, have a higher proportion of rented arable land and have their farm located mainly in the eastern or southern region of Germany.

Estimation Results

Models estimated using PLS-SEM are evaluated in two steps. In the first step, indicator loadings (λ), internal consistency via composite reliability (CR), convergent validity via average variance extracted (AVE) and discriminant validity via Heterotrait-Monotrait (HTMT) ratios are assessed. Values for λ and CR should be above 0.7. The value for AVE should exceed 0.5, while HTMT ratios should not exceed 0.9 (Hair et al., 2021). The lowest values for λ and CR in the model are 0.571 and 0.728, respectively. Hair et al. (2021) recommends that indicators with a loading below the threshold of 0.7 can remain in the model due to adverse impacts on further model results and content validity. Furthermore, bootstrapping results reveal that all indicator loadings are statistically significant. Henceforth, we decided to leave all indicators in the model as the current model met the recommendations of the literature. 0.536 is the lowest value estimated for AVE. The highest HTMT ratio amounts to 0.787. To conclude, all quality criteria of the first step are met (Hair et al., 2021).

In the second step, the relationship between the constructs as displayed in Figure 1 is evaluated by estimating path coefficients (β) and t-statistics using a bootstrapping procedure with 10,000 subsamples. Table 1 shows the estimation results for the UTAUT model via PLS-SEM. The model explains approximately 60 % of the variation in young farmers' intention to adopt organic farming. Hence, the results indicate that the proposed UTAUT is able to capture a large amount of latent information in young farmers' intention to adopt organic farming.

The results confirm existing literature (e. g. Läpple, 2013) that ecological as well as economic factors (H1 and H2) play a role in the decision process. Hence, convincing information provided to young farmers to switch should focus on both. Considering the increasing restrictions for coventional farming to enhance environmental goals, educating farmers on the additional ecological advantages of organic farming can be an important lever to facilitate adoption. Perceived efforts with respect to the agronomic knowledge and bureaucratic procedures do not play a (statistical) significant role (H3 and H4). To enhance the findings regarding H1 to H4, one could also consider including organic farming and conversion more in depth into young farmers' education. Social norms with respect to expectations from family, befriended farmers and consumers have a statistically significant influence on the intention, whereby the effect of the former is far larger (H5 and H6). Facilitating conditions in terms of market access and technical equipment also play a statistically significant role (H7). Hence, sale channels for organic products should be strengthened and expanded by policy makers. In this context, the finding that subsidies and certification programs in the model did not have a statistically significant effect on young farmers' intention should also be considered (H8). Instead of additional programs and further subsidies, rather the market for organic products should be strengthened.

Table 1. Estimation results of the UTAUT model (N=150) [a]

Path	H	β	t [b]	p-value
EcolExp → Int	H1	0.311***	4.798	< 0.001
EconExp → Int	H2	0.152*	1.947	0.052
EffortKnow → Int	H3	0.014	0.244	0.807
EffortProced → Int	H4	0.072	1.278	0.201
SocNoFF → Int	H5	0.261***	4.929	< 0.001
SocNoCons → Int	H6	0.092*	1.741	0.084
FaCo → Int	H7	0.256***	4.127	< 0.001
Politics → Int	H8	-0.023	0.387	0.699

[a] H = Hypothesis, EcolExp = Ecological Expectancy; EconExp = Economic Expectancy; EffortKnow = Effort Expectancy Knowledge; EffortProc = Effort Expectancy Conversion Procedure; SocNoCons = Social Norm Consumers; SocNoFF = Social Norm Farmers & Family; FaCo = Facilitating Conditions; Int = Intention

[b] Bootstrapping results with 10,000 subsamples.

R^2(Int) = 0.599; Adjusted R^2(Int) = 0.576

Acknowledgement

The authors would like to thank Catharina Lindwedel and Marlene Wätzold for their assistance in data collection and the conduction of the survey.

References

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*: 27(3):425–478.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J. and Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association* 9(3):522-550.

Hair, J.F., Hult, G.T.M., Ringle, C.M. and Sarstedt, M. (2021). A primer on partial least squares structural equation modeling (PLS-SEM), 3rd ed. Thousand Oaks: Sage publications.

Läpple, D. (2013). Comparing attitude and characteristics of organic, former organic and conventional farmers: Evidence from Ireland. *Renewable Agriculture and Food Systems* 28(4):329-337.