Understanding Producers' Motives for Adopting Sustainable Practices: The Role of Expected Rewards, Risk Perception, and Risk Tolerance

Dianne Hofenk[1], Joost M.E. Pennings[1,2] and Andres Trujillo-Barrera[1]

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[1] Marketing and Consumer Behaviour Group, Wageningen University, The Netherlands
[2] Department of Marketing and Department of Finance, Maastricht University, The Netherlands
Corresponding author: Andres Trujillo-Barrera email:andres.trujillobarrera@wur.nl

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Abstract

This paper examines producers' motives underlying the adoption of sustainable practices. In particular, we focus on expected economic, social, and personal rewards, and examine the role of producers' risk perception and risk tolerance. Results from personal computer-guided interviews with164 hog producers show that the adoption of sustainable practices is affected by expected economic rewards but not by social and personal rewards. Further, while perceived risk is a barrier to the adoption of sustainable practices, risk tolerance is a positive moderator of the relationship between economic rewards and adoption. In addition, higher income and tax benefits have a significant a positive relationship with adoption. Other characteristics of the firm and the owner, such as leverage and education, do not seem to play a role.

Keywords: motives, adoption of sustainable practices, expected rewards, risk perception, risk tolerance

1. Introduction

The implementation of sustainability, that entails a balance between economic prosperity, environmental quality, social inclusion, and good governance (Elkington 1999), has been gaining attention from firms due to societal, governmental, and market pressures (Chabowski, Mena, and Gonzalez-Padron, 2011; Cronin, Smith, Gleim, Ramirez, and Martinez, 2011; Kotler, 2011). The debate about corporate responsibility in the context of agriculture made sustainability an important component of the policy agenda (i.e. the Common Agricultural Policy and the UN Sustainable Development Goals). In addition Zilberman (2013) states that the pursuit of sustainable development depends on the formation of science-based policies, integrating the understanding of economic systems, policies, and natural resources, coupled with an improvement in our understanding of human behavior, a feature where applied economics is particularly suited.

The adoption of sustainable practices differs from regular business decision making since it can be driven by non-instrumental motives in addition to instrumental motives. Thus, the adoption of sustainable practices relies on relational and moral motives such as

legitimation, collective identity, social cohesion, and collective responsibility besides traditional motives such as profitability and competitiveness (Aguilera et al. 2007). Despite of its increasing importance, little attention has been paid to understanding why firms adopt sustainable practices. Studies addressing this question are mostly conceptual or qualitative in nature (Drumwright 1994; Menon and Menon 1997; Bansal and Roth 2000; Aguilera et al. 2007), while research that empirically verifies the theories proposed in these studies is scarce. The purpose of this paper is to examine producers' motives underlying the adoption of sustainable practices with a particular focus on expected economic, social, and personal rewards. In addition, we examine the roles of producers' risk perception and risk tolerance, because the outcomes of investments in sustainability are often uncertain. If the perceived risk associated with the adoption of sustainable practices is high and risk tolerance is low, the adoption of sustainable practices might be hindered. Understanding the motives for adopting sustainable practices, including the role of risk perception and risk tolerance in decision making, can help suppliers of sustainable products and services as well as public policy makers aiming at stimulating sustainable behavior increase their effectiveness.

2. Hypotheses development

Behavior is often motivated by expected rewards, which, in the context of this study, are defined as beliefs of extrinsic and intrinsic benefits that a producer would receive from adopting sustainable practices over time (Frazier, 1983: 70). We focus on three types of rewards: economic, social, and personal. The first two types of rewards are linked to instrumental motives, which are based on self-interest. Economic rewards reflect the expected present value of economic benefits from adopting sustainable practices (Frazier 1983). For social rewards, received for sustainability, we focus on organizational legitimacy. Producers may adopt sustainable behavior, because they feel societal pressure to do so. Sustainability

can then help to obtain and retain a license to operate. Sustainability thus becomes legitimacy, which, as defined by Suchman (1995, p.574), "is a perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions". Meanwhile, personal rewards motivations may result from the belief that something is "the right thing to do" rather than self-interest (Bansal and Roth 2000; Aguilera et al. 2007). Thus, adopting sustainable practices may result in psychological pleasure, in a sense of pride. We expect these three types of rewards to have positive effects on producers' probability of adopting sustainable practices, as illustrated in Figure 1. This generates the following hypotheses:

H1: Expected economic rewards are positively related to the adoption of sustainable practices.

H2: Expected social rewards are positively related to the adoption of sustainable practices.

H3: Expected personal rewards are positively related to the adoption of sustainable practices.

In addition to examining expected rewards, we study the role of producers' risk perception and risk tolerance in the decision to adopt sustainable practices. Risk associated with innovation adoption can be a major barrier to its implementation (Bocqueho, Jacquet and Reynaud 2013). Improving the sustainability of farm operations often involves substantial financial investments, for instance, new machinery and equipment. The payoff of such investments is often uncertain. Therefore, we propose:

H4: Risk perception is negatively related to the adoption of sustainable practices.

H5: The relationship between expected economic rewards and the adoption of sustainable practices is weakened by risk perception.

Finally, risk tolerance may affect adoption, not only directly but through its impact on expected economic rewards and risk perception (Bocqueho et al. 2013). Therefore we hypothesize:

H6: The relationship between economic rewards and the adoption of sustainable practices is strengthened by risk tolerance.

H7: The relationship between risk perception and the adoption of sustainable practices is weakened by risk tolerance.

[INSERT FIGURE 1 ABOUT HERE]

3. Method

3.1 Study context

In the agricultural industry much attention is paid to sustainability. The industry has received criticism over the past decades regarding the negative impact of agriculture on the environment and animal welfare. In addition, most farmers own small firms of less than 10 employees. Since small firms represent 90 percent of European companies (European Commission, 2013), they have a vast potential for contributing to a more sustainable world. However, most existing research on sustainability has focused on large companies, leading to findings which may not be (fully) applicable to small firms (Jenkins 2004; Pedersen 2009).

While large companies often have decision-making teams (Schoemaker 1993), thus incorporating a range of different opinions and values in the decision process, in small companies one person, the owner-manager, often makes all the decisions. Therefore, (the owner-manager's) personal values are likely to play a more prominent role in small-firm decision making (Jenkins, 2004), which becomes particularly salient when studying firms' motives for adopting sustainable practices.

We study Dutch hog farmers' decisions whether or not to build a certified stable. In the Netherlands, farmers can obtain tax benefits if they build a new stable or renew an existing stable in line with the Dutch policy document "Maatlat Duurzame Veehouderij" (Yardstick for Sustainable Husbandry). In either case, if they fulfill the requirements, they receive a

certificate. Certified stables have a lower impact on the environment and have facilities for increased animal health and welfare. There are strict requirements with regard to emissions, animal welfare, animal health, energy use, and particulate matter (www.maatlatduurzameveehouderij.nl).

3.2 Sample and data collection

We identified 2,830 hog producers who operate businesses with at least 1,000 hogs or 200 breeding sows in the five main pig-farming provinces of the Netherlands. 400 of these producers were randomly selected, and they received a letter by mail in which they were informed about the research. Several days later, a telephone interviewer asked them whether they were willing to participate in the research. If they agreed, an appointment was made to visit the producer on the farm. A total of 164 hog producers were interviewed on site yielding an effective response rate of 41 percent.

The interviewers brought laptops on which the farmers answered the questions.

[INSERT TABLE 1 ABOUT HERE]

Table 1 show the descriptive statistics of the hog farmers. On average, it took participants 30 minutes to complete the questionnaire. 51 percent of the producers in the sample had built or were in the process of building a certified stable. Table 1 present characteristics of our sample. Reported average annual turnover was over €1,000,000 for 54 percent of the farms, between €500,000 to €1,000,000 for 21 percent, between €250,000 to €500,000 for 7 percent, and less than €250,000 for 7 percent (11 percent missing). Most participating producers were male (96 percent) and the average age was 47 years. About 61 percent of producers have an intermediary education degree (MBO), 15 percent higher education (HBO), while 1.2 percent completed university.

Farms have a relatively high leverage. About 15% have more than 76% debt-asset ratio, 34% a ratio in the range of 51%-75%, while almost 30% have it in the range of 25%-50%, with the remaining 10% with less than 25%.

4. Empirical Model

4.1 Measurement

We adopted existing psychometric scales to measure our variables of interest (e.g. Figure 1) based on existing research, using multiple items on seven-point scales. Five items to measure expected social rewards (legitimacy) were based on the definition of legitimacy by (Suchman 1995) and the legitimacy scale developed by Handelman and Arnold (1999). Three items of expected personal rewards (pride) were based on the scales of Verbeke (2004) and Gouthier and Rhein (2011). We measured expected economic rewards by using eleven items identified as relevant in pre-tests with hog farmers. For risk perception and risk tolerance we used four items based on Pennings and Garcia (2001), and Hoffmann, Post, and Pennings (2013). The wording of the items was adapted based on whether producers had already built a certified stable, were in the process of building such a stable, or did not have a certified stable at all. For a more detailed description of the variables, sources, and measurement please see Appendix B, and table 2.

[INSERT TABLE 2 ABOUT HERE]

4.2 Dependent variable

Firms can engage in sustainable practices by building a stable that meet the MDV certification. The dependent variable is the level adoption of sustainable practices measured on a scale from 1 to 6, where 1 represents no adoption and no awareness of MDV certificates while 6 represents full adoption, in response to the following question:

Adoption:

Do you have one or more stables with a Maatlat Duurzame Veehouderij (MDV) certificate (stable completed) and/or one or more stables with a Maatlat Duurzame Veehouderij design certificate (stable in preparation)?

1. No, and I don't know what the Maatlat Duurzame Veehouderij entails
2. No, but I do know what the Maatlat Duurzame Veehouderij entails
3. No, but I do keep track of the points my stable scores on the Maatlat Duurzame Veehouderij
4. Yes, I have no stable with MDV certificate, but I do have one or more stables with MDV design certificate
5. Yes, I have one or more stables with MDV certificate and no stable(s) with MDV design certificate
6. Yes, I have one or more stables with MDV certificate and also one or more stables with MDV design certificate

5. Analysis and Results

To test our hypotheses as reflected in Figure 1 we used structural equation modeling (SEM) using the software R and the package lavaan 0.5-16 (Rosseel 2012). We start with exploratory factor analysis (EFA) identifying the items of the latent variables used in the confirmatory factor analysis. All items and the corresponding latent variable measures are shown in Table 2. We dropped items that either had low loadings (<0.50) or loaded on more than one factor (>0.30). All selected items exhibit significant loadings, while the latent variables display high construct reliabilities, exceeding 0.816.

5.1 Measurement model and construction of latent moderation

We assessed the measurement properties of the latent variables in figure 1 using confirmatory factor analysis. This includes expected economic rewards, expected social rewards, expected personal rewards, risk perception, and risk tolerance. Each latent construct measure is built from the items described in table 2, selected from EFA.

Hypotheses five and six involve the moderation of risk perception and risk tolerance on the relationship between economical rewards and adoption. Hypothesis seven considers the moderation of risk tolerance on the relationship between risk perception and adoption. Several approaches have been proposed to measure moderation on SEM, among them, the use of maximum likelihood estimation of latent moderation (Muthén, L.K. and Muthén 2012), Ping (1996) two step interaction effect estimation, and Marsh, Wen and Hau (2004) latent interaction with the products of the indicators between the first-order factors using mean centering. Results from these approaches often provide very similar estimates, with no significant statistical differences as reported by Korschun, Bhattacharya and Swain (2014).

We follow Marsh, Wen and Hau (2004) to test for moderation effects considering two alternative procedures. In the first, we match item variables. For instance, to find the latent interaction between risk perception and risk tolerance, we obtain the mean centered product of the first construct item of risk perception by the first construct item of risk tolerance (RP1 x RT1rc), second risk perception item by second risk tolerance item (RP3 x RT2rc), and third by third (RP4 x RT4rc), using those as inputs for the measurement model. The second alternative to build the latent moderation is to use all product combinations of the construct items. In the case of latent interaction between risk perception and risk tolerance, that would include nine pairs of combinations.

To assess the goodness of fit we use the standards recommended by Bagozzi and Yi (2011) and Hu and Bentler (1999) for confirmatory factor analysis, with Root Mean Square Error of Approximation (RMSEA) ≤0.06, Comparative Fit Index (CFI) ≥0.95, and

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Standardized Root Mean Square Residual (SRMR)≤.08. Results for the CFA of the model

with matched-pair interactions are: CFI = 0.969, RMSEA = 0.037, and SRMR = 0.053. While

the results for the all-pair configuration are: CFI = 0.495, RMSEA = 0.142, and SRMR =

0.082. Under those standards the matched-pair measurement model is satisfactory, while the

all-pair model exhibits a poor fit.

For discriminant validity we used a procedure suggested by Bagozzi et al.1991, and

implemented by Scheer, Miao and Garrett (2009) and Ingenbleek, Frambach and Verhallen

(2010). Each pair of constructs is evaluated using nested CFA models in where a one-factor

model is compared to a two-factor model using chi-square difference tests. Results show that

the two factor models exhibit better fit in all cases. Also, the average variance extracted

(AVE) by each construct is greater than the shared variance with other constructs.

5.2 Structural model

After the measurement model, we estimate the structural model to test the hypotheses H1 to

H7 in figure 1. The adoption of sustainable practices is regressed on latent variables of

expected rewards (economical, social, and personal), risk perception and risk tolerance, and

observed variables such as expected tax benefits, income from business, debt-asset ratio, and

highest level of education of the owner. Risk perception and risk tolerance act as moderators

between economical rewards and adoption.

For robustness check of the structural model we estimate three models. The first is the

hypothesized model using interaction effects for the latent moderation based on pair-match.

The second model does not consider any interaction effect, while the third model uses

interaction effects for the latent moderation based on all-pairs configuration.

Since interaction effects added to the model are non linear and unlikely to follow a

normal distribution, we use a robust estimator using Satorra-Bentler scaled χ^2 (Satorra and

Bentler 1994) to calculate standard errors. Results show that the hypothesized model exhibits a satisfactory goodness of fit with a CFI = 0.941, RMSEA = 0.038, and SRMR = 0.077. The correlational matrix of the hypothesized model is displayed in table 3.

[INSERT TABLE 3 ABOUT HERE]

5.3 Hypothesis testing

Table 4 shows the results of the structural models. In addition figure 2 depicts the results of the hypothesized model, and table 5 provides a summary of hypothesis and findings. As seen in table 4, the results of the hypothesized model show that the economical rewards have a positive and significant relationship with adoption of sustainable practices, supporting H1. While social and personal rewards do not exhibit a significant impact on the adoption decision, hence H2 and H3 are not supported. Results for risk perception show a negative and significant impact, thereby supporting H4.

[INSERT TABLE 4 ABOUT HERE]

[INSERT TABLE 5 ABOUT HERE]

[INSERT FIGURE 2 ABOUT HERE]

We also evaluated a set of moderated relationships. First, the effect of risk perception on economical rewards is not significant (although it shows the expected negative sign) Hence H5 cannot be confirmed. Risk tolerance on the other hand plays a significant role in its interaction with economic rewards, therefore, offering support for H6.

Finally, H7 is not supported, since risk tolerance does not moderates the relationship between risk perception and adoption. Findings of the structural model are robust across the estimated models. Results of the hypothesized model are almost the same to the model with

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latent moderation built with all-pairs combination, however the fit of the later model decreases drastically. Compared to the model that does not include interaction effects the findings for hypotheses 1 to 4 are robust.

Results for non-latent variables show that tax benefits have a strong positive relationship with adoption of sustainable practices. Similarly, income is also strongly significant and positively related. Debt-to-asset ratio, and education do not seem to play a role in the adoption decision.

6. Discussion

Implementation of sustainable production practices is becoming a prerequisite to operate in many markets, particularly those in the food industry, since stakeholders in the supply chains demand practices that generate less waste, improve food safety, animal welfare, and use of land, water, and energy. We explore the motivations of hog farmers in the Netherlands to engage in the adoption of sustainable practices.

Results show that while the expected economic rewards are positively related to adoption, expected social and personal rewards do not seem to influence the decision to invest in sustainable practices (e.g. sustainable stables in the context of hog farmers) the stables. In terms of the risk variables we find higher risk perception to be associated with lower levels of adoption. More risk tolerance moderates positively the economic rewards, as expected. Further, we find that tax benefits play a role in the decision, as well as income, the higher the income the most likely the chance of building a sustainable stable.

These results show that suppliers of sustainable products and services, and policy makers aiming to stimulate sustainable behavior among producers may consider focusing on the economic benefits that result from adopting the sustainable product or service. Also, policy makers need to pay attention to tax benefits since it is a key element in the decision of

the firm. Future work, may include segmentation of groups by income, testing whether groups with higher incomes may be more willing to engage in sustainable practices. Given our sample size we did not pursue that analysis.

The results show that perceived risk is a major barrier to the adoption of sustainable practices. Therefore, it is important to minimize the financial risks involved in sustainable behavior and particularly provide producers with more content knowledge about the (financial) risk, which will impact the producers' risk perception. This can go in hand with risk tolerance that as seen from the results increases the association between economic rewards and adoption. It is expected that more education about sustainability would increase risk tolerance and acceptance of innovations.

This study has some limitations that motivate further research. Although this study is based on high quality personalized interviews, we only examined one industry, caution is therefore needed to avoid generalizations to other contexts. In addition, although the sample is adequate for the analysis on hand, particularly given the size of the industry, it would be interesting to extend the analysis in two directions. First, a larger sample that would allow SEM multigroup analysis. Second, the generation of longitudinal study that may help to better understands adoption patterns through time.

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Tables and Figures

Table 1: Descriptive Statistics (N=164)

Variable		N	Raw %	Valid %	Cumulative %
Adoption Level	1	23	14.02	14.02	14.02
	2	56	34.15	34.15	48.17
	3	1	0.61	0.61	48.78
	4	7	4.27	4.27	53.05
	5	60	36.59	36.59	89.63
	6	17	10.37	10.37	100
Income	Less than 100	6	3.66	4.11	4.11
In Thousands of	100 to 250	6	3.66	4.11	8.22
Euro €	250 to 500	11	6.71	7.53	15.75
	500 to 1.000	35	21.34	23.97	39.73
	1.000 or more	88	53.66	60.27	100
	Missing	18	10.98		
Debt to Asset	Less than 25%	16	9.76	11.03	11.03
Ratio	25% - 50%	48	29.27	33.1	44.14
	51% - 75%	56	34.15	38.62	82.76
	76% - 100%	25	15.24	17.24	100
	Missing	19	11.59		
Location	Drenthe	23	14.02	14.02	14.02
	Friesland	25	15.24	15.24	29.27
	Gelderland	95	57.93	57.93	87.2
	Limburg	20	12.2	12.2	99.39
	Noord-Brabant	1	0.61	0.61	100
Education	Basic school	14	8.54	8.54	8.54
	Middle school	13	7.93	7.93	16.46
	LBO	100	60.98	60.98	77.44
	MBO	25	15.24	15.24	92.68
	HBO	2	1.22	1.22	93.9
	University	8	4.88	4.88	98.78
	Post-University	2	1.22	1.22	100
Age	(20,30]	6	3.66	3.66	3.66
	(30,40]	18	10.98	10.98	14.63
	(40,50]	81	49.39	49.39	64.02
	(50,60]	47	28.66	28.66	92.68
	(60,70]	11	6.71	6.71	99.39
	(70,80]	1	0.61	0.61	100
Gender	Male	157	95.73	95.73	95.73
	Female	7	4.27	4.27	100

Table 2: Standardized Loadings and Reliabilities (N=164)

Constructs and Items	Loading	S.E.		R^2
Economic Rewards:(α= 0.924; scale: 1=strongly disagree, 7=strongly agree)				
I expected that building a certified stable for my firm would lead to:				
An improvement in technical performance (ER1)	0.809			0.654
An improvement in financial performance (ER2)	0.728	(.074)	***	0.530
More efficiency (ER3)	0.841	(.061)	***	0.707
Labor savings (ER4)	0.808	(.063)	***	
Lower cost price (ER5)	dropped			
Higher selling price (ER6)	dropped			
Higher productivity (ER7)	0.829	(.050)	***	0.687
Lower financial risk (ER8)	dropped			
Higher returns (ER9)	dropped			
Tax Benefits (ER10)	Used in structural model			
More profits (ER11)	0.721	(.071)	***	0.520
Social Rewards: Legitimacy (α= 0.918; scale: 1=strongly disagree, 7=strongly agree)				
I expected that building a certified stable would lead to my firm being:				
More appreciated by society (SR1)	0.849			0.720
Perceived as more desirable by society (SR2)	0.916	(.045)	***	0.839
Perceived as more proper by society (SR3)	0.823	(.046)	***	0.677
Perceived as more appropriate by society (SR4)	0.849	(.047)	***	0.720
Better at meeting the standards that people expect of agricultural entrepreneur (SR5)	dropped			
Personal Rewards: Pride (α=0.904; scale: 1=strongly disagree, 7=strongly agree)				
I expected that building a certified stable would lead to my having feelings of:				
Pride (PR1)	0.917			0.841
Exhilaration (PR2)	0.871	(.049)	***	0.758
Meaningfulness (PR3)	0.832	(.043)	***	0.692
Risk Perception (α=0.936; scale: 1=strongly disagree, 7=strongly agree)				
From a financial perspective, I considered building a certified stable as:				
Very risky (RP1)	0.916			0.839
To be safe (RP2rc)	dropped			
Dangerous (RP3)	0.843	(.060)	***	0.710
Involving a lot of risk (RP4)	0.974	(.044)	***	0.949
Risk Tolerance (α=0.816; scale: 1=strongly disagree, 7=strongly agree)				
I prefer certainty over uncertainty when I invest in my firm (RT1rc)	0.826			0.682
I avoid risks when invest in my business (RT2rc)	0.661	(.086)	***	0.437
I like to take financial risks (RT3)	dropped			
I like to "play it safe" when I invest in my firm (RT4rc)	0.846	(.116)	**	0.716

Notes: *** Significant at 1%, ** Significant at 5%, Significant at 10% *
rc stands for reverse coded, α corresponds to the construct reliability

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Table 3: Correlational Matrix

	Econ	Social	Pers.	RP	RT	RT X RP	RT X Econ	RP X Econ
Economical (Econ)	0.924							
Social	0.426	0.918						
Personal	0.499	0.572	0.904					
Risk Perception (RP)	0.023	0.101	0.060	0.936				
Risk Tolerance (RT)	0.112	0.208	0.205	0.009	0.816			
RT X RP	0.055	0.118	0.148	-0.239	0.143	0.707		
RT X Economical	-0.181	-0.132	-0.050	0.176	-0.058	0.020	0.674	
RP X Economical	0.037	-0.068	-0.071	-0.362	0.095	0.421	0.050	0.791

Notes: Construct reliabilities are on the diagonal; Structural model fit: χ^2 (555) = 2075   p < 0.01, CFI=0.941, RMSEA=0.038, SRMR = 0.077, any correlation above |0.17| is significant at 1%

Table 4: Estimated Path Coefficients (Standardized)

Adoption on	Model 1 Hypothesized			Model 2 Without Interaction Effects			Model 3 Interaction effects All Combinations		
Economical	0.259	(.092)	***	0.197	(.088)	**	0.221	(.087)	**
Social	0.036	(.08)		-0.006	(.09)		0.032	(.084)	
Personal	-0.008	(.101)		0.026	(.099)		0.007	(.101)	
Risk Perception	-0.243	(.073)	***	-0.14	(.07)	*	-0.191	(.07)	***
Risk Tolerance	0.091	(.085)		0.062	(.079)		0.07	(.078)	
Risk Perception X Economical	-0.022	(.087)		-	-		0.01	(.073)	
Risk Tolerance X Economical	0.295	(.112)	***	-	-		0.183	(.069)	***
RiskTolerance X Risk Perception	-0.063	(.089)		-	-		-0.04	(.072)	
Tax Benefits	0.322	(.088)	***	0.293	(.089)	***	0.265	(.081)	***
Income	0.454	(.124)	***	0.305	(.078)	***	0.284	(.076)	***
Leverage	0.101	(.068)		0.115	(.072)		0.11	(.069)	
Education	-0.016	(.067)		-0.028	(.071)		-0.01	(.069)	
Goodness of fit:									
χ^2 test p-value	0.000			0.000			0.000		
CFI	0.941			0.95			0.467		
RMSEA	0.038			0.05			0.099		
SRMR	0.077			0.083			0.089		
Satorra Bentler Scaled χ^2 Diff Test				231	0.245		2322	0.000	
Residual Covariances									
Economical and Personal	0.499	(.076)	***	0.498	(.076)	***	0.499	(.076)	***
Economical and Social	0.426	(.088)	***	0.427	(.088)	***	0.425	(.087)	***
Social and Personal	0.572	(.082)	***	0.571	(.082)	***	0.569	(.082)	***

Notes: *** Significant at 1%, ** Significant at 5%, Significant at 10% *

Table 5: Summary of model results

|	Variables	Relationship	Finding
H1:	Expected economical rewards → Level of MDV adoption	Positive and moderated by risk perception and risk tolerance	Supported
H2:	Expected social rewards → Level of MDV adoption	Positive	Not supported
H3:	Expected personal rewards → Level of MDV adoption	Positive	Not supported
H4:	Risk perception → Level of MDV adoption	Negative and moderated by risk tolerance	Supported
H5:	Risk perception moderates expected economic rewards	Negative	Not supported
H6:	Risk tolerance moderates expected economic rewards	Positive	Supported
H7:	Risk tolerance moderates expected economic rewards	Positive	Not Supported
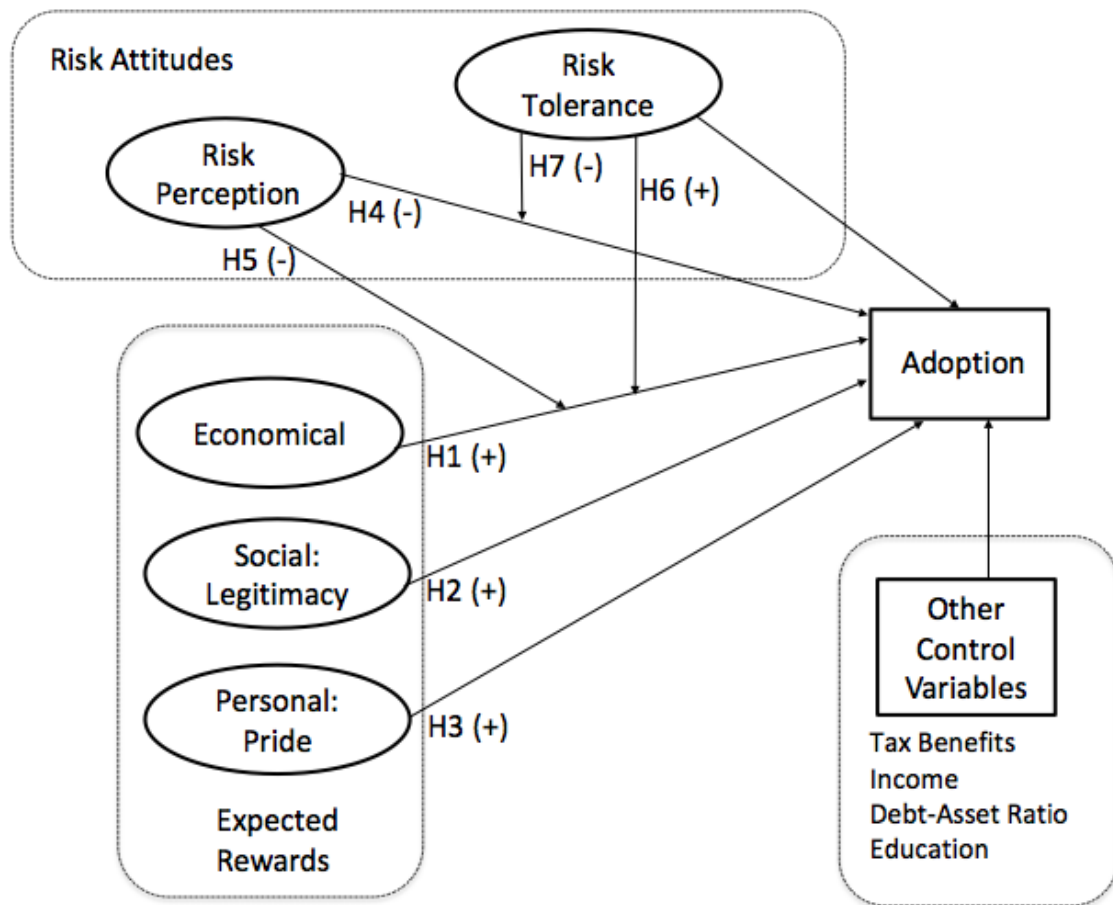
Figure 1. Conceptual Model
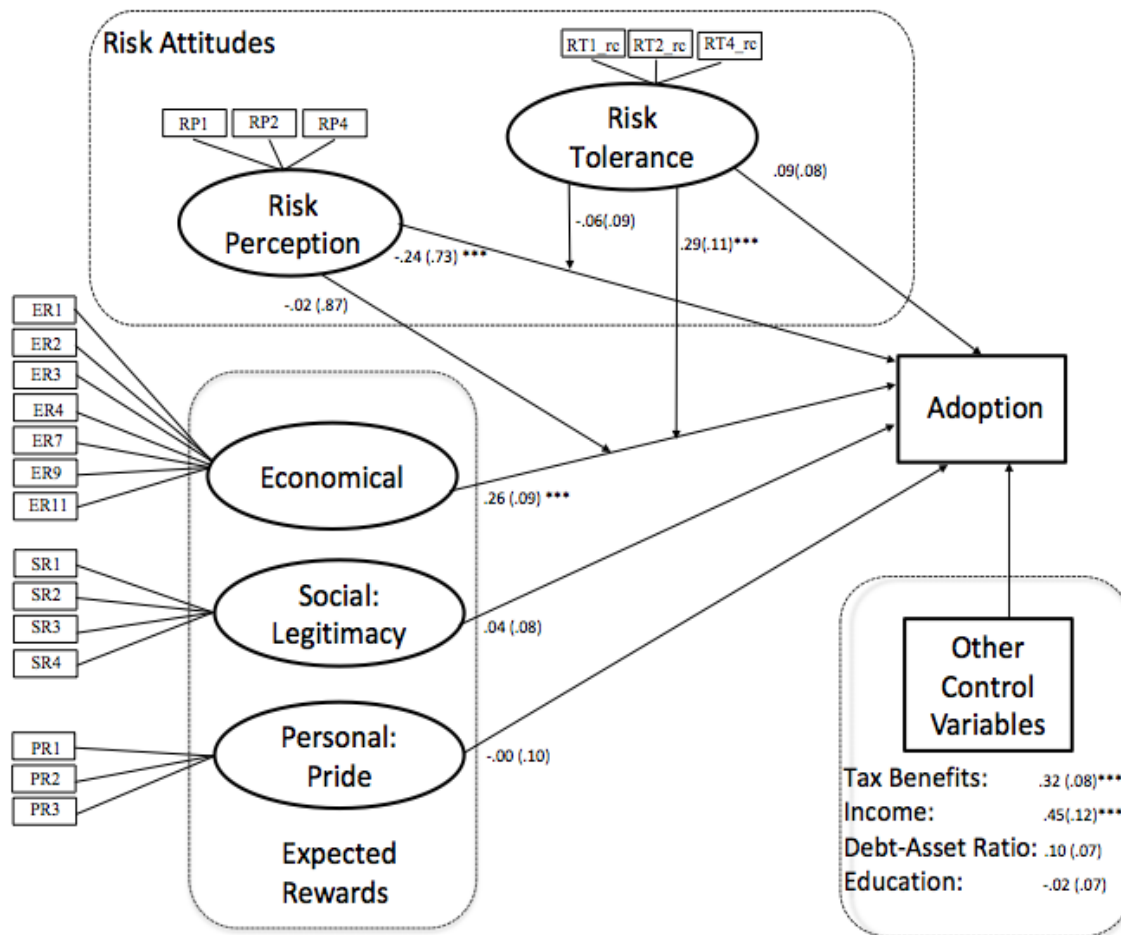
Figure 2. Estimation Results for Hypothesized Model

Appendix A

Table A. Measurement Model of hypothesized model

	Estimate	Std.err	Z-value	P(>|z|)	Std.lv	Std.all
Latent variables:						
Economical by						
ER1	1.000				1.448	0.809
ER2	0.870	0.088	9.869	0.000	1.259	0.728
ER3	0.952	0.069	13.825	0.000	1.378	0.841
ER4	0.934	0.073	12.751	0.000	1.352	0.808
ER7	0.956	0.058	16.548	0.000	1.384	0.829
ER9	0.953	0.074	12.845	0.000	1.380	0.848
ER11	0.844	0.082	10.229	0.000	1.222	0.721
Social by						
SR1	1.000				1.564	0.849
SR2	1.026	0.051	20.137	0.000	1.605	0.916
SR3	0.947	0.053	17.874	0.000	1.481	0.823
SR4	0.941	0.052	17.967	0.000	1.471	0.849
Personal by						
PR1	1.000				1.470	0.917
PR2	0.920	0.052	17.600	0.000	1.352	0.871
PR3	0.920	0.048	19.253	0.000	1.352	0.832
RskPrcpt by						
RP1	1.000				1.671	0.916
RP3	0.871	0.062	13.972	0.000	1.456	0.843
RP4	1.021	0.046	22.242	0.000	1.707	0.974
RskTol by						
RT1_rc	1.000				1.282	0.826
RT2_rc	0.827	0.107	7.719	0.000	1.061	0.661
RT4_rc	0.941	0.129	7.271	0.000	1.207	0.846
RT_RP by						
RT1_rc.RP1	1.000				1.968	0.683
RT2_rc.RP3	0.901	0.307	2.933	0.003	1.772	0.569
RT4_rc.RP4	1.027	0.295	3.486	0.000	2.021	0.786
RT_Econ by						
RT1_rc.ER1	1.000				2.143	0.733
RT2_rc.ER2	0.787	0.181	4.339	0.000	1.686	0.595
RT4_rc.ER3	0.683	0.193	3.542	0.000	1.463	0.585
RP_Econ by						
RP1.ER1	1.000				2.784	0.780
RP3.ER2	0.706	0.188	3.763	0.000	1.965	0.638
RP4.ER3	0.974	0.158	6.143	0.000	2.711	0.835

Appendix B.

Expected rewards

Beliefs about the benefits, extrinsic as well as intrinsic, that the firm and owner-manager would receive from adopting sustainable innovations over time (Frazier, 1983, JM). "Extrinsic rewards include increases in market share, sales volume, and profits. The amount of psychological pleasure received from entering and managing an exchange relationship as well as gaining approval and status within the industry are examples of intrinsic rewards (Frazier, 1983, p. 70, JM)."

See also "expectations about possible gains" as motivations for action (Alexandrov, Lilly, and Babakus, 2013, JAMS).

Expected social rewards: Legitimacy

Legitimacy: "A generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p. 574, Academy of Management Review). Cf. intrinsic rewards (approval and status) in Frazier (1983, JM).

SR1: In industry discussions and projects, societal appreciation is often mentioned as one of the motives to adopt sustainable innovations .

SR2-4: Based on the definition of legitimacy (desirable, proper, appropriate)

SR5: Based on the second item of the legitimacy scale developed by Handelman and Arnold (1999, JM, retailing context). The other items are difficult to apply to our context/question. Complete scale is:

- RetailWorld sets an example for how other retailers should conduct their activities.

- RetailWorld is committed to meeting the standards that people expect of retailers.

- RetailWorld genuinely listens to the demands that people put on it.

- RetailWorld sets an example for how retailers should behave.

Handelman and Arnold (1999,

Expected personal (emotional) rewards: Pride

The amount of psychological pleasure received from adopting sustainable innovations (based on the definition of intrinsic rewards by Frazier, 1983, p. 70, JM).

In several projects organized for agricultural entrepreneurs to increase sustainability (e.g., Mijn Duurzaamheid, Het Nieuwe Veehouden), entrepreneurs indicate that they want to be proud of their farm and that increasing sustainability of their business might contribute to their pride.

Pride: an emotion that emerges when a person reaches or exceeds social standards or expectations (Verbeke, Belschak, and Bagozzi, 2004, p. 387, JAMS).

Scale (Verbeke, Belschak, and Bagozzi, 2004, JAMS):
Deep inside I feel (subjective experience):

- exuberant and exhilarated

- invincible

- proud

 (Verbeke, Belschak, and Bagozzi, 2004, JAMS):

The second item seems a bit over the top in our context. Therefore, the scale is complemented by the fourth item of the emotional organizational pride scale of Gouthier and Rhein (2011, J. of Service Man.):

Please remember an event in which your company was most recently successful. Please evaluate what you are feeling in such moments:

- In these moments I am happy to be a member of this organization 0.926

- In these moments I have a feeling of joy to be a part of this company 0.927

- In these moments I am proud of what the company has achieved 0.921

- In these moments I have the feeling that the company is doing something meaningful 0.867

Gouthier and Rhein (2011)

Expected economic rewards

The economic benefits that the firm and owner-manager would receive from adopting sustainable innovations over time (based on Frazier, 1983, p. 70, JM).

Risk perception

A respondent's interpretation of the riskiness of the investment (based on Hoffmann et al., 2013, J. of Banking & Finance).

Scale (Pennings and Smidts 2000; Hoffmann et al. 2013)

- I consider investing to be very risky next month.

- I consider investing to be safe next month.

- I consider investing to be dangerous next month.

- I consider investing to have little risk next month. (I reversed this item in our questionnaire, because otherwise it was difficult to translate in Dutch)

Risk tolerance

A respondent's predisposition toward financial risk (like or dislike of risky situations) (Hoffmann et al., 2013, J. of Banking & Finance).

Scale (Hoffmann et al., 2013):

- Next month, I prefer certainty over uncertainty when investing.

- Next month, I avoid risks when investing.

- Next month, I do not like to take financial risks.

- Next month, I do not like to "play it safe" when investing.

I reversed the last two items in our questionnaire, because I believe the addition of "not" makes the items unnecessary complex, which may lead to difficulties in answering.