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MSc Thesis Marketing and Consumer Behavior Group and Biological Farming System

Farmers' entrepreneurial orientation, sensitivity to subjective norm, and land use change:

The case in a small scale farming community "Tierra y Libertad,"

Chiapas, Mexico

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SUMMARY

Land use change (LUC) is the adoption of agricultural innovations by farmers to adapt to a constantly changing environment. Some farmers adopt new land use types earlier than others, even if external factors are the same. The timing of innovation adoption is determined by personality, socio-economic status, and communication behaviour. Little study has been done to understand the timing of farmers' innovation adoption at social psychological level in small scale farming communities in developing countries. This study focuses on two personality traits: entrepreneurial orientation (EO) and sensitivity to subjective norm (SN) to analyse farmers' timing of LUC and the consequence of adoption, performance in terms of productivity or satisfaction. The timing of LUC was investigated in a small scale farming community, Tierra y Libertad, Chiapas, Mexico, where many land use changes have been observed since the settlement stated in 1960s.

A conceptual model was developed based on literature study. It hypothesized that three dimensions of EO; innovativeness, risk-taking, and pro-activeness have a positive influence on farmers' early LUC. On the other hand, higher sensitivity to SN makes farmers to adopt new LU slower, thus a negative relationship with the degree of EO was expected. In addition, EO might have a positive influence on performance, both farm production and farmers' perceived performance. Data was collected via secondary data and semi-structured interviews with 68 farmers. Secondary data identified farmers' land use focus and land use history. Farmers' EO, SN, and other variables were measured from 45 questions. The semi-structured interview was conducted to ask additional questions and clarifications. Indicators related to the questions were scored and analysed for statistical significance by regression analysis and other methods.

Results show that innovativeness had a positive influence on adoption of diversified LU, but did not influence the timing of LUC. In addition SN influenced farmers' attitude to adopt LU that farmers have never tried. The relationship between sensitivity to SN and EO was not found. Innovativeness was found to have a positive relation to higher production and farmers' perceived performance. The findings imply that farmers' innovativeness have a positive relationship with LU decision making and could relate to higher performance. On the other hand, it suggests that the method of measurement should be improved to obtain better understanding the timing of farmers' LUC in small scale farming community.

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1. INTRODUCTION

Land use change (LUC) is a modification of the current land use by adopting another type of land use (Lambin et al., 2003). For farmers, LUC is adoption of agricultural innovations. They have to take into account uncertainties about consequences of adoption such as price and cost fluctuations, weather variability and policy changes (Schmit and Rounsevell, 2006). As farmers are heterogeneous in personality, socio-economic status, and communication behavior (Rogers, 1995), some farmers adopt new land use types earlier than others.

Personality traits are one of the factors that influence the timing of innovation adoption (Rogers, 1995). Early adopters can be those who are willing to take risks and to try some new ideas (Rogers, 1995). Entrepreneurial orientation (EO) is a personal trait, characterized by innovativeness, risk-taking, and pro-activeness (Wiklund and Sheperd, 2005), which is closely linked to the description of early adopters of innovations (Roehrich, 2004). Therefore, the main hypothesis is that an early LUC adopters are characterized by a high degree of EO.

Another personal trait, which this study focused on, is the sensitivity to subjective norm (SN). Sensitivity to SN is a willingness to act according to a pressure from a society (Bearden et al., 1989). For some, the pressure of peers is necessary to motivate adoption (Rogers, 1995), instead of taking a decision individually. The level of sensitivity to SN varies from person to person.

This study focused on small scale farmers in the community "Tierra y Libertad (TyL)", Chiapas, Mexico. The area where the community located was originally a forest area. In the 1960s, people started settling and since then, land use has changed within a short period of time.

The purpose of this study is to understand farmers' LUC through analyzing the degree of EO and sensitivity to SN. Further, it aims to analyze whether the consequence of LUC, which is performance, differs between farmers. The reasoning behind it is the expected positive relationship between farmers' EO and higher performance, which is either turn over or satisfaction (Kodithuwakku and Rosa, 2002; Verhees et al., 2008). Therefore two main research questions are formulated:

-Can EO and SN influence the timing of LUC?

-Does EO influence the performance?

Then, sub-research questions are:

1. How is EO related to the timing of LUC?
2. How is EO related to LU adoption?
3. How is the sensitivity to SN related to LU adoption?
4. How is EO related to performance?

While many studies have been done to understand farmers' adoption of innovation at bio-physical and socio-economical level (Abdi Ghadim et al., 2005; Knowler and Bradshaw, 2007; Carletto et

al., 2010; Vignola et al., 2010), little is done on farmers' psychological level, where we want to focus on. Moreover, EO has not been measured for small scale farming communities nor tested in relationship to LU adoption. Besides, this study might be useful for external stakeholders involved in community development. When they bring and promote new ideas into the community, visible factors, such as socio-economic situation of households and farm physical conditions can motivate farmers to adopt or reject new ideas. Not only that but also farmers' invisible factors, such as EO and sensitivity to SN, can influence adoption. Thus, this study may help external stakeholders to understand farmers' decision making and improve the interaction methods with them.

2. THEORETICAL FRAMEWORK

This section will introduce and analyse relevant theories and concepts from literature related for this study. Then, integrating those studies, a conceptual model will be developed.

2.1. The timing of innovation adoption

When a new idea is communicated in society, it diffuses overtime among the members of a social system (Rogers, 1995). The timing of adoption of an innovation varies between individuals (Ryan and Gross, 1943; Boz and Akbay. 2000).

It is well recognized that the cumulative adoption of new idea follows the S-curve (Rogers, 1995). The S-curve explains that after one or a few people have succeeded in the adoption of a new idea, the majority of the population follows to adopt until few people are left who still will adopt.

What makes individuals different in timing of adoption is a personal preference for newness and riskiness about new ideas, and preference for compliance with others' opinion. Early adopters prefer doing things differently, are open to new ideas, and seek new information independently. On the other hand, late adopters prefer following what early adopters are doing (Rogers, 1995).

2.2. Entrepreneurial orientation (EO)

Descriptions of early adopters are close to the description of entrepreneurs. This section explains characteristics of entrepreneurs and entrepreneurial orientation (EO).

2.2.1. Definition of EO

An entrepreneur is a person who establishes and manages a business for the purpose of profit and growth (Carland et al., 1984). What is typical for an entrepreneur are psychological traits such as achievement motivation, risk-taking proclivity and preference for innovation (Stewart et al., 1999). These psychological traits of entrepreneurship are called entrepreneurial orientation (EO), which is the focus of this study.

EO has three dimensions: innovativeness, risk-taking, and pro-activeness (Matsuno et al., 2002). *Innovativeness* is a personal preference to engage and support new ideas, novelty, and experimentation. *Risk-taking* is one's sensitivity for uncertainty and investing resources to uncertain environments. *Pro-activeness* is about opportunity seeking, taking the initiative to pursue new opportunities and acting in anticipation of future demand (Lumpkin and Dess, 1996).

Even under limited resource or limited opportunity conditions, an entrepreneurial oriented persons may use creative ways to find and access new opportunities and resources (Kodithuwakku and

Rosa, 2002; Wiklund and Sheperd, 2005) to overcome such limitations. In that sense, EO can apply not only in the business or industrial situation (Miles and Arnold, 1991; Wiklund and Sheperd, 2005) but also in family firms (Naldi et al., 2007), farms (Verhees et al., 2008; Lans et al., 2010) in developed countries and developing countries (Kodithuwakku and Rosa, 2002); because EO is an individual's psychological predisposition that influences entrepreneurial behavior (Stewart, et al., 1999).

2.2.2. EO in agriculture

In this study, the focus is on individual farmers. The definition of EO in agriculture varies between scholars. By some, it is connected to intensification of production, pursuing efficiency and optimization of management (Van der Ploeg, 2008). By others, it is connected to diversification or multifunctional farming practice (Velsala and Vesala, 2010). Lans et al (in preparation) defined that EO is "*the identification and exploitation of business opportunities for the farm.*"

Entrepreneurially oriented farmers may shift from traditional crop production to non-traditional crop production (Wilson and Rigg, 2003; Carletto et al., 2010). Or such farmers may have the broad range of activities including farming related and non-related activities (Kodithuwakku and Rosa, 2002; Lans et al., in preparation). Such farmers may start these activities earlier than other farmers.

2.3. Sensitivity to subjective norm (SN)

Throughout the innovation adoption process, all adopters interact with their social networks to make a decision whether to adopt innovations as a trial, or/and an implementing action into their use. The way of interactions within social networks differs among individuals (Boz and Akbay, 2000).

2.3.1. Definition of SN

Subjective norm (SN) is "*a perceived pressure on an individual from social networks to make a certain behavioral decision* (Lu et al., 2005)". One's intentional decision is partly controlled by SN and partly controlled by attitude about correspond behavior (Ajzen, 1988). SN comes through his/her surrounding; friends, parents, or spouse, and also external agencies; consultancy agency or religious organizations. In addition, SN is always defined by how much he/she is sensitive to other people's opinion (Ajzen, 1988; Bearden et al., 1989; Lu et al., 2006).

2.3.2. SN and adoption of innovation

As innovations contain uncertainty, it makes adopters uncomfortable. Therefore, they tend to interact with the social network to make their adoption decisions (Burkhardt and Brass, 1990).

A person who is less sensitive and more non-conformant tends to search information about innovations independently (Manning et al., 1995; Rogers, 1995) and makes decisions independently (Oliver and Bearden, 1985). They adopt innovations earlier than other members of their society (Clark

and Goldsmith, 2005). On the other hand, a person who is sensitive to SN and others' opinion tends to ask opinions or observes what early adopters are doing, because he cannot cope with high degree of uncertainty about innovations when it is first introduced (Rogers, 1995). For him/her, peers' opinion is most important to adopt a new idea. Consequently, the person's adoption decision becomes slow (Ryan and Gross, 1943; Roechrich, 2004).

2.3.3. SN in small scale farming community

Within an agricultural community, individuals learn about new ideas through their social network, through one's own experience, their interaction with peers, and through agricultural support organizations (Boz and Akbay, 2000). For farmers, near peers are more important influencers for supporting an adoption process of innovations rather than external organizations (Ryan and Gross, 1943; Oreszczyn et al., 2010). In peasant communities, the external source of information is not easy to access; information is communicated mainly through interpersonal channels. In such situations, influence from close peers tends to be stronger (Harris, 1972; Rogers, 1995). Thus, SN is relevant in small scale farming community.

2.4. Performance

Many diffusion studies explain individual differences in timing of innovation adoption, but few discuss consequences of an adoption (Rogers, 1995). A consequence of innovation adoption is performance, which are defined as market share or turn over from the innovation adoption (Lans et al., in preparation). Entrepreneurial decision influences not only adoption of new things, but also the process and practices after adoption (Verhees et al., 2008). Consequently the outcome of the adoption differs from the degree of one's EO.

2.4.1. Performance and EO

Relationships between EO and performance are mostly positive (Lumpkin and Dess, 1996; Matsuno et al., 2002), even though the definition of performance varied from real performance to perceptional performance, such as satisfaction of the owner or entrepreneur. In this study, performance in terms of production from LU and farmers' satisfaction were used as performance measures.

2.5. Conceptual model

By integrating theories from literature, the conceptual model was developed and seven hypotheses were formulated (Figure 1). The conceptual model hypothesized that the farmer's EO and SN drive the farmer's LU adoption and the timing of LUC. That is, adoption of the LU is determined by whether a farmer makes a decision individually (Midgley and Dowling, 1978) or due to the social pressure (Ajzen,

1988; Rogers, 1995). These two ways of decision making processes can influence the timing of adoption and performance of the farm.

EO of a person is assumed constant over time, while SN changes continuously. Besides, decision making of the LU adoption was taken somewhere in the past. Due to the time gap, it is difficult to explain the influence of SN on the LU adoption in the past. To solve the time gap, the conceptual model distinguishes between LU adoption that was done in the past and that one intends to do in the future.

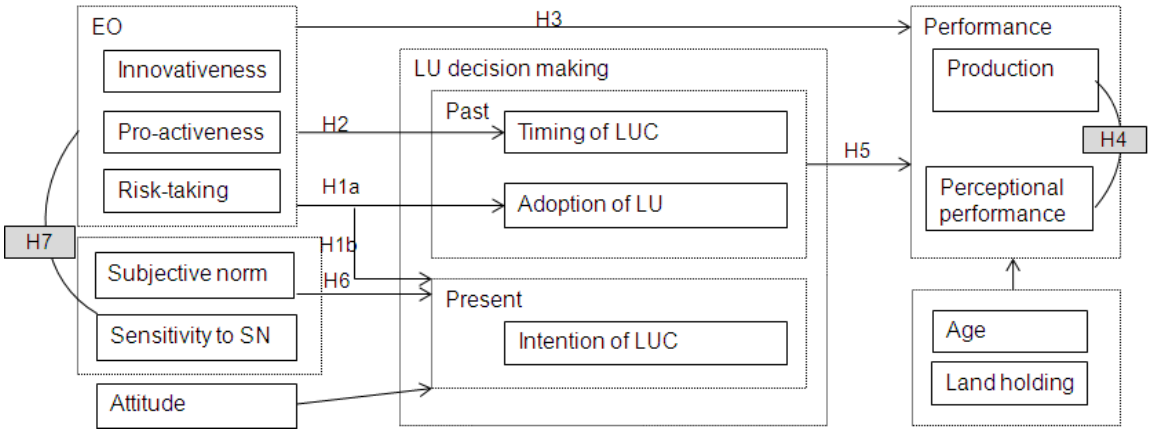

Figure 1 Conceptual model explaining a farmer's decision making to adopt the LU. H1 – H7 refer to hypotheses

2.5.1. EO and the LU adoption in the past

The LU adoption in the past distinguishes between two decisions; whether a famer adopted and when a farmer adopted. The conceptual model hypothesized that a farmer's EO influences LU adoption and its consequences influence the performance of the farm.

First decision is the dichotomous choice between adopting and non-adopting of the LU when some LUs became available. Innovativeness stimulates a person to adopt new ideas independently (Midgley and Dowling, 1978). As a farmer with high innovativeness is open for new ideas, he/she may prefer adopting new LU types, rather than traditional ones. For highly pro-active farmers, they can seek opportunities through adopting new LU types. Moreover, adopting requires new knowledge. High risk taking farmers may jump into such an unknown situation.

H1a : High EO of the farmer positively influences the LU adoption

Second decision is the timing of adoption. Early adoption requires a risk taking attitude in addition to high innovativeness (Rogers, 1995). Moreover early adopters take initiatives to adopt the new type of LU. Therefore, a high EO farmer may adopt it earlier than others.

H2: High EO of the farmer positively influences early response to the LU adoption

As the high EO person has an ability to spot a market opportunity and a willingness to invest large resources for developing it, such a person would have higher performance (Golder and Tellis, 1993; Wiklund and Sheperd, 2005). Particularly, the high EO farmer may constantly look for new ideas to improve farm activities and invest time and money for it after the LU adoption. Therefore, EO of farmers is hypothesized to have a positive relation with performance (Verhees et al., 2008).

H3: High EO of the farmer positively influences farmer's performance

Performance of the farm is divided in two: perceptional performance and production. There is a positive relationship assumed between both, because better production gives a better income, which satisfies the farmer.

H4: Production is positively related with perceptional performance

Early adoption allows for more experience with the LU. Consequently, it might give more production, therefore, generate a higher perceptional performance.

H5: Early responder to the LU has higher performance

2.5.2. EO, SN and intention of LU adoption

In line with adoption decision making, the high innovative farmer makes decisions individually (Midgley and Dowling, 1978), such a farmer may intend to adopt (Verhees et al., 2005) the new type of LU. In addition, pro-activeness and preference of risk-taking will increase a farmer's intention to adopt.

H1b: High EO of the farmer positively influences the farmer's intention to adopt the LU

At the same time, the pressure of peers is an important element to adopt new ideas (Ajzen, 1988; Rogers, 1995). There are always opinions of peers about a farmer's LU, regardless of his/her dependency on it.

H6: The SN towards LU influences the farmer's intention to adopt the LU

The influence of SN on the LU adoption depends on the sensitivity to SN. While the high EO farmer makes decisions individually, the farmer who is highly depending on the opinion of others makes

decision due to social pressure. Latter farmer can have low EO but high sensitivity in influential person/ group.

H7: Sensitivity to SN is negatively correlated with EO

2.5.3. Other variables and the LU adoption

In addition to EO and SN, background variables, which are included in the conceptual model are also assumed to influence LU adoption and performance.

Age of the farmer may influence different ways adoption decision making. Older farmers are more likely to have longer experience with LU than younger ones, consequently the income from the production can be higher, hence higher satisfaction. On the other hand, older farmers are likely to prepare for succession of his/her lands by their children. Therefore, such farmers may rather continue farming for sustaining own consumption than adopting new type of LU.

Second, land holding is the land holding area in 2010 and the number of LUs, which is the farmer's choice to specialize in one LU or diversify LUs. There may be a positive relationship between the land holding area and performance of the farm in terms of the satisfaction. As land is the asset of the farm and it is not easy for small scale farmers to extend its area, holding the larger size of the land may increase satisfaction of farmers. The number of LU can explain the strategy of the farmer, which can explain partly the reason of high (low) performance even if the farmer is high (low) EO.

Third, as explanatory variable for intention to adopt the LU, attitude is considered in line with the theory of reasoned action (TRA) (Ajzen, 1988). According to the theory, personal intentional behavior is explained by relative weight of subjective norm and attitude. Attitude is a personal evaluation about own action, whether it is good. Attitude may give better understanding of farmers' intention to adopt new LU type. This variable may give better understanding of LU intention. Besides, LU decision that is made in the past and the production of the farm may be explanatory variables. LU adopters may have different reasons to intend LU adoption from non-LU adopters. The more the farmer produces, the more income may be generated. Consequently, it will give an opportunity to invest and intend the new type of the LU.

3. STUDY AREA

Small scale farming community, Tierra y Libertad (TyL) was selected as study area, because some LUC have been observed within a short period of the community history. It offers the opportunity to analyze the influence of EO on LUC. In addition, there is the on-going study of Speelman (2008 – 2010) in the same area, which aims at understanding the dynamics of a social-ecological network (Speelman, 2008). This study has focused on how external and internal factors affect farmer's LUC decision making, but farmers' personality has remained a black box as a factor to understand LUC. This study can fill this black box.

3.1. General description of TyL

The study area, the community of Tierra y Libertad (TyL) is located on the Sierra Madre de Chiapas mountain range, state of Chiapas, Mexico. The community has a total area of 3600 hectares. The population of TyL is about 750 with an average age of 24 (Speelman, in preparation). There are schools from kindergarten to secondary school. However, Chiapas state has the highest illiteracy rate in Mexico, which was 23.1% in 2005 (INEGI, 2006). The illiteracy and functional-illiteracy rates in TyL have been estimated to be high (Speelman, in preparation). Infrastructure like water supply, electricity supply, and roads is present. The community runs a transportation service that connects TyL to the nearest town six times a week.

3.2. LU history in TyL

The first inhabitants settled in TyL in the early 1960's as employees of a saw mill. From the settlement to the present, several important events related to LUC have been noted: in 1972, the community was established and land use rights were given by government. Then people started agricultural activities. In 1995, the government established the biosphere reserve 'La Sepultura' in the north-east part of the mountain chain Sierra Madre. The whole community of TyL became part of the reserve. The objective of its establishment was conservation of biodiversity of the region, based on the agreement of the regional development. Regulations and restrictions of the reserve were made with minimal participation of local communities. This lack of adequate communication and transferring information caused conflict with some local communities, including TyL (Morgantini, 2004).

Figure 2 shows in qualitative terms how land use in TyL changed over time. Dotted and continuous lines refer to illegal and legal activities. By 2010, 80% of total land is covered by forest (Dahringer, 2004 in Speelman et al., submitted). Land is used for forest-based productions, which are

coffee and palm plantation, and clear-land productions, which are grassland for livestock ranshing, maize and bean production.

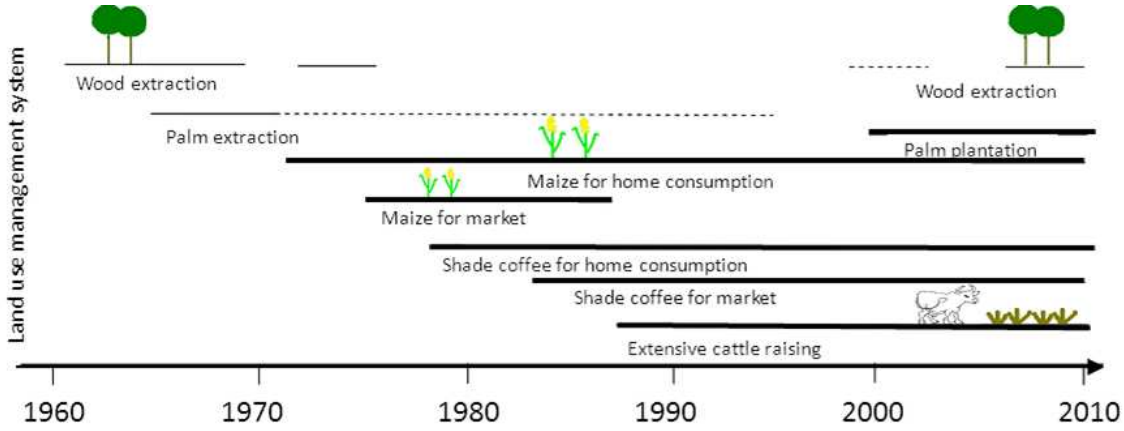

Figure 2 Qualitative overview of land use history in TyL (source: Speelman et al., Submitted)

3.3.1. Forest based production

Palm leaves production: Wild Palm was originally found in the forest. Since the arrival of first inhabitants, the leaves of these wild plants were harvested to give extra income for employees of the saw mill. In 1995, the reserve was established and forest extractions, including palm, became prohibited. Since the late 90's, there have been initiatives from the municipality and NGOs for palm plantation. They provided assistance for palm plantation both economically and technically. During these projects groups of producers were formed. The production is sold to the international markets as an ornamental plant.

Coffee production: When the community was established in 1972, people started coffee production under forest mainly for home consumption. Since the middle of 1980's shade coffee is produced for the market. Producer groups were established for applying government subsidies, on e hand, and for applying organic certification, on the other hand. In addition to governmental subsidies, there is some technical assistance for organic coffee production from NGO.

3.3.2. Cleared land production

Maize and bean production: Maize and bean production started when the community was established. It is staple food for the families. Many farmers stop producing it the middle of 1990's due to market price crisis, high price of external input, and decreased subsidies. Current maize and bean production is only for family consumption.

Livestock: After the market crisis of maize, production activities moved to raising cattle. Government promoted livestock production as an alternative for maize production with credit. The cattle group has been formed in order to apply for subsidies of the government. In 2010, extensive cattle fields occupy the largest area of the TyL.

3.3.3 Other land use

Tomato production: Early in the 1980's, one farmer started commercial tomato production. After a while, many farmers dove into its production but few farmers continue producing tomato until 2010. It was seen as a new crop or better to say "gambling crop", quoting a farmer. Characteristics of its production were very distinct from other crop in the community. It required plain land, extra inputs such as an irrigation system and hybrid seed, and intense workload. In addition, access to the fresh products market was hard due to the road conditions and distances. Even worse, the market is volatile. Many farmers stopped tomato production due to the loss of investments.

Other land use: Once in a while, government distributed seedlings of fruit trees such as citrus and avocado trees for the purpose of home consumption. Many trees were not successful because the plant was not adequate for local climate/ soil conditions and/or information about fruit tree management was lacking. There have been initiatives from NGOs such as small animal production, including fish. Some farmers joined these and a few of them continued. Individually, some farmers manage own orchards where vegetables and fruit trees are grown for home consumption. Size and diversity of orchards differ from farmer to farmer, what is common to them is that they purchase inputs from their own resources.

4. METHOD

4.1. Sample

Based on Speelman's study in 2010 (Submitted), 68 farmers were selected out of 151 as sample for this study. In order to collect data from the sample farmers, a questionnaire was designed. Interviews were conducted through home visiting from the end of September till the end of October, 2010. Duration of one interview varied from 15 minutes to 60 minutes. Interviews were recorded with the permission of farmers.

4.2 LU adoption

The survey of LUC was conducted by Speelman in 2010 (Submitted). LU adoption was defined as what LU type a farmer adopted and when a farmer adopted. The timing of LUC was measured in relation to external drivers (Table 1). Sampled farmers who adopted a LU ten years after a related driver was introduced were assumed to be influenced by the driver. Analyses included only these farmers to test the timing of LUC.

Table 1. External event of each LU (source: Speelman et al., Submitted)

External events (year)		Description
1995	Coffee	Establishment of biosphere reserve
2007		Coffee price start increasing
1997	Palm	First palm project provided by municipality
2000		Second project provided by municipality
2005		Participatory palm project provided by reserve, NGO, and municipality
1980	Livestock	First credit by government
1985		Second credit by government
1989		Maize market price crisis, many farmers sifted from maize to livestock farming

4.3. Questionnaire construction

A questionnaire was designed to test the conceptual model. An initial questionnaire of 45 questions was developed taking several things into account to make it suitable for a small scale farming community. Questions and answer choices were elaborated in English, and then translated into Spanish by a native speaker (Appendix 1). The questionnaire was tested with two farmers, who were not in the sample group. Some questions were difficult to answer for farmers, as they were too abstract and/or answer choices were too extensive. The questionnaire was adjusted accordingly. In the section on EO questions, farmers were asked to talk about a series of topics about land use management instead of being asked questions from questionnaire (Appendix 2). These topics were used by the author to answer questions

of the questionnaire. Sections on questions of subjective norm, attitude, intention, and performance remained unchanged.

After all interviews were performed, answer choices for questions were made from topics. Five answer choices were formulated based on the answer span of the interviewees (Appendix 2). For instance, in order to measure the importance of information that can be used on the farm (Question 3), answer choices were made as follows. During interviews, farmers talked about what kind of information they needed for their farm. Information that farmers referred to was diverse; some information was well known in the community, other was relatively new, and some information was very new and mentioned by just one farmer. Importance of information was classified into five categories according to the novelty of information, assuming that new information is more important as it is hard to obtain. Then, all interviews were reassessed and finally all questions were scored by answer choices. Once data collection finished, quality of data was examined statistically using SPSS software. Especially for EO and performance measurement, principle component analysis (PCA) was used to assess whether scores actually reflected one dimension. Criteria showed that Eigen values of the second component are smaller than 1, the variance accounted for by the first component is more than 60%, and all questions load on the first component are higher than 0.60. A reliability analysis was conducted, as well. If Croncach Alpha was higher than 0.60, these questions were used in the measure for further analyses. Further sections explain about the quality of obtained data for each concept.

4.3.1. Entrepreneurial orientation (EO)

EO questions measure to which degree farmers have the character of an entrepreneur. Three dimensions of EO, which are innovativeness, risk-taking, and pro-activeness, were identified by Millar (1983). Questions for each dimension were developed based on the work of Verhees, et al. (2008).

Innovativeness

Innovativeness in this study is the openness of farmers for new information. Principle component analysis (PCA) for one component solution was used to test the reliability of questions. A description of the measurement properties is provided in Table 2. All three innovativeness' variables loaded higher than 0.739 on the first component, which accounts for 63% of the variance. The reliability (Cronbach's Alpha) was 0.833, which was an acceptable value. That suggests that average scores across these three questions can be used for further analyses.

Pro-activeness

Pro-activeness in this study is to what extent a farmer takes an initiative to improve farm activities. Principle component analysis (PCA) yielded a one component solution (Table 2). However, one variable (Q9) loaded very low (0.477), while other two variables loaded 0.926 and 0.925. Varimax rotation

suggested that Q10 is well explained in the second component, which means that the interpretation of this question was different from others. After excluding Q9, further PCA analysis was tested to see the correlation between innovativeness and pro-activeness. All variables loaded more than 0.695 in one component. Cronbach's alpha was good with 0.838. For statistical reason, all three questions for innovativeness and two questions for pro-activeness were combined. The average score of 5 questions will be used for further analyses.

There may be some reasons, both conceptually and practically, why innovativeness and pro-activeness were highly correlated with each other. Rauch et al (2009) reported that most EO studies have a single variable, which were summed across all dimensions of EO, because of the conceptual closeness between dimensions. For this study, therefore, it can be the case that two dimensions were extracted as one dimension. Practically, a close relationship between two dimensions may be due to the interpretation by a third person. After finding difficulties to obtain consistent data from initial questionnaire, answer choices were selected by the author but not by respondents. Even if the answer choices were classified based on farmers' story in order to make the interpretation to be as objective as possible, it can be subjective to some extent. This subjectivity may cause the high correlation between questions of innovativeness and pro-activeness.

Risk-taking

Risk-taking in this study is the preference of farmers for uncertainty and for the investment in terms of money and time. The topic discussed with farmers was tomato production, which was the only high risk production that was found in the community. Then, farmers who had grown tomato were assumed to have high risk attitudes. Questions and detailed answer choices are found in appendix 2.

The PCA yielded a one component solution explaining 91% of the variance (Table 2). All variables load higher than 0.929 on the first component. The reliability (Cronbach's Alpha) was very good value (0.933). Additional PCA analysis was done to see correlation between risk-taking and other EO dimensions. All variable of risk-taking was extracted in one component, which formed one distinct and independent dimension of EO. Finally, it was decided to take risk-taking as an independent dimension and the average scores is used for further analyses.

Table 2 Measurement scale properties

Scale	# of questions	Eigen value second component	Variance accounted for	Lowest question loading	Cronbach's Alpha
Innovativeness	3	0.693	63%	0.739	0.833
Pro-activeness	3	0.875	65%	0.477	0.705
Inn + Pro[1]	5	0.705	63%	0.695	0.838
Risk-taking	3	0.221	91%	0.929	0.933
Performance	4	0.660	61%	0.687	0.781

[1] Inn+Pro means joined measurement of innovativeness and pro-activeness excluded Question 9.

4.3.2. Subjective norm, attitude, intention

To explain the relationship between intention of LU and influence of subjective norm (SN), questions were developed based on the work of East (1997). There are three concepts, SN, attitude, and intention. In this study, four influential person/ group as subjective norm were recommended by the expert, which were wife, family members, neighbors, and NGOs. Five land uses were identified, which were staple crop, coffee, palm leaves, livestock, and other land use type. Other LU type was considered in order to see whether farmers have ideas to use their land differently from existing land uses.

Subjective Norm (SN)

SN in this study is third person's opinion about a farmer's land use choice. Measurement asked four influential people's opinion about five different land uses. Farmers were asked whether they knew the opinion of an influential person/ group about their farm activities. Only when farmers knew about it, they were asked further about influential people's opinions.

Obtained results showed that mostly farmers did not know about SNs opinion (82%) or SNs have positive opinion about LUs (17%), and few cases for the negative SN's opinion about LUs (2%). Individual questions were used for further analyses, because SN is about different influential groups or different land uses.

Attitude

Attitude in this study is a farmer's opinion about LU options. Five land use option had one question each, asking whether a farmer thinks that a LU is a good idea for him/her. Individual questions were used for further analyses.

Intention

Intention in this study is a farmer's plan in terms of LU for the coming three years. LU plan was asked for having new LU and/or continuing current LU. Five LU options had one question each. Individual questions were used for further analyses.

4.3.3 Performance

Performance in this study is a farmer's perception about both absolute and comparative performance of the farm. After obtaining data, principle Components Analysis (PCA) and a reliability analyses were performed (Table 2). The PCA resulted that one component solution explains 63% of the variance. Questions were reliable (α=0.704). The average score of four questions assessed a farmer's perceptional performance and used for further analyses.

4.4. Other variables

For better understanding of analyzing dependent variables, additional data were considered as well. One part of variables had been obtained in Speelman's study (in preparation), which were current age of farmers, the amount of land holdings, and LU focuses. Among sampled farmers, an average land holdings per farmer was 23 ha, ranging from 0 to 252 hectare. Farmers' average age was 46 years old and it varied from 19 to 82 years old. Seven LU focuses were identified (Speelman, submitted), which were 0) no land holding, ii) staple crop production, iii) coffee production, iv) palm production, v) livestock production, vi) coffee & palm production, vii) all LU (coffee & palm & livestock).

Another variable was obtained in this study, which was the production of each land use activity in last season, 2009. Farmers were asked the production per crop. Production unit for maize was ton per hectare, for coffee was kg per hectare, for livestock was number of animals sold, and for palm leaves was number of packages harvested. Average production of maize was 1.14 t/ha, coffee was 188.4 kg/ha, cattle were 1, palm leaves was 3.7 packages.

4.5 Data analysis

After obtaining data for the variables in the conceptual model, statistical analyses were done to see partial correlations between variables. Correlations of each variable were analyzed before proceeding with regression analyses (Appendix 3). Normality was assumed for regression analyses. Regression analyses were performed across all sampled farmers or group of farmers for each variable using SPSS. Regression analyses were performed to see whether each independent variable predicts the timing of LUC, LU adoption, LU intentions, and performance of LU. If it is necessarily, further analyses were done to explain the outcome (result) of performed regression models.

[1] Relation between EO (innovativeness and risk-taking) and the timing of LUC in relation to the external driver

The timing of LUC is about distance of the time to adopt a LU from point of the time when external driver was introduced. Seven external drivers were identified (Table 1). Farmers who adopted the LU during ten years from the external driver was introduced were selected for this analysis. Regression analysis was done to see whether and to what extent timing of adoption was related to innovativeness and risk-taking.

The timing of LUC $= \beta_{0i} + \beta_{1i}$**Innovativeness* $+ \beta_{2i}$**Risk-taking + ei*

Where: i = External driver i, β_{0i} = Constant of external driver i, ei = error terms of external driver i

[2] Relation between EO (innovativeness and risk-taking) and the LU adoption

LU adoption is about whether or not sampled farmers adopted the LUs. Logistic regression was done with all respondents to see whether and to what extent the LU adoption was related to innovativeness and risk-taking. Taking into account that farmers had different LU focuses, regression was tested to 5 LU focuses: (ii) staple, (iii) coffee, (v) livestock, (vi) coffee& palm, and (vii) all LU (coffee & palm & livestock). Farmers with no land were not included in the analysis. Besides, palm focus (iv) neither included because only one farmer was categorized.

$Adoption\ LU\ i = \beta_{0i} + \beta_{1i} * Innovativeness + \beta_{2i} * Risk\text{-}taking + ei$

Where: i = LU focus, β_{0i} = Constant of LU focus i, ei = error terms of LU focus i

Further, the discriminant analysis was applied to identify difference of innovativeness and risk-taking based on LU focus.

[3] Relation between EO (innovativeness and risk-taking), SN, and LU intention

Regression was formulated to test whether and in what extent intention of LU is estimated by innovativeness, risk-taking, subjective norms, and attitude. Same regression model was applied for four LU types: coffee, palm, livestock, and other LU intention.

Two things were considered to formulate the regression model. Firstly, group that were included in the regression model was considered. Adopter and non-adopter of LUs may have different motives for the intention. While adopters' intention is whether they want to maintain same LU, non-adopters' intention is whether they want to try to use new type of LU. We are interested in the latter case, therefore adopters' intention was not included. Second consideration was which LUs were included in the regression model. Staple food production has different focus from other LUs. Farmer may adopt it for sustaining daily food but not for the purpose of income generation. Therefore, staple intention was not included in the regression model.

$Intention\ of\ LU\ i = \beta_{0i} + \beta_{1i} * Innovativeness + \beta_{2i} * Risk\text{-}taking + \beta_{3i} * SN\ Wife + \beta_{4i} * SN\ Family + \beta_{5i} * SN\ Neighbor + \beta_{6i} * SN\ NGO + \beta_{7i} * Attitude + ei$

Where: i = LU type, β_{0i} = Constant of LU type i, ei = error terms of LU type i

Further, sensitivity of SN was estimated by coefficient of each SN from the regression model.

[4] Relation between EO (innovativeness and risk-taking), the timing of LUC and production

Regression was formulated to test whether and in what extent the production of each LU is related to innovativeness, risk-taking, and year of LU adoption. As background variables, age at LU adoption, land

holding at 2010, and number of LU were included. Same regression model was applied for four LU types: staple, coffee, palm, and livestock.

*Production i = β_{0i} + β_{1i} * Innovativeness + β_{2i} * Risk-taking + β_{3i} * Year LU adoption + β_{4i} * Age at LU adoption + β_{5i} * Land holding at 2010 + β_{6i} * Number of LU + ei*

Where: i = LU type, β_{0i} = Constant of LU type i, ei = error terms of LU type i

[5] Influence of innovativeness, risk-taking, and the timing of LUC <u>on perceptional performance</u>

Regression was formulated to see whether innovativeness, risk-taking, the year of adoption and the production relate to perceptional performance. Five different LU focuses were included as dummy variable.

*Perceptional performance = β_0 + β_1 * Innovativeness + β_2 * Risk-taking + β_4 * Age + β_5 * Land holding at 2010 + β_6 * LU focus ii + β_7 * LU focus iii + β_8 * LU focus v + β_9 * LU focus vi + β_{10} * LU focus vii + e*

Further, regression model was tested to see whether year of adoption and production influence perceptional performance. Staple crop production was not included as it has different focus from the rest of LU type. Same regression model was applied for three LU type; coffee, palm, and livestock.

*Perceptional performance i = β_{0i} + β_{1i} * Innovativeness + β_{2i} * Risk-taking + β_{4i} * Production + β_{5i} * Year of adoption + β_{6i} * Land holding at 2010 + β_{7i} * Age + e*

Where: i = LU type, β_{0i} = Constant of LU type i, ei = error terms of LU type i

5. RESULTS

5.1. LU adoption in the past

5.1.1. The timing of LUC

A regression model estimated influence of farmers' innovativeness and risk-taking on the timing of LUC in relation with external driver (Table 1). The timing: early and late, was determined by the distance from the time when external driver was introduced.

It was expected that the early adopters have higher innovative and risk-taking scores. The result of the regression model (Table 3) showed significance only in earlier adopters of livestock in 1989 (*F*=10.003, *P*=0.003). Early adopters had higher innovativeness (*B*=-0.861, *P*=0.001) and lower risk-taking (*B*=0.557, *P*=0.016). However, the test did not have enough accurate to support hypothesis, because of the small number in the regression (N=14).

Table 3 Regression model estimation result; explanatory variables for the timing of LUC in relation to external drivers (Standardized coefficient)

	Timing of LUC in relation to external drivers							
	Coffee		Palm			Livestock		
	1995	2007	1997	2000	2005	1980	1985	1989
	B	B	B	B	B	B	B	B
Innovativeness (H2)	-0.321 (P=0.244)	0.082 (*P* =0.853)	-0.696 (*P*=0.060)	-0.059 (*P*=0.808)	-0.250 (*P* =0.381)	0.425 (*P* =0.294)	-0.230 (*P* =0.372)	-0.861* (*P* =0.001)
Risk-taking (H2)	0.648* (P =0.033)	0.018 (*P* =0.967)	0.343 (*P*=0.305)	0.213 (*P*=0.382)	0.105 (*P* =0.710)	-0.174 (*P* =0.656)	0.281 (*P* =0.280)	0.557* (*P* =0.016)
N	12	10	10	20	19	10	18	14
R^2	0.431	0.008	0.422	0.047	0.048	0.155	0.103	0.649
F	3.415 (P =0.079)	0.030 (*P* =0.971)	2.556 (*P*=0.147)	0.417 (*P*=0.666)	0.407 (*P* =0.672)	0.643 (*P* =0.554)	0.865 (*P* =0.441)	10.003* (*P* =0.003)

* Coefficient is significant at the 0.05 level (2-tailed)

Further analysis was done to see if result is still consistent as previous regression models when sample number is increased. All adopters who were included previous regressions (N=113) were tested in one regression model. In this test, difference between external drivers, such as type of external driver, introduced year, and affected LU type were not considered. Therefore a farmer who adopted several LU or/and was overlapped across different year in same LU, was counted separately.

Table 4 shows that the regression model was significant (F=3.127, P=0.048) although R^2 was very small (R^2=0.054). Within ten years of range, farmers' risk taking was significantly higher for late adopters (*B*=0.246, *P*=0.016) but innovativeness was not significant (*B*=-0.137, *P*=0.174). This was partly

in line with the result of higher risk-taking in late adopters of livestock 1989 (*B*=0.557, *P*=0.016 in Table 3). Hypothesis 2 was not supported by insignificance of innovativeness and lower risk-taking of early adopters (Table 4).

Table 4 Regression model estimation result; explanatory variables for the timing of LUC (Standardized coefficient)

	Timing of LUC	
	B	Sig.
Innovativeness (H2)	-0.137	0.174
Risk taking (H2)	0.246*	0.016
N	113	
R^2	0.054	
F	3.127* (*P* =0.048)	

* Coefficient is significant at the 0.05 level (2-tailed)

5.1.2. The adoption decision

Farmers in this study had different LU focuses, therefore adopted land use differ amongst farmers. Binary logistic regression was tested to estimate LU adoption according to five LU focus group: *staple focus* farmers (ii), *coffee focus* farmers (iii), *livestock focus* farmers (v), *coffee & palm* focused farmers (vi), and *all LU* (coffee & palm & livestock) farmers (vii). Results of binary logistic regression (Table 5) showed that innovativeness (*B*=1.298, *P*=0.021) and risk-taking (*B*=0.702, *P*=0.008) of all LU (vii) were only significant for LU adoption.

Table 5 Liner regression model estimation result; explanatory variables for LU adoption in different LU focus

	Adoption of the LU									
	LU focus ii		LU focus iii		LU focus v		LU focus vi		LU focus vii	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Innovativeness (H1a)	-1.868	0.177	0.067	0.926	-0.767	0.344	0.620	0.288	0.298*	0.021
Risk-taking (H1a)	-0.154	0.823	-0.531	0.228	0.001	0.999	-0.408	0.224	0.702*	0.008
Constant	1.774	0.465	-1.378	0.459	-0.510	0.790	-2.576	0.095	-5.176	0.001
N	68		68		68		68		68	

* Coefficient is significant at the 0.05 level (2-tailed)

The discriminant analysis was done to identify differences of innovativeness and risk-taking between LU focus group. Two discriminant functions were identified: innovativeness and risk-taking. The first function explained 92.7% of the variance, whereas the second function explained only 7.3%. The first function was significantly differentiated between groups (*P*<0.000), but not in the second function (*P*=0.50). The correlations between outcomes and the discriminant functions revealed that innovativeness loaded highly on the first function (*r*=0.787), and risk-taking loaded highly on the second function (*r*=0.925).

According to LU focus group variables, which were expressed unstandardized coefficient, were plotted with different color on the discriminant function plot (Figure 3). Group Centroid (Blue square in Figure 3) is unstandardized coefficient of each group's average score. The plot tells that LU focus groups plotted with negative sign are being differentiated by correspond function.

First function (innovativeness) significantly differentiated LU focus, *coffee & palm focused* (vi) and *all LU* (vii) from LU focus *no land* (0), *staple focused* (ii), *coffee focused* (iii), and *livestock focused* (v). This result was in line with coefficient of the previous regression (Table 5), showing the highest innovativeness in *all LU* (vii) (*B*=1.298). On the other hand, difference of the second function (risk-taking) was not as notable as for the first variate (Figure 3, Group Centroid), which did not correspond with the result of coefficient of the previous regression: the highest risk-taking in *all LU* (vii) (*B*=0.702 in Table 5). The results show that risk-taking might have been less important than innovativeness. To sum, hypothesis 2a was supported by higher innovativeness for *all LU* (LU focus vii) (Table 5 and Figure 3) .

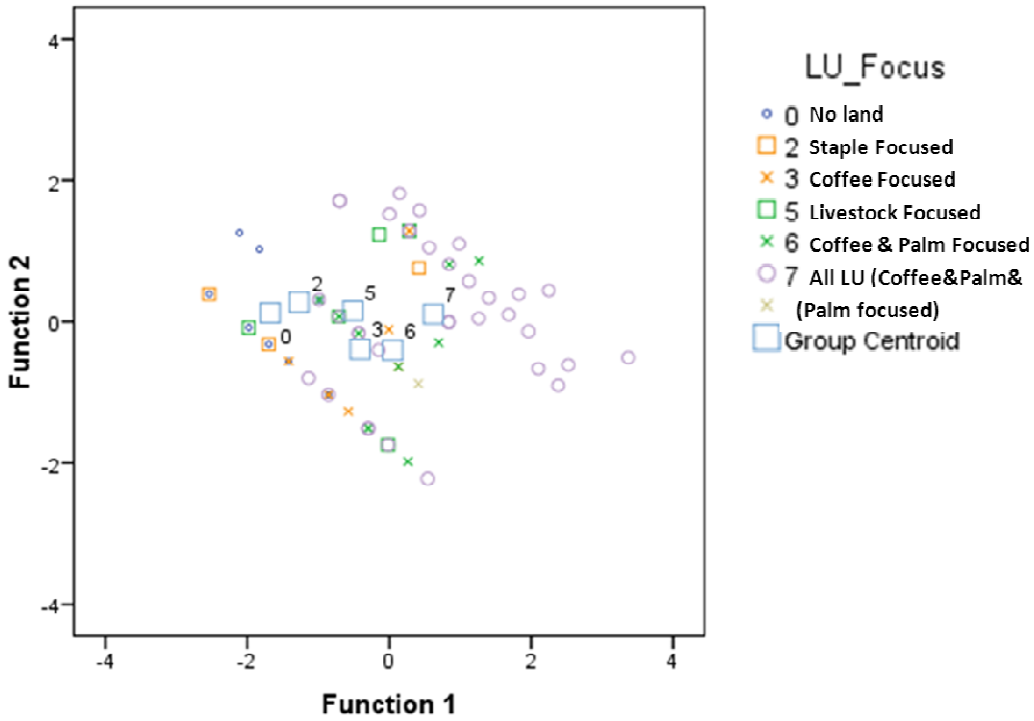

Figure 3 Canonical Discriminant Functions: Function 1= innovativeness, Function 2 = Risk-taking

5.2. Intention of adoption

Influence of innovativeness, risk-taking, subjective norms, and attitude on intention to adopt each LU was estimated by regression analysis with sampled farmers who had not adopted each LU. The result of regression model is presented in Table 6. In the regression model of each LU intention, there were some variables that were excluded because these received same score, hence no variation within a variable. The regression model was significant for palm (*F*=3.570, *P*=0.011) and other LU type intention

(*F*=6.675, *P*<0.000) but not for coffee (*F*=2.718, *P*=0.096) and livestock intention (*F*=2.560, *P*=0.059). Coefficient of attitude towards intention of both palm (*B*=0.458, *P*=0.005) and other LU type (*B*=0.510, *P*<0.000) were significant. There was no significant coefficient of innovativeness nor SN for intention of LU adoption, therefore hypotheses 1b and 6 were not accepted.

Table 6 Regression model estimation result; explanatory variables for LU intention for coffee, palm, livestock, and other type of LU (Standardized coefficient)

	LU intention							
	Coffee		Palm		Livestock		Other	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Innovativeness (H1b)	0,486	0,083	0,185	0,286	0,443*	0,037	0,144	0,216
Risk-taking (H1b)	-0,524	0,053	0,010	0,955	-0,364	0,112	-0,029	0,806
SN Wife (H6)	0,368	0,157	0,025	0,875	[1)]		-0,030	0,783
SN Family (H6)	0,107	0,634	0,169	0,334	-0,051	0,865	0,148	0,169
SN Neighbour (H6)	0,674*	0,019	0,331	0,057	0,130	0,674	[1)]	
SN NGOs (H6)	-0,383	0,198	[1)]		0,471	0,058	0,161	0,138
Attitude	[1)]		0,460*	0,006	0,290	0,214	0,510*	0,000
N	15		32		24		63	
R^2	0,671		0,461		0,475		0,417	
F	2,718 (*P* =0,096)		3,570* (*P* =0,011)		2,560 (*P* =0,059)		6,675* (*P* <0,000)	

* Coefficient is significant at the 0.05 level (2-tailed)

[1)] These variables of shaded columns were excluded from the regression model because they did not have variation within samples

As attitude was the largest influential variable for palm and other LU type, mediation effect of attitude was tested (Table 7). For palm intention, the regression model became insignificant when attitude was removed (*F*=1.886, *P*=0.131). On the other hand, the regression of other LU type, which excluded attitude, was significant (*F*=2.715, *P*=0.029). SN variables except SN-wife became the main influential variable on intention to adopt other LU type. When attitude was regressed by these SN variables: SN-family and SN-NGOs, the regression model was significant (*F*=3.456, *P*=0.038) although R^2 was very small (R^2=0.099) (Table 7). Therefore, SN influenced attitude, and then attitude influenced LU intention.

Table 7 The mediating role of attitude for LU intention of palm and other LU type (Standardized coefficient)

	Palm		Other LU type			
	Intention		Intention		Attitude	
	B	Sig.	B	Sig.	B	Sig.
Innovativeness (H2b)	0.240	0.224	0,208	0,124		
Risk-taking (H2b)	-0.111	0.586	0,029	0,835		
SN Wife (H6)	0.010	0.956	0,066	0,600		
SN Family (H6)	0.225	0.260	0,261*	0,034	0,244*	0,046
SN Neighbour (H6)	0.313	0.111	[1)]			
SN NGOs (H6)	[1)]		0,235	0,061	0,213	0,081
Attitude						
N	63		63		66	
R^2	0.266		0,192		0,099	
F	1.886 (*P* =0,131)		2,715* (*P* =0,029)		3,456* (*P* =0,038)	

* Coefficient is significant at the 0.05 level (2-tailed)

[1)] These variables of shaded columns were excluded from the regression model because they did not have variation within samples

Sensitivity of subjective norm on intention was estimated from coefficient of each SN (Table 6). Coefficient was significant only with SN neighbours for coffee intention (*B*=0.674, *P*=0.019), but not wife, family, nor NGOs. It can be concluded that non-coffee adopters were sensitive to neighbours' opinion. However, the test was less accurate due to the low number of non-coffee adopters (N=15). On the other hand, no evidence of sensitivity to influential person/ group was found in another LU intention. Contrary to expectation, no relationship between sensitivity to SN and EO elements was found. Hence hypothesis 7 was not supported.

5.3. Performance

Influence of variables on each LU's production per unit was estimated by regression model. All regression model was significant, except staple food production (Table 8). Coefficient of coffee producers' innovativeness (*B*=0.523, *P*<0.000) and adoption year (*B*=-0.336, *P*=0.019) were significant for coffee production. Coefficient of palm producers' innovativeness was significant for palm production (*B*=0.559, *P*=0.002). For production of livestock, coefficient of land holding was significant(*B*=0.542, *P*=0.002).

Table 8 Regression model estimation result; explanatory variables for production of LU adopters of staple, coffee, palm and livestock (Standardized coefficient)

	Production							
	Staple		Coffee		Palm		Livestock	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Innovativeness (H3)	-0.052	0.824	0.523*	0.000	0.559*	0.002	0.088	0.586
Risk taking (H3)	-0.069	0.729	-0.272	0.054	0.000	0.999	0.040	0.801
Year of LU adoption (H5)	-0.216	0.227	-0.336*	0.019	-0.179	0.301	0.080	0.658
Age at the LU adoption	0.106	0.594	0.104	0.456	-0.092	0.614	-0.121	0.492
Land holding at 2010	0.202	0.282	-0.091	0.500	-0.323	0.079	0.542*	0.002
Number of the LU	-0.028	0.895	0.010	0.941	0.356	0.089	0.074	0.636
N	37		48		30		39	
R2	0.114		0.384		0.528		0.346	
F	0.645 (*P* =0.693)		4.263* (*P* =0.002)		4.293* (*P* =0.005)		2.824* (*P* =0.025)	

*Coefficient is significant at the 0.05 level (2-tailed)

Perceptional performance was tested to see influence of LU adoption. All sampled farmers were included in regression model and it was significant (*F*=5.223, *P*<0.000) (Table 9). Result showed that coefficient of innovativeness (*B*=0.407, *P*=0.002) and farmers' age at 2010 (*B*=0.286, *P*=0.021) were significant for perceptional performance (Table 9). However, LU focus was not related to perceptional performance. Hypothesis 3 was partly supported by the significant coefficient of innovativeness, while hypothesis 5 was not supported.

Table 9 Regression model estimation result; explanatory variables for perceptional performance (Standardized coefficient)

	Perceptional performance	
	B	Sig.
Innovativeness (H3)	0.407*	0.002
Risk taking (H3)	0.020	0.862
LU Focus ii (H5)	-0.031	0.786
LU Focus iii (H5)	0.241	0.062
LU Focus v (H5)	0.167	0.216
LU Focus vi (H5)	0.208	0.156
LU Focus vii(H5)	0.301	0.148
Age at 2010	0.286*	0.021
Land holding at 2010	-0.052	0.647
N	68	
R^2	0.448	
F	5.223* (*P* <0.000)	

*Coefficient is significant at the 0.05 level (2-tailed)

Further regression of perceptional performance was done to see influence of production and the timing of LUC on it (Table 10). Staple production was not included because the purpose of LU is different from other three LUs. Regression model was significant in perceptional performance of coffee adopters (coffee (a) in Table 10 (*F*=3.418, *P*=0.012) and livestock adopters (*F*=2.711, *P*=0.030) but not significant in perceptional performance of palm (*F*=0.960, *P*=0.473). Perceptional performance of livestock adopters was not related to production but to innovativeness (*B*=0.494, *P*=0.004) and age (*B*=0.349, *P*=0.030). That was the same result as the regression model that included all farmers. On the other hand, perceptional performance of coffee adopters was not related to innovativeness but coffee production (*B*=0.508, *P*=0.004) (coffee (a) in Table 10). When this main influential variable is removed, coefficient of innovativeness for perceptional performance was not significant (*B*=0.262, *P*=0.068) (coffee (b)). However, there might be mediation effect of coffee yield between innovativeness and perceptional performance, due to positive relation to innovativeness with coffee yield (Table 8). Hypothesis 4 was supported by positive influence of coffee production on perceptional performance. Hypothesis 5 was not supported because early adoption did not influence perceptional performance in each LU option.

Table 10 Regression model estimation result; explanatory variables for perceptional performance of LU adopters of staple, coffee, palm and livestock (Standardized coefficient)

	Perceptional performance							
	Coffee (a)		Coffee (b)		Palm		Livestock	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Innovativeness (H3)	- 0.021	0.896	0.262	0.068	0.349	0.179	0.494*	0.004
Risk taking (H3)	0.193	0.201	0.102	0.489	-0.112	0.592	-0.036	0.818
Production (H4)	0.508*	0.004			0.142	0.583	0.217	0.231
Year of LU adoption (H5)	-0.007	0.965	-0.113	0.506	0.072	0.752	0.135	0.387
Land holding at 2010	0.045	0.749			0.208	0.376	-0.111	0.551
Age at 2010	0.113	0.489	0.213	0.214	-0.133	0.562	0.349*	0.030
N	48		50		30		39	
R^2	0.315		0.187		0.200		0.337	
F	3.148* (*P* =0.012)		2.642* (*P* =0.046)		0.960 (*P* =0.437)		2.711* (*P* =0.030)	

*Coefficient is significant at the 0.05 level (2-tailed)

6. CONCLUSION

Figure 4 summarizes the results of the conceptual model in this study. The relationships that have been confirmed in analyses are indicated in it.

H2, stating that innovativeness and risk-taking influence farmers' early adoption of LU, was not supported by the regression of the timing of LUC on innovativeness but negatively supported by the regression of the timing of LUC on risk-taking (Table 3 & Table 4).

H1a, stating that innovativeness and risk-taking influence farmers' LU adoption decision in the past, was supported by the regression of LU adoption on innovativeness but not supported by the regression of adoption on risk-taking (Table 5 & Figure 3).

H1b, stating that innovativeness and risk-taking influence farmers' intention to change their LU, was not supported by the regression of intention on innovativeness and risk-taking (Table 6).

H3, stating innovativeness and risk-taking influence LU performance either production or farmers' perceptional performance, was partly supported by the regression of perceptional performance on innovativeness and the regression of coffee and palm production on innovativeness (Table 8 & Table 9).

H4, stating that production has positive relation with farmers' perceptional performance, was supported by the regression of perceptional performance on coffee production (Table 10).

H5, stating that the timing of LUC influences either production or farmers' perceptional performance, was supported by the regression of coffee production on early adoption of coffee (Table 8).

H6, stating that opinion of influential person/ group about farmers' LU influences on farmers' intention to change their LU, was not supported by the regression of intention on SNs (Table 6 & Table 7).

H7, stating that sensitivity of SN is negatively related with innovativeness and risk-taking, was not supported by the regression of intention on SNs (Table 6)

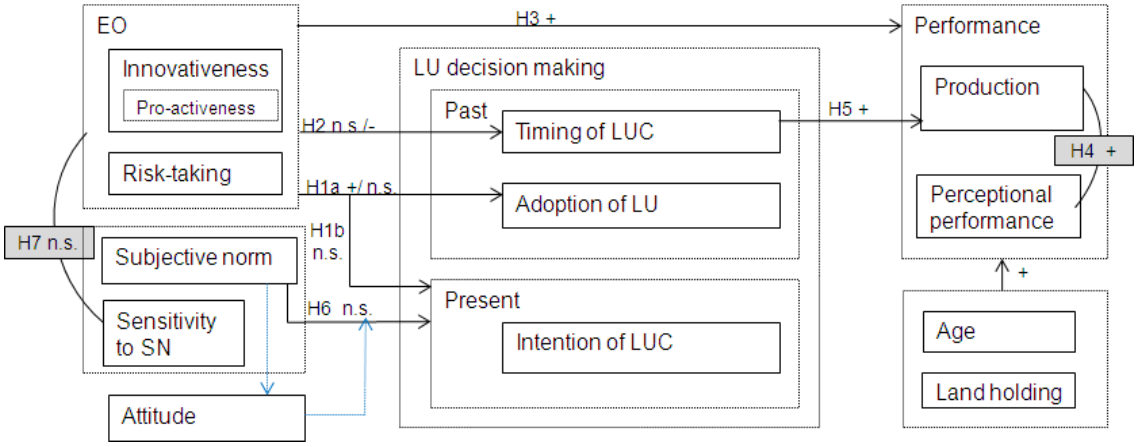

Figure 4. Result of conceptual model: supported hypotheses expressed (+) with significant at 5% level, whereas rejected hypotheses expressed (-) and (n.s.) with significant at 5% level

7. DISCUSSION AND IMPLICATIONS

The study was conducted to see the relationship between the timing of land use change (LUC) and entrepreneurial orientation (EO) and sensitivity to subjective norm (SN) among farmers in Tierra y Libertad (TyL). EO was positively related to LU adoption and performance. On the other hand, risk-taking was negatively related to early LU adoption. EO was not related with sensitivity to SN.

7.1. LUC in the past

A positive relationship between the timing of LUC and EO was expected. However results did not support this hypothesis, which means there was no relationship between the timing of LUC and innovativeness, and negative relationship between the timing of LUC and risk-taking (Table 3 and Table 4). This findings contradicted theoretical description of an early adopter, provided by Rogers (1995), which could have been higher innovativeness and risk-taking. A possible explanation of contradicted results could be due to the measurement. A questionnaire about risk-taking was finally made based on tomato production. Therefore only adopters of this LU were assumed to have higher risk-taking. Besides, the way of analyse may raise questions about the relevance of the outcome (Table 4). Future study should be done with appropriate questionnaire and sufficient number of samples in order to find the role of EO in early adoption.

It was hypothesised that EO and LU adoption has a positive relationship. For the past decision making, higher innovativeness positively related to adoption of diversified LU (Table 5) but relation to risk-taking was not clear (Table 5 and Figure 3). A finding was consistent with early literature, stating that diversification is one of the innovative strategy to explore better income opportunities (Kodithuwakku and Rosa, 2002; Barbieri and Mahoney, 2009; Vesala and Vesala, 2010). In TyL, farmers may have to learn new practices related to LU. Innovativeness can encourage farmers to learn such new information actively. Furthermore, farmers can reduce risks through getting new information (Abdi Ghadim et al., 2005). On the other hand, risk-taking may not be important elements for adoption (Figure 3). It is possible, again, that a measurement of risk-taking might have influenced on unclear result.

7.2. Intention of LUC

A positive relationship was expected between intention of adoption with either EO or SN. Intention of LU adoption was influenced by attitude but not neither innovativeness nor SN (Table 6). Influence of SN on intention was mediated by attitude (Table 7). Result did not support hypothesis. However, attitude can be main effect on the intention, because it directly evaluates the consequences of action than other variables (Vallerand et al., 1992). Then, function of innovativeness and SN on intention is indirect (Oliver

and Bearden, 1985; Verhees et al., 2005). Moreover, the effect of SN neighbours to farmers' intention to adopt other LU type (Table 7) tells that farmers make decision individually and not persuasion by peers. Consistent with early studies (Ryan and Gross, 1943; Oreszczyn et al., 2010), external stakeholders bring new information to the community but its adoption decision is influenced more by peers. Then, a peer influence can convince farmers to have positive image about new LU type.

On the other hand, unexpectedly innovativeness was not related to any variables of intention regression model in this study. Considering another finding in this study (Table 5), which is a positive relationship between higher innovativeness and adoption (Table 5), role of innovativeness may be found directly on adopting behaviour rather than intention. A similar study should be repeated after some years to see if innovativeness of same person influences adoption.

In addition, negative relationship between EO and sensitivity of SN on adoption was expected in hypothesis 7, but the result did not support this (Table 6). One reason was due to no relation to innovativeness with intention. Another possible reason is a measurement of SN. Although there was some findings related to SN, measuring SN and sensitivity to SN in TyL by interview might have been inadequate culturally. It could be doubted that questions about SN was too direct and sensitive to obtain accurate answer from sampled farmers. Questionnaire should have constructed after understanding cultural background in study area. Or, another method such as observation to measure SN and its sensitivity should be implemented. Further study should be done with adequate measurement.

Result of farmers' intention to adopt other LU type suggested that influence of neighbour was significantly important than influence of NGOs (Table 7). The result was consistent with earlier studies (Ryan, and Gross, 1943). In TyL, external stakeholders are the main source of new information related to LU. Farmers can motivate to adopt this new information, which they have never tried nor seen, by neighbours' influence such as receiving advice and/or observation of neighbours' field. During interviews, farmers expressed the necessities of practical experience to learn and adopt new information. Therefore, if external stakeholders provide new information very practical way and constantly, learning and adoption within farmers can be enhanced. Consequently, interaction of external agencies to the community will be more efficient.

7.3. EO and performance

Consistent with earlier studies, innovativeness had positive relationship with perceptional performance directly (Table 9) (Verhees and Meulenberg, 2004; Nybakk et al., 2009). Besides, production, specifically coffee yield, which had positive relationship with innovativeness, influenced perceptional performance (Table 8). As innovative farmers can have more knowledge (Kodithuwakku and Rosa, 2002; Verhees and

Meulenberg, 2004), it can suggest that farmers who have more knowledge or/and experiences on LU activities can affect both higher production and higher perceptional performance (Table 8 and Table 9).

7.4. Implications

Innovativeness can have positive impact on adoption of diversified LU and performance among farmers in TyL. Considering the situation of TyL, resources are becoming limited and the farming has been affected by market and policies changes (Speelman et al., Submitted). Therefore it will be an advantage for farmers to be innovative, in other words open to new ideas. So that they will be able to be open for new opportunities to adjust social changes. At the same time, external stakeholders should proactively collaborate with the community through providing practical training and new information about new LU type constantly. In that way, at society level, farmers' influence between peers can be enhanced and this may be desirable situation for external stakeholders. On the other hand, at individual level, farmers' innovativeness will be enforced, and it may be linked with higher performance.

8. CRITIQUES AND FURTHER RESEARCH

This study supported some of hypotheses. It shows that quantifying innovativeness to measure LU adoption and performance is possible in small scale farming community but measurements should be improved. It is still challenging to measure the personality of famers. It is desirable that questionnaire is scored by farmers without being interpretation of a researcher. But at the same at the same time third person's measurement such as observation can be more accurate. Further efforts are required to compare which method can be accurate to measure "a hinder part of a person" in small scale farming communities in developing countries.

Sample size and research design should be improved for further research. In order to obtain better understanding of EO and sensitivity to SN, different LU focus group should be compared with sufficient sample size. Besides, cross sectional research had limitation to understand relationship of EO and sensitivity to SN on the timing of LUC. Longitudinal data may explain causality of the proposed conceptual model. Therefore, similar study should be done some years after as a further research to see if findings in this study are constant over time.

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APPENDIX 1

A. Original questionnaire (English)

Innovativeness

1. If I hear about a new way of doing things on my farm:
   - I want to try it immediately, even before I have seen it work on other farmers.
   - I want to try it after I have seen it work on other farmers.
   - I may want to try it, but only after I have see it work at another farmer.
   - I may want to try it, but only if I have seen it work **well** for other farmers.
   - I do not want to try it.

2. I am searching for new ideas that I can use on my farm:
   - Never
   - By talking to people from the neighborhood
   - By talking to people from nearby communities
   - By talking to people from all over the country
   - By talking to people from all over the world

3. A constant stream of new ideas is:
   - Extremely important for my farm
   - Very important for my farm
   - Important for my farm
   - Not important for my farm
   - A waste of time for my farm

Risk-taking

4. How much do you invest to which case? A. Very high profits are expected for an investment, but with high chance of losing the investment: B. Some profits are expected for an investment, but with very small chance of losing the investment.
   - I will invest for A.
   - I will invest for B.
   - I want to think whether invest A or B.
   - I want to think whether invest or not.
   - I will not invest.

5. When profits are expected for an investment, but with a small (10%) chance of losing the investment:

- I will invest all the money that I have and that I can borrow
- I will invest all the money that I have myself
- I will invest what I do not need to guarantee the basic needs (food, shelter) for my family
- I will invest what I do not need to guarantee comfort for my family
- I will not invest anything

6. When higher profits are expected for a new variety/ breed, but with a small (10%) chance of losses:

- I switch completely to the new crop/ breed
- I will switch for the bigger part of my farm to the new crop/ breed
- I will switch with half my land/ animals
- I will try on a small piece of land / a few animals
- I will not switch to the new crop/ breed

Pro-activeness

7. Changes in society (markets, legislation, technologies) are

- Generally positive for my farm
- Mostly positive for my farm
- Positive nor negative for my farm
- Mostly negative for my farm
- Almost always negative for my farm

8. I take opportunities to improve my farm,

- earlier than all other farmers.
- earlier than most other farmers.
- at the same time as most other farmers.
- later than most other farmers
- later than all other farmers.

9. Introducing new production methods or products on my farm is something that:

- I am doing constantly.
- I am doing regularly
- I am doing sometimes
- I have done rarely
- I have never done.

A. Subjective norm

Farmer has three answer choices: [I should do, I do not know, and I should not do].

10. My wife thinks that I should grow staple crops:
11. My family thinks that I should grow staple crops:
12. My neighborhood thinks that I should grow staple crops:
13. NGOs think that I should grow staple crops:

14. My wife thinks that I should grow coffee:
15. My family thinks that I should grow coffee:
16. My neighborhood thinks that I should grow coffee:
17. NGOs think that I should grow coffee:

18. My wife thinks that I should grow palm leaves:
19. My family thinks that I should grow palm leaves:
20. My neighborhood thinks that I should grow palm leaves:
21. NGOs think that I should grow palm leaves:

22. My wife thinks that I should raise cattle:
23. My family thinks that I should raise cattle:
24. My neighborhood thinks that I should raise cattle:
25. NGOs think that I should raise cattle:

26. My wife thinks that I should use land for something that completely new to the community:
27. My family thinks that I should use land for something that completely new to the community:
28. My neighborhood thinks that I should use land for something that completely new to the community:
29. NGOs think that I should use land for something that completely new to the community:

B. Attitude

30. Growing staple crops on my farm is:
31. Growing coffee on my farm is:
32. Growing palm leaves on my farm is:
33. Raising cattle on my farm is:
34. Starting completely new crop production on my farm is:

Answer choices: [a bad idea, good nor bad, a good idea]

C. Intentions

35. Three years from now, I will grow staple crops:

36. Three years from now, I will grow coffee:

37. Three years from now, I will grow palm leaves:

38. Three years from now, I will raise cattle:

39. Three years from now, I will start completely new production on my farm:

Answer choices: [certainly not, probably not, maybe, probably yes, certainly yes]

Performance

40. I can support my family with the production of my farm

- Very well
- More than sufficient
- Sufficiently
- Most of the time
- not at all

41. Over the past three years, the production of my farm:

- Exceeds my expectations
- Is slightly better than expected
- Is as I had expected
- Is worse than I had expected
- Is a lot worse than I had expected

42. Over the past three years, the production of my farm:

- Is better than the rest of the community
- Is slightly better than the rest of the community
- Is similar to the rest of the community
- Is worse than the rest of the community
- Is a lot worse than the rest of the community

43. Compare to other producers of (whatever, cattle, coffee, palm…),

- I am more successful than all other farmers.
- I am more successful than most other farmers.
- I am an average farmer compared to other farmers.
- I am less successful than most other farmers.
- I am less successful farmer than all other farmers.

Real performance

44. To crop producers:

-How much was your last harvest per hectare? (QQ:Coffee/ Bag: Frijol/ Ton (bag): Maize)

45. To cattle raising farmers:

-How many cows do you have now? → This question is not always reliable to ask but just to see the indication, I will ask it.

-How many bulls did you sell last year?

B. Original questionnaire (Spanish):

Capacidad de innovación

1. Cuando escucho que hay un nuevo método de hacer algo en mi parcela,

- Me gustaría probarlo inmediatamente, aún no lo he visto funcionando en las parcelas de otros agricultores.
- Me gustaría probarlo después de ver que funciona en las parcelas de otros agricultores.

-Tal vez me va a gustar probarlo pero solo después de ver que funciona en las parcelas de otros agricultores.

-Tal vez me va a gustar probarlo pero solo después de ver que funciona varios años en las parcelas de otros agricultores.

-No quiero intentalo.

2. Estoy buscando nuevas ideas que puedo utilizar en mi parcela:

- Núnca
- A través de la conversasión con los vesinos.
- A través de la conversación con la gente de las comunidades cercanas.
- A través de la conversación con la gente de todos los lugares de México.
- A través de la conversación con la gente de todos los lugares del Mundo.

3. Las nuevas ideas que viene constantemente son:

-Sumamente importantes

-Muy importantes

-Importantes

-No importante

-gastar timpo no mas.

Toma de riesgos

4. ¿Con cuánto invertirá en cuáles casos?

(A) Una inversión con mucha ganancia esperada, y al mismo tiempo, alta posibilidad de perder su inversión.

(B) Una inversión con alguna ganancia que puedes esperar, y al mismo tiempo, poca chance de derder su inversión.

-Invertiré para A

-Invertiré para B

-Quiero pensar en quáles invertiría A o B.

-Quiero pensar si invierto o no.

-No invierto

5. Cuando la ganancia está esperado por la inversión, pero con poca posibilidad (10%) de la pérdida de su inversión:

- Voy a invertir con todos el dinero que tengo y con los préstamos que puedo pedir
- Voy a invertir con todos los dineros que tengo.
- Voy a invertir con mi dinero aparte del dinero para guarantizar la necesidad básica para mi familia.
- Voy a invertir con mi dinero aparte del dinero para garantizar la comodidad de mi familia.
- No voy a invertir para nada.

6. Cuando alta ganancia está esperado por nueva variedad (raza), pero con poca (10%) posibilidad de la pérdida:

- Voy a cambiar completamente mi parcela a la nueva variedad (raza)
- Voy a cambiar la mayor parte de mi parcela a la nueva variedad (raza)
- Voy a cambiar la mitad de mi parcela a nueva variedad (raza)
- Voy a provar una pequeña parte de mi parcela a nueva variedad (provar unas cabezas de animales)
- No voy a cambiar ni provar la nueva variedad (animales)

Toma iniciativas

7. Los cambios de la sociedad (mercados, legislación, tecnología):

-Generalmente son positivos para mi trabajo de la parcela.

-Mayormente son positivos para mi trabajo de la parcela.

-No son positivos ni negativos para mi trabajo de la parcela.

- Mayormente son negativos para mi trabajo de la parcela.

-Casi siempre son negativos para mi trabajo de la parcela.

8. Para mejorar el trabajo en mi parcela, tomo la oportunidad:

- más temprano que todos los agricultores de la comunidad?
- más temprano que los mayorías agricultores de la comunidad?
- el mismo tiempo que los mayores agricultores de la comunidad?
- más tarde que los mayorías agricultores?
- más tarde que todos los agricultores?

9. Iniciar nuevos métodos o los nuevos productos en mi parcela es algo que:

-estoy haciendo constantemente,
-estoy haciendo regularmente
-estoy haciendo a veces
-estoy haciendo rara vez
-núnca hice

A. Influenceia Social

Producción del maíz y los frijoles

10. Mi esposa piensa que yo debería producir el maíz y los frijoles
11. Mi padre piensa que yo debería producir el maíz y los frijoles
12. Mis vecinos piensan que yo debería producir el maíz y los frijoles
13. El ingeniero de ONG piensa que yo debería producir el maíz y los frijoles

Respuestas elegidas [Debería hacerlo - No sé - No debería hacerlo]

Producción del Café

14. Mi esposa piensa que yo debería producir el café
15. Mi padre piensa que yo debería producir el café
16. Mis vecinos piensan que yo debería producir el café
17. El ingeniero de ONG piensa que yo debería producir el café

Producción de las palmas

18. Mi esposa piensa que yo debería producir las palmas
19. Mi padre piensa que yo debería producir las palmas
20. Mis vecinos piensan que yo debería producir las palmas
21. El ingeniero de ONG piensa que yo debería producir las palmas

Crianza de los ganados

22. Mi esposa piensa que yo debería criar los ganados

23. Mi padre piensa que yo debería criar los ganados

24. Mis vecinos piensan que yo debería criar los ganados

25. El ingeniero de ONG piensa que yo debería criar los ganados

Otro uso del terreno

26. Mi esposa piensa que yo debería utilizar el terreno para otra cosa que es totalmente nuevo para la comunidad.

27. Mi padre piensa que yo debería utilizar el terreno para otra cosa que es totalmente nuevo para la comunidad.

28. Mis vecinos piensan que yo debería utilizar el terreno para otra cosa que es totalmente nuevo para la comunidad.

29. El ingeniero de ONG piensa que yo debería utilizar el terreno para otra cosa que es totalmente nuevo para la comunidad.

C. Actutides

30. La producción del maíz y los frijoles en mi parcela es:

31. La producción del café en mi parcela es:

32. La producción de las palmas en mi parcela es:

33. La crianza de los ganados en mi parcela es:

34. La utilización del terreno para algo totalmente nuevo para la comunidad es:

Respuestas elegidas [Mala idea - No buena ni mala - Buena idea]

D. Intentions

35. En los tres años próximos, produciré el maíz y los frijores:

36. En los tres años próximos, produciré el café

37. En los tres años próximos, produciré las palmas

38. En los tres años próximos, criaré los ganados

39. En los tres años próximos, utilizaré el terreno para algo totalmente nuevo para la comunidad.

[No, de ninguna manera - Probablemente, no. - Tal vez sí - Probablemente, sí - Ciertamente, sí]

E. Desempeño

40. Con la producción de mi parcela, puedo soportar mi familia:

- Muy bien (Bastante bien-Excelentemente bien)
- Más que suficiente
- Suficientemente
- Normalmente

- Absolutamente no.

41. En los últimos tres años, la producción en mi parcela:

- Fue superado de mi expectativa
- Fue un poco major que esperaba
- Fue como esperaba
- Fue peor que esperaba
- Fue mucho más peor que esperaba

42. En los últimos tres años, la producción en mi parcela:

- Fue mayor que los de más en la comunidad
- Fue un poco major que los de más en la comunindad
- Fue similar que los de más en la comunidad
- Fue peor que los de más en la comunidad
- Fue mucho más peor que los de más en la comunidad

43. Comparando con otros productores de (el maíz, el café, la palma, los ganados),

- Tengo más exito que todos los productores?
- Tengo más exito que mayorias de los productores?
- Estoy promedio de otros productores?
- Tengo menos exito que mayorías de los productores?
- Tengo menos exto que todos los productores?

F. Desempeño real

44. Para los productores de café, maíze, frijol, palmas:

-¿Cuántos (quintales) (sacos) (toneladas) ha cosechado por hectarea pasado año?

45. Para los ganadelos:

-¿Cuántos ganados tiene ahora?

-¿Cuántos toros vendió el año pasado?

APPENDIX 2

Modified questionnaire

1. Innovativeness

Q1:When you hear about a new way of doing things/ a new variety/ a new crops on your farm, do you want to try it?

Scoring is according to what farmer talked that they are interested in during the interview.

- ➔ Score 5: Immediately, even before he has seen it works on other farm.
  Farmers who want to try something that hasn't been introduced yet in the community: Rose production, Collon, Tomato production in greenhouse.
- ➔ Score 4: He will try it after he has seen it works on other farms.
  Farmers who want to try something that has been introduced recently to the community: Fish production, Oro Azteca (new coffee variety), some vegetables (yucca, sweet potato, or herbs) that are not grown in the community to establish home garden.
- ➔ Score 3: He will try it after he has seen it has been working several years on other farms.
  Farmers who want to try something that has been introduced for many years but not commercialized yet: Citrus fruit production, pig production, goat production, coffee varieties except Arabica, which is the original coffee variety in the community.
- ➔ Score 2: He will try it after he has seen it has been working several years on other farms and encouraged by someone.
  Same criteria as score 3 but also mentioned that need for an encouragement from someone.
- ➔ Score 1: He does not want to try it.
  Farmers who do not want to try something and maintain what he has or way he produces.

Q2: Where do you find new ideas that you can use on your farm?

- ➔ Score 5: National level (Mexico)
- ➔ Score 4: States level (Chiapas)
- ➔ Score 3: Municipal level (Villa Flores)
- ➔ Score 2: Community level (Tierra y Libertad)
- ➔ Score 1: Farmers who do not look for new idea.

Q3: What kind of information do you need (Original: A constant stream of new ideas is …)

- ➔ Score 5: Farm related information that is very new for the community. (Original: Extremely important on my farm.)

Farmers who need information that has not been informed yet or has informed recently in the community to implement new ideas on their land. And who showed these necessities extremely.

➔ Score 4: Farm related information that is very new for the community. (Original: Very important on my farm.)

Same criteria as Score 5 but less enthusiastic than farmers on score 5.

➔ Score 3: Farm related information that has been already informed in the community (Original: Important for my farm)

Farmers who need information that that has already informed in the community: improve coffee productivity, pruning coffee trees, integrated pest management of coffee farm or/and palm leaves plantation, vaccination of cattle.

➔ Score 2: Information is enough so far. (Original: Not important for my farm)

Farmers who said that they have sufficient information for their farm so far.

➔ Score 1: Information is not necessary (Original: A waste of time for my farm)

Farmers who do not need information at all.

2. Risk taking:

Question 4: Did/do you produce Tomato?

➔ Score 5: Yes, I am doing.

Some farmers are producing tomato until now.

➔ Score 4: Yes, I want to try several years.

Some farmers were producing tomato for several years. Some of them lost investment either money or time. Some of them were affected by chemicals (pesticides and insecticides).

➔ Score 3: Yes, I want to try once.

Some farmers tried once, but stopped doing it. Some of them lost investment either money or time. Some of them were affected by chemicals (pesticides and insecticides).

➔ Score 2: Yes, if there is possibility.

Some farmers did not work for tomato due to lack of financial resources but they are interested in producing it.

➔ Score 1: No, I do not. I prefer producing with low risk.

Some farmers did not work for tomato due to their risk averse.

Question 5: How much money did you invest for Tomato? / or do you want to invest for it?

➔ Score 5: Own money that is available for it and borrowed money.

➔ Score 4: Borrowed money.

➔ Score 3: Own money that is available for it.

➔ Score 2: I will not invest because I do not have money. If I would have money, I did it.

➔ Score 1: I will not invest, even if I have money.

Question 6: How much land did you change for Tomato? / or do you want to change for it?

➔ Score 5: 1 ha

➔ Score 4: 0.5 ha

➔ Score 3: 0.25 ha

➔ Score 2: I want to try for small part of my land

➔ Score 1: I do not want to try

3. Pro-activeness:

Q7: In what timing do you take an action to improve your farm?

➔ Score 5: The earliest

Farmers who are doing an experiment producing something new to the community: Oro Azteca (new coffee variety) or silage the earliest amongst farmers.

➔ Score 4: Earlier

Farmers who are doing an experiment followed by farmers in score 5.

➔ Score 3: Same time as most other farmers

Being in the group is the one way to take an opportunity to improve their farm, because majority of information reach to the group, especially coffee and palm group. Farmers who assist training and implement what they have learned immediately on their farm are scored 3.

➔ Score 2: Later

Most of coffee growers who do not take part in the group were scored. They do what farmer in the group do. Some of them are selling their product wherever they can. Some of them have recently established coffee farm, and they want to be in the group when they have harvest.

➔ Score 1: The latest

Those who do not land scored 1. Farmers who are very satisfied what they are doing so far on their farm and do not intent to change the way of production scored 1 as well.

Q8: How often do you introduce new production methods or products on your farm?

➔ Score 5: I am doing constantly

More than yearly: Farmers who assist training (coffee or/and palm) and doing experiment on their farm scored 5.

➔ Score 4: I am doing regularly

Every year: Farmers who assist training (coffee or/and palm) scored 4.

➔ Score 3: I am doing sometimes

Less than yearly: Farmers who introduce something when productivity decreases.

➔ Score 2: I have done rarely

Farmers who learned new method when they started farming independently scored 2.

➔ Score 1: I have never done

Farmers who maintain the method and production since they started farming scored 1.

Exceptionally, I asked question 9 (pro activeness) as same as questionnaire said.

Q9: How do you think about changes in society (markets, legislation, technologies) ?

➔ Score 5: Generally positive for my farm

No one said that changes in society can be positive on their farm.

➔ Score 4: Mostly positive for my farm

Many farmers answered that changes in society affect negatively on their farm. Farmers who said they can overcome their negative situation were scored 4.

➔ Score 3: Positive nor negative for my farm

Some farmers who do not have land or who do not have products for market answered neutrally. Some farmers seemed not to understand (puzzled face) the meaning of question, then said changes in society does not affect on their farm.

➔ Score 2: Mostly negative for my farm

Many farmers answered that changes in society affect negatively on their farm. Most of them said they cannot overcome their negative situation, because of their economic situation and social status. They said that just only when the market or the government turns favorable to the poor people, it is positive.

➔ Score 1: Almost always negative for my farm

APPENDIX 3

Correlation matrix

A. Pearson correlation coefficients for variables related to EO, LU focus, and performances

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Performance	Pearson Correlation	1	,532**	,315**	,362**	,258*	,466**	,184	,503**	,289	,244	-,212	,049	,053	,006	,353**
	Sig. (2-tailed)		,000	,009	,002	,033	,000	,275	,000	,121	,134	,082	,691	,670	,961	,003
	N	68	68	68	68	68	68	37	48	30	39	68	68	68	68	68
2. Innovativeness	Pearson Correlation		1	,433**	,060	,367**	,501**	-,081	,457**	,622**	,264	-,229	-,054	-,127	,073	,431**
	Sig. (2-tailed)			,000	,627	,002	,000	,633	,001	,000	,105	,060	,664	,302	,555	,000
	N		68	68	68	68	68	37	48	30	39	68	68	68	68	68
3. Risk_taking	Pearson Correlation			1	,210	,300*	,457**	-,044	-,138	,287	,168	-,119	-,157	-,054	-,103	,462**
	Sig. (2-tailed)				,086	,013	,000	,798	,349	,124	,306	,334	,200	,664	,404	,000
	N			68	68	68	68	37	48	30	39	68	68	68	68	68
4. Age	Pearson Correlation				1	,312**	,382**	,268	,227	-,013	-,039	,073	-,129	,238	-,214	,337**
	Sig. (2-tailed)					,010	,001	,108	,120	,944	,812	,555	,296	,050	,079	,005
	N				68	68	68	37	48	30	39	68	68	68	68	68
5. Total_land Total owned land (ha)	Pearson Correlation					1	,357**	,195	,068	-,092	,557**	-,099	-,107	-,012	-,163	,414**
	Sig. (2-tailed)						,003	,247	,645	,629	,000	,420	,387	,921	,183	,000
	N					68	68	37	48	30	39	68	68	68	68	68
6. Number_of_LU	Pearson Correlation						1	-,089	,070	,256	,130	-,229	-,291*	-,123	,048	,757**
	Sig. (2-tailed)							,599	,635	,172	,429	,060	,016	,319	,697	,000
	N						68	37	48	30	39	68	68	68	68	68
7. P_Staple Maize production last year (t/ha)	Pearson Correlation							1	,062	,025	,048	-,148	-,077	,279	-,072	-,019
	Sig. (2-tailed)								,749	,924	,812	,382	,650	,094	,671	,911
	N							37	29	17	27	37	37	37	37	37
8. P_Coffee Coffee production last year (kg/ha)	Pearson Correlation								1	,356	,226 .a		,061 .a		-,035	-,013
	Sig. (2-tailed)									,063	,213	,000	,679	,000	,812	,932
	N								48	28	32	48	48	48	48	48
9. P_Palm # of packages delivered last year	Pearson Correlation									1	-,024 .a	.a	.a		-,210	,241
	Sig. (2-tailed)										,921	,000	,000	,000	,265	,200
	N									30	20	30	30	30	30	30
10. P_Livestock #of animals sold last year	Pearson Correlation										1 .a	.a		-,055 .a		,055
	Sig. (2-tailed)											,000	,000	,739	,000	,739
	N										39	39	39	39	39	39
11. LU_Focus_ii	Pearson Correlation											1	-,067	-,061	-,089	-,221
	Sig. (2-tailed)												,588	,624	,469	,070
	N											68	68	68	68	68
12. LU_Focus_iii	Pearson Correlation												1	-,088	-,129	-,320**
	Sig. (2-tailed)													,477	,294	,008
	N												68	68	68	68
13. LU_Focus_v	Pearson Correlation													1	-,117	-,290*
	Sig. (2-tailed)														,342	,016
	N													68	68	68
14. LU_Focus_vi	Pearson Correlation														1	-,428**
	Sig. (2-tailed)															,000
	N														68	68
15. LU_Focus_vii	Pearson Correlation															1
	Sig. (2-tailed)															
	N															68

* Correlation is significant at the 0,05 level.

** Correlation is significant at the 0,01 level.

B. Pearson correlation coefficients for variables related to intention to adopt coffee

		1	2	3	4	5	6	7	8	
1. Innovativeness	Pearson Correlation		1	,433**	-,001	,043	-,101	,078	-,056	,440**
	Sig. (2-tailed)			,000	,995	,732	,413	,529	,647	,000
	N		68	68	65	66	68	68	68	68
2. Risk_taking	Pearson Correlation			1	,043	-,065	-,207	,155	-,112	,208
	Sig. (2-tailed)				,734	,605	,090	,205	,365	,088
	N			68	65	66	68	68	68	68
3. q17 My wife thinks that I should grow coffee	Pearson Correlation				1	,165	,036	-,031	,105	,125
	Sig. (2-tailed)					,195	,773	,808	,404	,320
	N				65	63	65	65	65	65
4. My family thinks that I should grow coffee	Pearson Correlation					1	,174	,116	,166	,149
	Sig. (2-tailed)						,164	,355	,182	,232
	N					66	66	66	66	66
5. q19 My neighbors thinks that I should grow coffee	Pearson Correlation						1	,078	,108	,254*
	Sig. (2-tailed)							,528	,379	,037
	N						68	68	68	68
6. NGOs think that I should grow coffee	Pearson Correlation							1	,064	,149
	Sig. (2-tailed)								,607	,225
	N							68	68	68
7. Growing coffee on my farm is	Pearson Correlation								1	,241*
	Sig. (2-tailed)									,048
	N								68	68
8. q48 Three years from now, I will grow coffee	Pearson Correlation									1
	Sig. (2-tailed)									
	N									68

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

C. Pearson correlation coefficients for variables related to intention to adopt palm

		1	2	3	4	5	6	7	8	
1. Innovativeness	Pearson Correlation		1	,433**	,043	,192	,006	,142	,045	,296*
	Sig. (2-tailed)			,000	,736	,122	,962	,246	,713	,014
	N		68	68	65	66	68	68	68	68
2. Risk_taking	Pearson Correlation			1	-,181	-,057	-,141	,070	-,171	-,015
	Sig. (2-tailed)				,150	,648	,251	,572	,162	,903
	N			68	65	66	68	68	68	68
3. q21 My wife thinks that I should grow palm leaves	Pearson Correlation				1	,152	,006	-,052	-,004	,125
	Sig. (2-tailed)					,234	,960	,678	,972	,321
	N				65	63	65	65	65	65
4. q22 My family thinks that I should grow palm leaves	Pearson Correlation					1	,171	,255*	,217	,395**
	Sig. (2-tailed)						,169	,039	,080	,001
	N					66	66	66	66	66
5. q23 My negibour thinks that I should grow palm leaves	Pearson Correlation						1	,099	,133	,304*
	Sig. (2-tailed)							,424	,280	,012
	N						68	68	68	68
6. q24 NGs thinks that I should grow palm leaves	Pearson Correlation							1	,175	,335**
	Sig. (2-tailed)								,153	,005
	N							68	68	68
7. q43 Growing palm leaves on my farm is	Pearson Correlation								1	,534**
	Sig. (2-tailed)									,000
	N								68	68
8. q49 Three years from now, I will grow palm leaves	Pearson Correlation									1
	Sig. (2-tailed)									
	N									68

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

D. Pearson correlation coefficients for variables related to intention to adopt livestock

		1	2	3	4	5	6	7	8	
1. Innovativeness	Pearson Correlation		1	,433**	-,045	,033	,004	-,106	,098	,258*
	Sig. (2-tailed)			,000	,720	,795	,972	,389	,427	,034
	N		68	68	65	66	68	68	68	68
2. Risk_taking	Pearson Correlation			1	,055	-,047	-,044	-,044	,142	,229
	Sig. (2-tailed)				,661	,709	,721	,720	,247	,061
	N			68	65	66	68	68	68	68
3. q25 My wife thinks that I should raise cattle	Pearson Correlation				1	,221	,397**	-,041	,179	,356**
	Sig. (2-tailed)					,082	,001	,744	,153	,004
	N				65	63	65	65	65	65
4. q26 My family thinks that I should raise cattle	Pearson Correlation					1	,231	,278*	,052	,305*
	Sig. (2-tailed)						,062	,024	,677	,013
	N					66	66	66	66	66
5. q27 My neighbour thinks that I should raise cattle	Pearson Correlation						1	-,020	,246*	,297*
	Sig. (2-tailed)							,870	,043	,014
	N						68	68	68	68
6. q28 NGOs thinks that I should raise cattle	Pearson Correlation							1	,041	,124
	Sig. (2-tailed)								,742	,314
	N							68	68	68
7. q44 Raising cattle on my farm is	Pearson Correlation								1	,386**
	Sig. (2-tailed)									,001
	N								68	68
8. q50 Three years from now, I will raise cattle	Pearson Correlation									1
	Sig. (2-tailed)									
	N									68

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

E. Pearson correlation coefficients for variables related to intention to adopt new LU type

		1	2	3	4	5	6	7	8	
1. Innovativeness	Pearson Correlation		1	,433**	-,131	,007 .[a]		,155	,136	,248*
	Sig. (2-tailed)			,000	,297	,957	.	,207	,270	,041
	N		68	68	65	66	68	68	68	68
2. Risk_taking	Pearson Correlation			1	-,296*	,001 .[a]		,086	,118	,163
	Sig. (2-tailed)				,017	,997	.	,484	,336	,185
	N			68	65	66	68	68	68	68
3. q33 My wife thinks that I should use land for something that completely new to the community	Pearson Correlation				1	-,103 .[a]		-,085	,122	,043
	Sig. (2-tailed)					,423	.	,502	,332	,732
	N				65	63	65	65	65	65
4. q34 My family thinks that I should use land for something that completely new to the community	Pearson Correlation					1 .[a]		-,055	,232	,216
	Sig. (2-tailed)						.	,658	,061	,081
	N					66	66	66	66	66
5. q35 My neighbour thinks that I should use land for something that completely new to the community	Pearson Correlation					.[a]	.[a]	.[a]	.[a]	
	Sig. (2-tailed)							.	.	.
	N						68	68	68	68
6. q36 NGOs thinks that I should use land for something that completely new to the community	Pearson Correlation							1	,191	,152
	Sig. (2-tailed)								,119	,216
	N							68	68	68
7. q46 Starting completely new crop production on my farm is	Pearson Correlation								1	,567**
	Sig. (2-tailed)									,000
	N								68	68
8. q52 Three years from now, I will start completely new production on my farm	Pearson Correlation									1
	Sig. (2-tailed)									
	N									68

**. Correlation is significant at the 0.01 level (2-tailed).

a. Cannot be computed because at least one of the variables is constant.

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX 4

Statistical Analyses Outcomes

1. PCA and Factor analyses for variables (Corresponds chapter 4)

```
FACTOR
  /VARIABLES q1_Inn q3_Inn q6_Inn
  /MISSING LISTWISE
  /ANALYSIS q1_Inn q3_Inn q6_Inn
  /PRINT INITIAL KMO EXTRACTION ROTATION
  /CRITERIA FACTORS(2) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /METHOD=CORRELATION.
RELIABILITY
  /VARIABLES=q1_Inn q3_Inn q6_Inn
  /SCALE('innovativeness') ALL
  /MODEL=ALPHA
  /STATISTICS=CORR
  /SUMMARY=TOTAL.
FACTOR
  /VARIABLES q7_Risk q8_Risk q9_Risk
  /MISSING LISTWISE
  /ANALYSIS q7_Risk q8_Risk q9_Risk
  /PRINT INITIAL KMO EXTRACTION ROTATION
  /CRITERIA FACTORS(2) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /METHOD=CORRELATION.
RELIABILITY
  /VARIABLES=q7_Risk q8_Risk q9_Risk
  /SCALE('risk taking') ALL
  /MODEL=ALPHA
  /STATISTICS=CORR
  /SUMMARY=TOTAL.
FACTOR
  /VARIABLES q10_Pro q11_Pro q12_Pro
  /MISSING LISTWISE
  /ANALYSIS q10_Pro q11_Pro q12_Pro
  /PRINT INITIAL KMO EXTRACTION ROTATION
  /CRITERIA FACTORS(2) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /METHOD=CORRELATION.
RELIABILITY
  /VARIABLES=q10_Pro q11_Pro q12_Pro
```

```
  /SCALE('pro activeness') ALL
  /MODEL=ALPHA
  /STATISTICS=CORR
  /SUMMARY=TOTAL.
FACTOR
  /VARIABLES q1_Inn q3_Inn q6_Inn q10_Pro q11_Pro q12_Pro
  /MISSING LISTWISE
  /ANALYSIS q1_Inn q3_Inn q6_Inn q10_Pro q11_Pro q12_Pro
  /PRINT INITIAL KMO EXTRACTION ROTATION
  /CRITERIA FACTORS(2) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /METHOD=CORRELATION.
RELIABILITY
  /VARIABLES=q1_Inn q3_Inn q6_Inn q10_Pro q11_Pro q12_Pro
  /SCALE('innovativeness and pro activeness') ALL
  /MODEL=ALPHA
  /STATISTICS=CORR
  /SUMMARY=TOTAL.
FACTOR
  /VARIABLES q1_Inn q3_Inn q6_Inn q11_Pro q12_Pro
  /MISSING LISTWISE
  /ANALYSIS q1_Inn q3_Inn q6_Inn q11_Pro q12_Pro
  /PRINT INITIAL KMO EXTRACTION ROTATION
  /CRITERIA FACTORS(2) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /METHOD=CORRELATION.
RELIABILITY
  /VARIABLES=q1_Inn q3_Inn q6_Inn q11_Pro q12_Pro
  /SCALE('innovativeness and pro activeness') ALL
  /MODEL=ALPHA
  /STATISTICS=CORR
  /SUMMARY=TOTAL.
*Here we start with the analyses of Performance

FACTOR
  /VARIABLES q53_Perform q54_Perform q55_Perform q56_Perform
  /MISSING LISTWISE
  /ANALYSIS q53_Perform q54_Perform q55_Perform q56_Perform
  /PRINT INITIAL KMO EXTRACTION ROTATION
  /CRITERIA FACTORS(2) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION VARIMAX
  /METHOD=CORRELATION.
RELIABILITY
```

```
  /VARIABLES=q53_Perform q54_Perform q55_Perform q56_Perform
  /SCALE('performance') ALL
  /MODEL=ALPHA
  /STATISTICS=CORR
  /SUMMARY=TOTAL.
*Create new variables for EO

COMPUTE Innovativeness = (q1_Inn + q3_Inn + q6_Inn + q11_Pro + q12_Pro)/5.
EXECUTE.
COMPUTE Risk_taking = (q7_Risk + q8_Risk + q9_Risk)/3.
EXECUTE .
COMPUTE Performance = (q53_Perform + q54_Perform + q55_Perform + q56_Perform)/4.
EXECUTE .
```

2. Correlation and regression analyses for variables (Corresponds chapter 5)

```
*5.1.1. Regression of early adopters of each exteranl driver
USE ALL.
COMPUTE filter_$=(Response_to_external_event >= 1).
VARIABLE LABEL filter_$ 'Response_to_external_event >= 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMAT filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LUC_Coffee
  /METHOD=ENTER Innovativeness Risk_taking.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LUC_Palm
  /METHOD=ENTER Innovativeness Risk_taking.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LUC_Livestock
  /METHOD=ENTER Innovativeness Risk_taking.

*5.1.1. Regression of early adopters with 113 sample
```

```
DATASET ACTIVATE DataSet12.
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Distance
  /METHOD=ENTER Innovativeness Risk_taking.

*5.1.2 The adoption decision

LOGISTIC REGRESSION VARIABLES LU_Focus_ii
  /METHOD=ENTER Innovativeness Risk_taking
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).
LOGISTIC REGRESSION VARIABLES LU_Focus_iii
  /METHOD=ENTER Innovativeness Risk_taking
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).
LOGISTIC REGRESSION VARIABLES LU_Focus_v
  /METHOD=ENTER Innovativeness Risk_taking
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).
LOGISTIC REGRESSION VARIABLES LU_Focus_vi
  /METHOD=ENTER Innovativeness Risk_taking
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).
LOGISTIC REGRESSION VARIABLES LU_Focus_vii
  /METHOD=ENTER Innovativeness Risk_taking
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

*5.1.2. Discriminant analysis

DISCRIMINANT
  /GROUPS=LU_Focus(0 7)
  /VARIABLES=Innovativeness Risk_taking
  /ANALYSIS ALL
  /SAVE=SCORES
  /PRIORS EQUAL
  /STATISTICS=RAW GCOV TABLE
  /PLOT=COMBINED
  /CLASSIFY=NONMISSING POOLED.

*5.2. Intention

CORRELATIONS
  /VARIABLES=Innovativeness Risk_taking q17_SNW_Cf q18_SNF_Cf q19_SNN_Cf q20_SNE_Cf
q42_Att_Cf
    q48_Int_Cf
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

```
CORRELATIONS
  /VARIABLES=Innovativeness Risk_taking q21_SNW_Pm q22_SNF_Pm q23_SNN_Pm q24_SNE_Pm
q43_Att_Pm q49_Int_Pm
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
CORRELATIONS
  /VARIABLES=Innovativeness Risk_taking q25_SNW_Ct q26_SNF_Ct q27_SNN_Ct q28_SNE_Ct
q44_Att_Ct
    q50_Int_Ct
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
CORRELATIONS
  /VARIABLES=Innovativeness Risk_taking q33_SNW_Ot q34_SNF_Ot q35_SNN_Ot q36_SNE_Ot
q46_Att_Ot
    q52_Int_Ot
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.

REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(90) R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT q48_Int_Cf
  /METHOD=ENTER Innovativeness Risk_taking q17_SNW_Cf q18_SNF_Cf q19_SNN_Cf q20_SNE_Cf
q42_Att_Cf.
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(90) R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT q49_Int_Pm
  /METHOD=ENTER Innovativeness Risk_taking q21_SNW_Pm q22_SNF_Pm q23_SNN_Pm
q24_SNE_Pm q43_Att_Pm.
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(90) R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT q49_Int_Pm
  /METHOD=ENTER Innovativeness Risk_taking q21_SNW_Pm q22_SNF_Pm q23_SNN_Pm
q24_SNE_Pm.
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(90) R ANOVA
```

```
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT q50_Int_Ct
  /METHOD=ENTER Innovativeness Risk_taking q25_SNW_Ct q26_SNF_Ct q27_SNN_Ct q28_SNE_Ct
q44_Att_Ct.
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(90) R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT q52_Int_Ot
  /METHOD=ENTER q33_SNW_Ot q34_SNF_Ot q35_SNN_Ot q36_SNE_Ot q46_Att_Ot Innovativeness
Risk_taking.
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(90) R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT q52_Int_Ot
  /METHOD=ENTER q33_SNW_Ot q46_Att_Ot Innovativeness Risk_taking.
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI(90) R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT q52_Int_Ot
  /METHOD=ENTER q33_SNW_Ot q34_SNF_Ot q35_SNN_Ot q36_SNE_Ot Innovativeness Risk_taking.
REGRESSION
  /DESCRIPTIVES MEAN STDDEV CORR SIG N
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT q46_Att_Ot
  /METHOD=ENTER q34_SNF_Ot q36_SNE_Ot.

*5.3. Performance

CORRELATIONS
  /VARIABLES=Performance Innovativeness Risk_taking Age Total_land Number_of_LU P_Staple
P_Coffee
    P_Palm P_Livestock
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
CORRELATIONS
  /VARIABLES=Performance Innovativeness Risk_taking Age Total_land LU_Focus_ii LU_Focus_iii
```

```
   LU_Focus_v LU_Focus_vi LU_Focus_vii
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.

*5.3. Influence of EO and LUC on Production

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Staple
  /METHOD=ENTER Innovativeness Risk_taking LUC_Staple Starting_age_Staple Total_land
Number_of_LU.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Coffee
  /METHOD=ENTER Innovativeness Risk_taking LUC_Coffee Starting_age_Coffee Total_land
Number_of_LU.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Palm
  /METHOD=ENTER Innovativeness Risk_taking LUC_Palm Starting_age_Palm Total_land
Number_of_LU.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT P_Livesotck
  /METHOD=ENTER Innovativeness Risk_taking LUC_Livestock Starting_age_Livestock Total_land
Number_of_LU.

*5.3. Influence of EO on perceptional performance

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Performance
  /METHOD=ENTER Innovativeness Risk_taking LU_Focus_ii LU_Focus_iii LU_Focus_v LU_Focus_vi
    LU_Focus_vii Age Total_land.
```

*5.3. Influence of Production on perceptional performance

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Performance
  /METHOD=ENTER Innovativeness Risk_taking Production_Coffee LUC_Coffee Total_land Age.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Performance
  /METHOD=ENTER Innovativeness Risk_taking LUC_Coffee Age.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Performance
  /METHOD=ENTER Innovativeness Risk_taking P_Palm LUC_Palm Total_land Age.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Performance
  /METHOD=ENTER Innovativeness Risk_taking P_Livesotck LUC_Livestock Total_land Age.
```