TO ACTIVELY SEEK A GOOD IDEA, ONE HAS TO KNOWS IT EXISTS

INTERDISCIPLINARY LAND USE AND NATURAL RESOURCE MANAGEMENT

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1. ABSTRACT

Through the Sustainable Land Use and Natural Resource Management program, we got the opportunity to go to Northeast Thailand, specifically Ban Suk Somboon, a village located in Nakhon Ratchasima province to conduct a research about the choice of many farmers to adopt organic farming. Using questionnaires, semi structured interviews, focus group interviews and other methods, data was gathered over the course of 12 days. We initially observed the advantages the village has for practicing organic farming: access to water, with a lot of ponds and reservoirs, easy access to knowledge, and market opportunities with an increasing tourism industry and the close proximity to Bangkok.

Amongst the farmers, the main motivations to practice organic farming were health, economic opportunities and improved soil quality. During the research, we encountered perceptions of organic farming that were very different from the certification system and differed for each farmer.

2. ACKNOWLEDGEMENTS

We would like to express our gratitude Dr. Oelofse and Dr. Stacey for their guidance and supervision, both in assisting us in planning this research before heading to the field, as well as during the fieldwork and in supervising us in the best way to construct our assignment. The expertise of the Thai teachers from Kasetsart University, particularly Dr. Santi, Dr. Wanana and Dr. Ratcha, were extremely valuable to us. We would like to thank University of Copenhagen and Kasetsart University for giving us this opportunity. Also, we would like to thank the cooks, cleaners, drivers and the remaining team at the basecamp that allowed us to conduct our research well-rested and satiated.

The Thai students, whom we collaborated with, proved absolut invaluable to us - We want to thank both of them for helping us with our research, and for their patience in helping us understand the cultural differences. Without our two translators, Benz and Aom, our research would not have been possible. We are extremely grateful for the time and effort they put into helping us and for making our time in Thailand so enjoyable.

We also wish to express our gratitude to the villages and farmers of Ban Suk Somboon for their time and for allowing us to spend two weeks in their village and farms, poking around and asking questions.

Table of Contents

3. TABLE OF ABBREVIATIONS

ACT - Organic Agriculture Certificate Thailand

DO - Dissolved Oxygen

EC - Electrical Conductivity

FGI - Focus Group Interview

NGO - Non-Government Organisation

NTA - New Theory of Agriculture

PBT5 - Por Bor Tor 5

PO -Participatory Observation

SE - Sufficiency Economy

SSI - Semi-Structured Interview

TDS - Total Dissolved Solids

WHO - World Health Organisation

4. INTRODUCTION

Agriculture is a common livelihood for people in Thailand. As a result of good agro-climatic conditions, Thailand is known for its global exportation of rice, in addition to fish, cassava, grain and cane sugar (OEC, 2014). As with farming practices elsewhere, agriculture in Thailand has faced the challenge of pests destroying crops. The most common way of dealing with this problem is through the use of pesticides. Farmers frequently use pesticides to protect their crops from pests, along with the hope of securing a higher crop yield (Aktar *et al*., 2009). However, the excessive use of pesticides in farming can cause adverse effects to ecosystems and human health (Timprasert et al., 2014). Thailand is the world's fifth biggest user of chemicals in agriculture (Ekachai, 2016). Recently, there has been a growing global trend in converting from conventional into organic farming practices (Rigby & Cáceres, 2001; Willer & Lernoud 2016). The trend has increased because of consumer demand and peoples awareness of food quality, health, environmental impacts etc. (Ellis et al, 2006). Another factor favouring this trend has been the former King's Sufficiency Economy Philosophy and his New Theory of Agriculture, promoting organic farming in order to address the issues of environmental degradation and natural resource depletion (Mongsawad, 2010).

According to Willer & Lernoud (2016), only 0,2% of agricultural land in Thailand is organic, thus the market for organic produce in Thailand is relatively small (Sriwaranun et al., 2015). Despite this, there are farmers taking on the challenge of growing organic. In 2005, in response to the new Free Trade Agreements in Asia and the new European law regarding traceability and residues in food, the Thai government introduced the National Agenda on Organic Agriculture (Ellis & Lorlowhakarn, 2005). The purpose of the programme was to support farmers in using organic fertilizers, alongside reducing the use of pesticides and promoting organic exports (ibid). The programme only includes farmers with Organic Agriculture Certification Thailand (ACT). ACT is the only organic certification body in Thailand that is internationally recognized and that follows European Union regulations (ibid). Despite the efforts announced within politics, organic farming in Thailand remains very low (Ei Win, 2017).

Ellis et al. (2006) explain that the increasing popularity of organic farming originates from three major trends; (1) public awareness on healthy lifestyle associated with organic farming, (2) the crisis within the farming sector due to globalization and (3) environmental issues. Globally, organic farming can have a significant influence not only on economic and environmental aspects, but also on social conditions such as improved livelihoods, gender equality and labour rights (Eisses & Chaikam, 2002; Shrek et al., 2006).

Currently, organic farming in Thailand can be seen in two ways: certified and uncertified. According to Green Net Cooperative statistics from 2010, organic farming is constantly growing both in area and production(GNC, n.d.). The number of farmers who consider themselves to be organic but are not certified is unknown. There may be a significant misinterpretations in the perception of organic practice, which raises several interesting questions, that will be investigated in this assignment.

Our study area is the village of Ban Suk Somboon, which is located in the district of Wang Nam Khiao, in the province of Nakhon Ratchasima in Thailand (shown in figure 1). Wang Nam Khiao district is associated with a cool climate, good growing conditions for vegetables and surrounded by mountains, why it has been referred to as the "Switzerland" of Thailand

(Tourism Authority of Thailand, 2017). The region, located relatively close to Bangkok, is a popular tourist destination to enjoy the surrounding national parks and cooler conditions. Agriculture is the main source of income for many families in this area, which is also an area where organic farming has gained prominence in recent years.

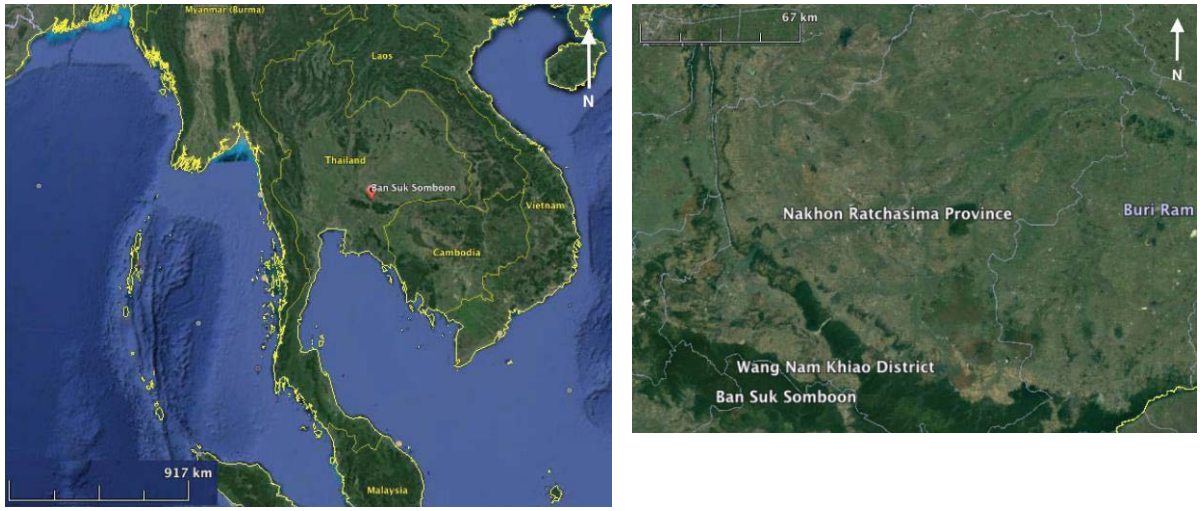

Figure 1. Location of Ban Suk Somboon on a national scale, and in relation to Wang Nam Khiao District and Nakhon Ratchasima Province (Google Earth, 2016).

In this assignment, we aim to gain an understanding of the impacts and influences of organic farming on a local scale, which may be beneficial for other areas and farms who are considering venturing into organic farming. Our main research question reads:

Why did the farmers of Ban Suk Somboon in Nakhon Ratchasima province, Thailand, identify specific prerequisites and repeatedly mention the same three motivations when engaging in organic farming and how can the process of organic farming be interpreted using theory on technology adoption?

This main question will be divided in the following three sub-questions:

- How do knowledge, money, water and land constitute prerequisites for organic farming in Ban Suk Somboon?
- How can health, economic opportunities and high quality soil be considered sensible and logical motivations for engaging in organic farming in Ban Suk Somboon?
- Using Everett Roger's theory on Diffusion of Innovation, how can we interpret technology adoption in Ban Suk Somboon?

4.1 Definitions of the types of farming

We began the fieldwork with a clear understanding of organic and conventional farming, but in Thailand it soon turned out not to be so simple. Dilip Nandwani defines organic farming as an agricultural system which avoids the use of inorganic fertilisers, synthetic pesticides and genetically modified organisms, and also lessens air, soil and water pollution as well as optimises ecosystem productivity and human health (Nandwani, 2016). Mary V. Gold defined conventional farming as an agricultural system that has an extensive use of pesticides, fertilizers and external energy inputs, high labor efficiency and dependency on agribusiness, single crops and large investments (Gold, 2007). In Ban Suk Somboon we encountered other ways of

perceiving different agricultural systems. Farmers defined themselves interchangeably either non-chemical, pesticide-free, organic or conventional, also known as traditional farmers. They explained, that conventional and traditional farmers use pesticides to a greater or lesser extent. Many of the interviewed organic farmers explained that they use chemicals under certain circumstances, such as during drought. However, whether the chemicals used are approved organic fertilisers was not established, and therefore should be regarded with scepticism. A study from 2011, conducted by Thapa & Rattenasuteerakul in Thailand, showed that although a farmer may claim to be practising organic farming, the extent of the area used to grow organic produce, varied from one farm to another, which also shows the lack of correlation between what they say and actually do.

According to semi-structured interviews (SSI) and the Focus group interviews (FGI), the farmers explained that they only use inputs from nature and thus consider organic farming to be healthier than conventional farming. To demonstrate that organic fertilizer was healthier, one farmer drank and gurgled some of his fertiliser, before spitting it out. Beside finding ourselves in an anecdotal situation, this also showed the common idea amongst some farmers that literally everything organic is considered to be healthy and edible.

In this assignment we have decided to use the term "*organic*" to cover both organic as well as non-chemical and pesticide-free farming. Organic is in general also, the term most frequently used in literature on farming. Conventional and traditional farmers will be referred to under the term *"conventional"*.

4.2 Lost in translation

Not long into the fieldwork we realized that our translators had very poor English skills. We took into consideration that they were studying on a bachelor level, were inexperienced with translating, as well as the fact that working with translators most often can be quite difficult (Temple, 1997). Initially our judgement of the significance of the situation was clouded by the fact that we really liked them and we all got along really well. Gradually, the feeling of "missing out" on important information grew. The informants' answer could be long and then translated into a single or very few words. In our field notes written the 7th of March (day 5), the following is recorded,

"We often experience asking the informant a question and getting a completely different answer or an answer that doesn't make much sense. E.g. during an interview we asked, *"Has it been necessary to adapt or change anything regarding crops, size, finance or other?"* and was told, *"Yes, salad"* and nothing more. In a different interview we asked the informant, *"A few days ago you showed us a book with your picture in it – What kind of book was it and why were you in it?"*, and got following translation of the answer, *"Because she say, she perform better than her husband?"*.

Problems like these appeared mainly when both of the translators worked together. They did not agree, or we did not advise them, on whom should be primarily responsible for each interview/questionnaire and thereof both relied on each other, got confused and delivered poor answers. Working separately they performed better. The translators also formed their own assessment about what was significant to translate, which is a common problem when using translators (Bujra, 2006). Instead of translating what the respondent said, they tried to seek an answer for our question, while other additional information were omitted. During one SSI, one translator explained that the reason he did not translate all that was said was because "it wasn't relevant". Therefore the credibility of the SSI method in this case is questionable. As far as we know, we may not have missed anything truly important but we definitely would have gained a better understanding of what people actually said if we had received the full answer. Another common problem was when the respondent talked too long and they were not able to follow the flow of the conversation. We should have informed the respondents that he/she had to pause every few sentences, to let the translators translate.

We knew that it mainly came down to lack of English skills and that we would not be able to teach them English in two weeks. So as an effort to handle the problem, we decided to go through our SSI-guide and make different questions leading to "the same" answer.

The translators were helpful in assisting us in the way of asking and phrasing questions. However, as mentioned previously, the problems with translation were not solely linguistic. Also, the interpreters also acted as a social filter.

5. METHODS

5.1 Questionnaires

Questionnaires can be a useful method to gain basic background knowledge of the local area and farming practices, and are often used in livelihood studies (Nepal & Spiteri, 2011; Dovie et al., 2006). The first version of the questionnaire was designed before the fieldtrip. It was necessary to make modifications for two reasons. Firstly, in order to conduct the questionnaire together with the Thai students, we merged their version with ours. The second modifications consisted of simplifying of questions and answers, after the questionnaire pilot test. The questionnaires were translated in collaboration with the interpreters and the Thai students (see appendixes g and h). We managed to collect 30 questionnaires.

It took time to agree on a final version of the questionnaire with the Thai students. However, it forced us to think deeper on our questions, even before the pilot test. Another challenge was the translation of the concepts. The definition of one concept for us may have a very different meaning for the Thai students, the translators and the farmers. For example "organic certification" or "chemical fertiliser" are potentially perplexing and can be understood in different ways. Nevertheless, a triangulation with the SSIs results was done to check their validity.

We were interested in gaining an overview of the farmers financial situation, not in detail but to gain approximate estimation of their annual income and expenditure. After the pilot-test, the Thai students pointed out that the farmers do not compute their finances in annual numbers. They had therefore designed a table that was supposed to be a summary of the income and the expenses of the farm. The table seemed initially a bit comprehensive but obtained information

that the students needed and therefore insisted on using. Processing the data, we realized that the information was very difficult to use. The farmers could not remember everything, so there were a lot of incoherences in some questionnaires and the answers ended up with too big of a variance and was therefore incomparable.

5.2 GPS and Mapping

GPS was used for several activities; to map the locations of the questionnaires, the semi-structured interviews and the locations of soil and water samples. The GPS was also used during the transect drive to map the borders of the village. GPS coordinates were transferred to Google Earth for further analysis and to produce maps of the area.

5.3 Soil and Water analysis

5.3.1 Soil analysis

According to Marinari et al. (2006), the soil quality of organic farms and conventional farms is different in terms of biomass production, nutrient content and levels of phosphorus and nitrate. To verify this difference, we conducted soil samples in selected farms to measure soil parameters, such as pH or nutrient content. We collected soil samples from three conventional farms and from three organic farms (figure 2), which were selected on access, through permission from the farmer, and location. We looked for farms located in three different areas of the village (south, center and north). The sampling locations were collected using GPS and mapped using Google Earth (2016).

Authorization to the fields was always asked to the farmers. Each of them granted us access to sample on any of their fields. An example of the transect of the soil sampling method is shown below. The method is the one recommended by the soil test kit. The exact location of sampling were chosen in advance and the objective was to try to cover uniformly each farm (see figure 3).

Samples were taken with the auger at a horizon depth of 20 cm. The soil from each sampling site at one farm was mixed together and then quartered. This gave one soil sample for the entire farm. The analysis of the soil was conducted on the 9th March, at the base camp following the method of the soil analysis kit of Kasetsart University.

In order to have representative soils of organic farms, we sampled in farms where they had been farming organically for many years, two of whom since 2000.

Figure 2. Soil samples locations. (Google Earth, 2016)

The soil sampling strategy could have been carried out on a greater number of both conventional and organic farms, as this could have given more comparable data for analysis, buttime restrictions did not allow this.

5.3.2 Water analysis

Figure 3.Example of a soil sample transect (Sarawut farm).

Research conducted by Wauchope and Ritter showed that water near fields can have a high level of contamination, mainly because of leaching of pesticides (Wauchope, 1978; Ritter, 1990). We wanted to investigate whether there would be a significant difference in quality between the irrigation water of conventional and organic farms. To obtain this information, seven water samples in six different farms (three organic and three conventional) were conducted. The locations of the farms selected for the soil sampling and water sampling are the same and selected on the basis of the same criteria. Therefore, the sampling strategies is the same as mentioned in the previous section. The water analysis was conducted in the field, during the whole week (from 6th to 9th of March), following the protocol of the water analysis kit of Kasetsart University.

5.4 Semi-Structured Interviews

We planned to conduct SSI with local people and farmers in order to gain qualitative data from their perspectives. SSIs bring many advantages to research : the open-ended questions allow the respondents to express themselves and allows the conversation to be steered towards topics of interest (Furze, 1996). It was important to acknowledge that respondents answers are potentially biased and they might be unwilling to give honest answers to sensitive questions (Babbie, 2002).

Besides seven of the farmers, we also interviewed four additional people: the head of the sub-district, the assistant headman, a public health officer and the founder of Non-toxic Agriculture Cooperative, as we found them helpful for our project to look at other insights and perspectives.

Due to time constraints, we began with gathering data from the SSIs while collecting the questionnaires. We had to rely on the Thai students, because they considered it important to get in touch with the farmer and to make an appointment before going to the farm. The fact that our research relied partly on the Thai students, to contact the farmers on our behalf, was useful as it enabled us to get in touch with farmers quickly and easily.

5.5 Focus Group Interview

FGIs are a useful research tool, as they encourage universal participation within a group and allow dialogue between participants (Kitzinger, 1995). FGI were carried out after the questionnaires and the SSIs to gain a deeper understanding of the data. It was also used as a triangulation to test the data.

We carried out the FGIs as part of a community meeting, where we presented our preliminary results to the farmers of Ban Suk Somboon. This ensured that we got a range of farmers present, without using more of their time. After a group discussion on how to divide the farmers, we separated them based on whether they perceived themselves as being either organic or conventional farmer. There were six farmers in each group, giving an even divide.

The FGIs gave us an overview of the dynamics between the farmers in the two groups. We started with a question regarding their perception of the opposite group of farmers. However, the organic farmers seemed not to understand this question, so after trying by using different wording and specify it, we moved on. Although we focused the questions to get the best possible outcome from the FGI, due to time restrictions, it was difficult to get a good indepth discussion and therefore we simply aimed to obtain a general opinion of the group.

5.6 Transect walks and transect drive

Transect walks are a useful method to investigate local knowledge (Chambers, 1994; Oudwater & Martin, 2003). Transect walks were carried out with two organic farmers and one conventional farmer. Information from the transect walks was aimed to discover overall aspects of farming and to understand some of the opportunities and difficulties of their way of farming. Photographs were taken to show the visual differences between organic and conventional farms (crops, soils, basic organization)

A transect drive of the village with the son of the Headman assistant was useful to understand the scale of the village, to see what was adjacent to the village and to map the borders of the village using GPS.

5.7 Participatory Observation

Participatory Observation (PO) is useful to understand everyday life situations (Jorgensen, 2015). To observe the two different types of farming practices, the PO method was carried out on one organic farm and one conventional farm. Working with the farmers, we were able to observe their work on a daily basis, to see the crops they grow, their social life, and to see first-hand their practices and the difficulties of their farming techniques. It would have been beneficial to have carried out this method on a greater number of farms over a longer period of time to pinpoint similarities and differences between organic farmers and conventional farmers, but due to time constraints, this was not possible.

6. RESULTS

6.1 Demographics

The headmans assistant in Ban Suk Somboon informed us that there are 600 people living in the village, 200 of which are working in one of the 40 farms spread over the area of the village. The subdistrict officer explained that since the government started promoting tourism in 2007, it has been increasing in the village. Since then, a significant proportion of the population started to work in the tourism industry, such as through homestays and various forms of ecotourism.

According to the questionnaire, the average age of farmers in Ban Suk Somboon is 52 years old and the average family size consists of five people. The majority of the families have lived in the village for more than 20 years. The majority of the farmers have always been farming.

Out of the farmers that answered the questionnaires, 13% had no schooling at all, 50% completed primary level, 23% completed secondary level, 7% had a form of vocational education and the remaining 7% had a higher education (bachelor or diploma) (see figure 4). According to the interviews, most of the farmers were taught their farming skills through family and knowledge-sharing with other farmers. Especially regarding organic farming, the farmers are good at sharing knowledge with each other and often seek out the pioneers in this field to gain expertise. Also, the government provides education about organic farming via the district office, or the training centers (see discussion 7.1.).

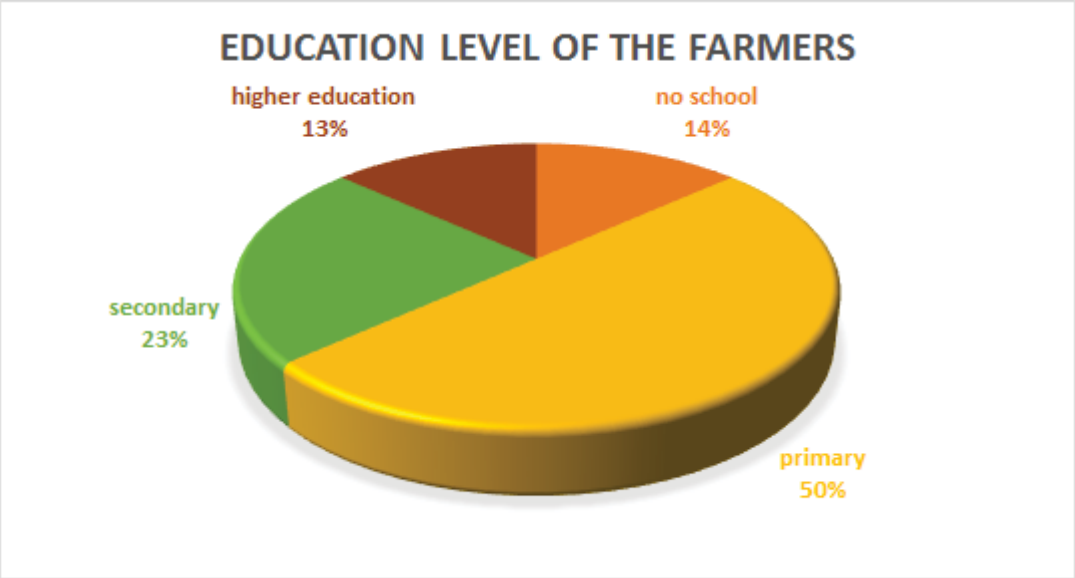

Figure 4. Education level of the farmers.(From the questionnaire results)

Land Titles and borders of Ban Suk Somboon

The data collected from the meeting with the sub-district office, the SSIs and questionnaires, show that the whole village has Por Bor Tor 5 land titles. This land title means that the land occupier pays the tax for using the land. It does not confer right or ownership on the land (Pensit and laws, 2009; NKD, n.d.). This leads to issues and misunderstandings. Furthermore, the farmers in the village claimed that there was no overlap between their village and the National Park. However, according to the government, part of Ban Suk Somboon is located in the

National Park. Borders of the village, mapped using GPS during the transect drive, are shown below (figure 5)

Figure 5. Map of Ban Suk Somboon. (Transect Drive with the headman assistant son)

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6.2 Types of Farming Practices in Ban Suk Somboon

There is a range of different types of farming practices in Ban Suk Somboon. The results from the questionnaires showed that the farmers considered themselves to partake in the following farming practices (figure 6). The questionnaire results show that 14 of the 30 farmers considered themselves to farm conventionally or traditionally, and that all (except three) of the organic farmers are uncertified.

From almost all of the methods used, results show that the conventional farmers mainly grow cassava and maize, whilst the organic farmers grow a much wider range of produce, primarily salad, vegetables and fruits.

According to the questionnaires, all farmers have been farming for more than 6 years, with the majority even for more than 20. Based on this, we assume that the farmers in the village are both experienced and knowledgeable. According to the FGI with the conventional farmers, all except one farmer hoped to change into organic farming in the future, because of the potential to increase their income and health concerns. The one farmer who did not want to convert, explained that it mainly was because of the size of her farm (300 rais/48 hectares). It would be impractical and difficult to change practices. However she did say, that had her farm been smaller, she would have liked to convert into organic farming.

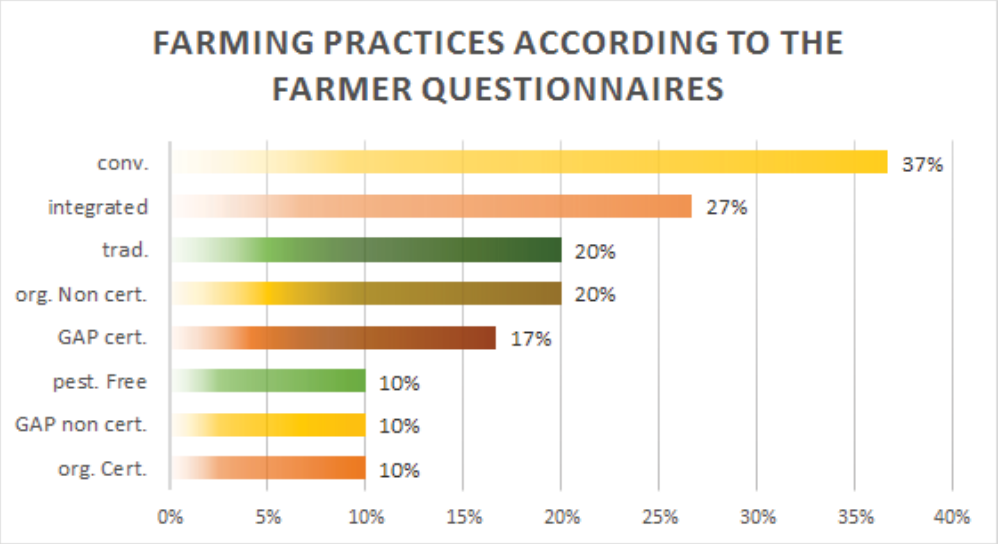

Figure 6. Farming practices in Ban Suk Somboon. (Questionnaires results)

Ban Suk Somboon appears to be a village where organic farming is more established than other nearby villages, who do not seem to have followed the trend to the same degree. The opportunities for organic farming in Ban Suk Somboon will be discussed in section 7.1.

6.3 Motivations

We had an assumption, before going to Thailand, that most likely the majority of the farmers would be motivated to engage in organic farming because of it being a financial opportunity: Organic farmers working in contracted groups or organic cooperatives has been shown to benefit more financially than conventional farmers (Setboonsarng, 2006). However, soon after arriving and talking to the first few farmers, we realized that there were three recurring motivational factors that they mentioned for engaging in organic farming. These were health, soil-quality (environment) and economic opportunity.

The results of the questionnaires concerning motivations (see figure 7) showed that 81% of the farmers that had already changed their practices mentioned health as a main reason for them to change practices.

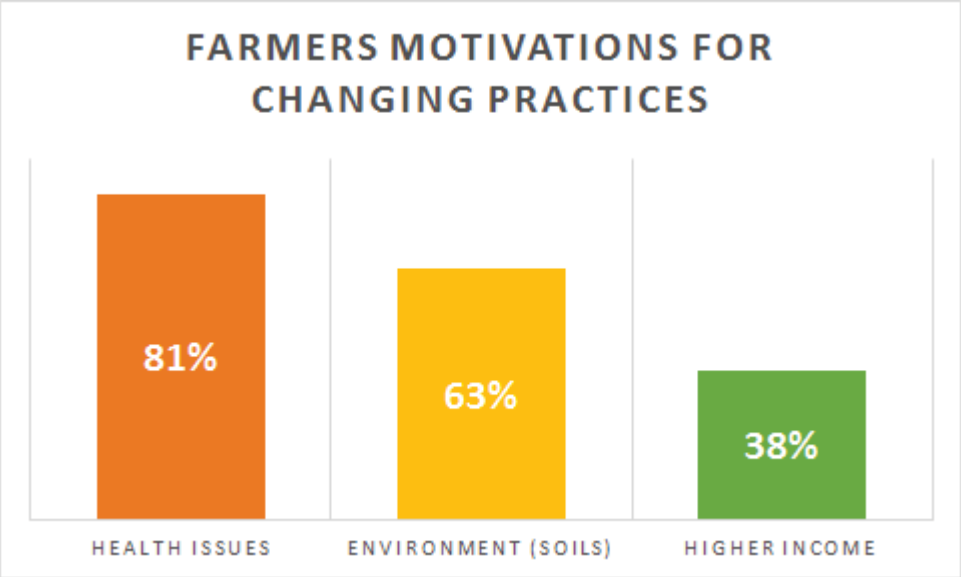

Figure 7. Farmers motivation to change their practices

6.3.1 Health

Health came up continuously in the SSIs, e.g. one of the organic farmers told us how working with chemical had left physical injuries and showed his hands and feet. Another organic farmer told us that he had experienced severe respiratory problems while working with chemicals and claimed that the speaking difficulties, which he obviously still suffered from, were caused by chemicals.

We decided to visit the local health centre to inquire whether they are aware of or have experienced any health problems related to the use of chemicals. They told us that there used to be more incidents of chemical-related health issues but that there had never been many. They ascribed the issues to be caused by lack of knowledge and inattention when working with the chemicals. Their recommendations were to cover up (unspecific in what gear) and to shower after spraying with chemicals.

We interviewed a woman who, along with her husband, is practicing conventional. She told us, that she personally would like to convert into organic farming, but her husband disagrees. She explained that a lot of the local people are recommending it, but it would require a lot of new equipment and new seeds. She also expressed concern regarding her husband's health, thus him being the one to spray chemicals. She told us that they buy herbal medicine, thunbergia laurifolia, from the “doctor” at the market.

6.3.2 Economic opportunity

According to the SSIs and the questionnaires, economic opportunity was often mentioned as an important factor for converting into organic. The farmers often mention that their income increased after changing practices and organic produce provides a more stable income. In comparison, the conventional farmers mentioned how, over the last two years, the price of cassava have decreased by almost 66% - from 3 baht/kg to 1 baht/kg. This indicates that conventional agriculture might be unreliable for a long run.

6.3.3 Environment and soil

In the questionnaires we asked about the motivations to practice organic farming and one of the multiple-choice options was 'environment. After having conducted a few SSIs we began to understand, that where we had intended ‘environment’ to be understood as ecology in a comprehensive form including climate change, the farmers ascribed environment to almost solely be related to soil and soil quality. This may also have been a translating issue, but either way we decided in this assignment to consider the two (environment and soil/soil quality) to be regarded as the same.

Environment and soil/soil-quality was mentioned as the another motivational factor for engaging in organic farming. In the SSIs many of the farmers stated that before changing into organic farming they experienced problems with the soil getting exhausted when growing cassava or maize with chemicals. Also to that point, another organic farmer told us during the interview that the land he bought was used to grow cassava before, and that he had to wait for two years before being able to grow salad and vegetables on it. The organic farmers found chemical farming to be neither environmentally or financially sustainable and had therefore decided to change practises. As part of researching this further we decided to collect soil samples. Soil and water results

6.3.4 Soil results

Averages for the soil samples from the organic and the conventional farms were calculated to enable a comparison between the two types of farming (table 1). The soil analysis showed differences in the pH and phosphorus level between the two type of farming, but also similarities in the ammonium and nitrate level. The total organic matter has been measured for only three farms due to the limited number of testing kits, which makes comparing organic matter from the organic and conventional farms complicated.

Results of soil analysis		
	Organic farms (3)	Conventional farms (3)
pH	6,33	5,50
Ammonium (mg/L)	M	L
Nitrate (mg/L)	VL	VL
Phosphorus (mg/L)	VH	L

Table 1. Soil analysis results. VL = very low; L= low; M=medium; VH = very high

6.3.5 Water results

Farm	pH	DO (mg/L)	Temperature (°C)	EC (mS/m)	Nitrate (mg/L)	Phosphate (mg/L)	TDS (mg/L)
O1a (pond)	7,78	8,5	29,7	212	0	0	114
O1b (stream)	6,46	n.m.	27,5	296	0	0	157
O2	7,16	0,19	31	371	0	0	179
O3	6,38	0,2	32,2	95,2	0	0	49,8
C1	6,69	0,24	24,6	174	0	0	92,8
C2	6,53	1,5	29,7	279	0	0	142
C3	6,64	0,21	29,5	998	0	0	52,7

Table 2. Results of the organic (O) and conventional (C) farms water analysis : pH, dissolved water (DO), electrical conductivity (EC), nitrate, phosphate and total dissolved solids (TDS)

We decided not to calculate average values because, as the results were so various, the average would not be representative of the results.

We expected the conventional farm irrigation water to have higher phosphate and nitrate content than the organic farms irrigation water. Indeed, Oquist et al. (2007) showed that alternative practices (within organic farming) could reduce nitrate losses by around 60%. Nevertheless, the water analysis results (table 2) showed that the nitrate and the phosphate content in all the irrigation water was very low. It is difficult to draw conclusions from the DO values: one extreme value (8,5 mg/L) should be rejected, since it was too high for the temperature of the pond (29,7°C, Fondriest Environmental, Inc. 2013). One measurement could not be done because of device calibration problems.

The relationship between EC and TDS showed that the link between these values could be approximated with the expression: TDS = K. EC, where K = 0,5 to 0,9 most of the time (Walton, 1989). In our cases, the K value is close to 0,5 except for C3 (0,05 mg/L). Therefore, we can assume that the extreme value of EC (998 mg/L) is an error.

The pH values are a bit higher in the organic farm. As has been discussed in this section, it might be due to the high pH of the manure.

7. DISCUSSION

7.1 Prerequisites for Organic Farming

Organic farming in Ban Suk Somboon has grown considerably, with almost 50% of farmers in the questionnaires saying that they have changed their practice in recent years

Thapa & Rattenasuteerakul (2011) point out that the local community, farmer groups and access to training are important factors when determining the likelihood of farmers to adopt organic farming techniques. A constraint of converting into organic farming practices is lack of information and knowledge on adopting new practices (Pattanapant & Shivakoti, 2009; Seeniang & Thaipakdee, 2013). In Ban Suk Somboon, there is a transfer of knowledge between the farmers and the means to learn about organic farming practices at the Non-Toxic Training Centre, which is located nearby. The centre is an NGO, founded by different European organisations, that seek to aid and promote organic and sustainable agriculture. Here, farmers are able to receive training on organic farming practices for free. This may be an incentive for farmers to venture into the practice of organic farming, and may also be a reason why organic farming has gained prominence in this area. The farmers who have learnt organic farming practices are encouraged by the Non-Toxic Training Centre to spread their knowledge (Scialabba & Hattam, 2003). This can lead their farms to be regarded as success stories or role models for others to follow, which will be further discussed in section 6.4.

Figure 8. Farmers learning about organic farming practices at the Non-Chemical Training Centre (credit to the Non-Toxic Training Centre for the pictures

In all forms of farming, land is an obvious necessity. Accessing land however, differed between farmers. The majority of farmers owned their land under PBT5 (as mentioned in section 6.1.). One farmer had been offered land with the specific intention that she would use the land to practice organic farming, so that her produce could be sold to his business in Bangkok, thus giving her both an income source and a guaranteed buyer. The complexities of land ownership constitutes an obstacle in obtaining organic certification (see reflection, appendix c).

Access to water evidently contributes to farmer's adoption of organic farming techniques (Pinthukas, 2015; Seeniang & Thaipakdee, 2013). Whilst other villages may not have sufficient access to water sources, Ban Suk Somboon did not appear to experience water shortage issues, even though the organic farmers are growing salads, which need more water than the traditional cassava. These new crops would, hence the need for more water, also require money to finance a sufficient irrigation system. However, this did not appear to have been a significant issue for the organic farmers. There was a reservoir in the centre of the village and many man-made ponds located around the village, which according to the SSIs, had been created by the military. According to Pimentel & Burgess (2014), a significant benefit of organic farming is that this farming practice does have the potential to conserve water resources, as the result of higher soil organic matter, which is evidently beneficial in years of drought. Over a 12-year period, their research showed that in the water volume percolating through the organic systems was 15-20% higher than that of conventional systems, showing increased groundwater flows and decreased water waste through surface runoff (Pimentel & Burgess, 2014).

Converting into organic farming practices requires initial finances, for example to purchase organic seeds and an adequate irrigation system. In the SSIs with the organic farmers, three of them mentioned that they had sufficient finances to begin farming organically. The farmer, Panupong, had worked in the Middle East for 10 years; the farmer, Sarawut, had worked in a factory in Bangkok, and Nan received the land to farm organically from Mr. Mushroom company. This shows that money is a prerequisite to adopt organic farming techniques.

There is a link between the increase in organic farming and tourism. According to the SSI with the sub-district office, the 2007 tourist boom to the region may have been a driver for agricultural intensification (see section 8.2), with farmers regarding increased tourism as a market opportunity. Because of tourism, farmers were able to invest in more inputs to their farms, such as sprinklers for better irrigation systems and seeds. This may be a reason as to the significant differences between organic farms and conventional farms. Additionally, this has led to many organic farmers in the village.

Even though the conditions seem to be favourable for the adoption of organic farming, the prerequisites mentioned previously are not the best opportunity for everyone. During the focus group and the interviews, many conventional farmers explained the difficulties in converting into organic farming. Three reasons were mentioned repeatedly; habits, money and water.

One farmer expressed that he did not want to change because his family had always been growing cassava. Also, they already tried using organic fertilizer, which had resulted in a lower yield that diminished their willingness to change their practices.

The economic constraint of changing was also often mentioned. The conventional farmers express that they cannot afford the seeds, the manure, etc. Furthermore, some farmers mentioned access to the market to be a challenge for conversion. The crops, as well as the customers, being different, the farmer would have to access a very different market. Finally, the water was seen as a constraint because of both the fear of water scarcity, and the investment needed for a better irrigation system.

7.2 Motivations

The saying, "*a person will not win a game, if they do not play*" can also be translated into, "*one's success depends on the willingness to become entrepreneu*r" (Shane et al. 2003). Human motivations influence their decision making processes and the differences between people will distinguish who is more likely to pursue entrepreneurial opportunities (ibid). The data collected from the SSIs showed three main motivations, which had influenced the farmers to convert into or start practicing organic farming.

7.2.1 Health

One motivation, that the farmers repeatedly mentioned, was health. Coming into the field we did not expect health risks associated with conventional farming to be as big a concern for rural villagers in Thailand. The reason we did not consider this was that Thailand is known as a country where farmers highly overuse chemicals in crop production (Panuwet et al., 2012). Pesticides can cause health problems, such as damage of the nervous system, eye or skin irritation, respiratory malfunction, poison of metabolic organs or even cancer (Muntz et al, 2016). However, in all the SSIs with the organic farmers, health was mentioned as a motivation as to why they adopted organic practices.

In the field we met people, who were injured by chemicals. A farmer, at the age 24, not only told us about health issues related to his former work with chemicals as a conventional farmer, but showed us the scars (see picture above), and once he stopped using chemicals the problems ended.

The farmer's story raises a question about safety and protection against chemicals. Visiting the health centre, we were told that very few farmers come because of pesticide related sickness. It happened more often ten years ago but was not a big issue, even then. The centre recommends to wear proper protection and shower after spraying with chemicals. We only observed one conventional farmer entirely covered up. The World Health Organisation (1991), recommends

further precautions, e.g. changing clothes when finishing work, store chemical containers in a safe places etc. We do know to what extent the farmers are applying these recommendations.

According to Baranski (2017) organic foods contain more antioxidants in comparison to conventional food. Promotion of organic agriculture in the province leads to better access of organic food. All the interviewed farmers claimed that they consume their own crops and sell it locally. The outcome of the growth of organic food consumption may be beneficial for the villagers health.

7.2.2 Economic Opportunities

Organic farming as an economic opportunity was mentioned as another motivation. We were told several times during SSIs, that organic produce has a more stable or better price on the market as well as a higher yield. According to the organic farmers, they are able to harvest the vegetables several times a year and not just once, as in the case of cassava production (Pretty, 2006). Many researchers consider organic farming to be a good investment for farmers (Bellon & Penvern, 2014; Cacek & Langner, 2009). The trend of organic produce is expanding along with the number of people buying organic goods. (Sriwaranun et al., 2015). The possibility to sell produce to markets in Bangkok and brand themselves as organic appears to be beneficial for the farmers in the village (Bellon & Penvern, 2014).

While Thailand is a major cassava producer worldwide (30 million tons in 2014, FAO stat), a very little part of the production is used as staple food (Piyachomakwan & Tanticharoen, 2011). Cassava is mainly used as an industrial crop, to produce pellets, bioethanol or powder, and the domestic consumption is lower than 30% (Poramacom et al., 2013). As an industrial crop, it is highly unlikely that an organic cassava market arises and bioethanol as an organic fuel will occur.

According to the farmer's, salad and vegetables seem to be a reliable and secure crop to grow organically. Roitner-Schobesberger et al. (2008) showed that the interest of Bangkok consumers for healthier fruits and vegetables is increasing, as well as the interest for environmentally friendly products. This can explain why all the organic farmers of Ban Suk Somboon consider salads and vegetables to be the best opportunity in organic farming.

7.2.3 Soil

Among the motivations to grow organic, the soil was often mentioned by the farmers during the SSIs. While organic farmers said their soil had improved since they converted into organic, conventional farmers claimed to have a drier soil, harder to plough. In a study on soil erosion losses and nutrient uptake with cassava, maize and other crops, Putthacharoen et al. (1998) showed that soil erosion losses are highest in cassava, even though some changes in practices can decrease these losses. Studying the long-term effect of cassava cultivation on soil productivity, Howeler (1990) concluded that cassava needs an input of potassium fertilizer to maintain the long-term soil fertility.

The soil analysis conducted in three organic farms and three conventional farms showed some interesting results. The conventional farms pH values (average 5,5) were lower than the organic farms (average 6,3), which can be related to the practices; all the organic farmers told us they were using manure, and especially pig manure, that has pH of 7-8 (Murto et al., 2004; Huang et al., 2004). Therefore, it will increase the soil pH when spread on the field (Ye et al., 1999). According to Cornell university growing guide (2006), 6,3 is an ideal pH for lettuce growing (ideal between 6,2 and 6,8)

Since it has a high phosphorus content (Huang et al., 2004), the organic fertilizer could also be the cause of the difference in soil phosphorus content (very high in organic farms, low in conventional) In the conventional farms, the soil potassium content is low, whereas it is medium in the organic farms. This might be related to the fact that cassava has an important potassium intake (Howeler, 1990). Therefore, the soil might contain less potassium.

The nutrient contents of the organic soils are higher for potassium and Phosphorus. To determine whether those soils are really better, more specific soil characterics may have to be measured, such as organic matter, soil porosity, exchangeable cations and texture.

Additionally, some farmers told us that even though they did not have organic certification, the companies they were supplying check their soil quality. According to these tests, all had observed improvement in their soil quality. Unfortunately, we could not obtain this information.

As a complement to the soil quality, we hoped to get information from the water analysis. From the analysis, the irrigation water of both the organic and conventional farmers are safe. They are approved for irrigation water use, according to the Malaysian and the Thai standards (see table in appendixes a and b).

7.3 Diffusion of Innovation

After interviewing several of the farmers, who are considered to be the pioneers of organic farming in Ban Suk Somboon, we started to notice some of their shared characteristics. Additionally, there seemed to be a similar process when venturing or converting into organic farming; curiosity, seeking knowledge and simply having the guts to do it. In the following section we will explore the process of adoption of organic farming in Ban Suk Somboon. We are using a theory on technology adoption lifecycle to show how organic farming is likely to have spread in the area. Explicitly, we are taking a point of departure in Everett Roger' theory on *Diffusion of Innovation*, published in the book by the same title (Rogers 1983).

Rogers defines diffusion of innovation as,

"…a process by which an innovation is communicated through certain channels over time among members of a social system" (Rogers, 1983).

In our case the innovation is organic farming and the social system consist of farmers in Ban Suk Somboon. The theory builds on two main factors, (1) *stages* that defines the different levels by which the process of adopting new ideas develops and (2) the *adopter group* that categorises people according to their innovativeness. The next section will begin with an elaboration of the latter.

7.3.1 Adopter Groups

According to Rogers, not everyone in a social system, undergoing innovation, will adopt new ideas at the same pace. He therefore categorises people in different adopter groups based on their innovativeness and argues that each group carries specific characteristics (ibid). The different groups innovativeness is determined by their socioeconomic status, personality variables and communication behaviour (ibid).

Beal and Bohlen offer a short summary of the categories, as presented here:

> *1. Innovators - Larger farms, more educated, more prosperous and more risk-oriented.*
> *2. Early adopters - Younger, more educated, tended to be community leaders, less prosperous.*
> *3. Early majority - More conservative but open to new ideas, active in community and influence to neighbours.*
> *4. Late majority - Older, less educated, fairly conservative and less socially active.*
> *5. Laggards - Very conservative, smaller farms and less capital, oldest and least educated.*
>
> (Beal et al., 1981)

The data collected from the SSIs, show the majority of the farmers of Ban Suk Somboon belong to one of the following adopter groups; innovators, early adopters and early majority. None of the conventional farmers were completely dismissive as mentioned towards turning into organic farming, but found there to be too many obstacles for changing. The data collected from the questionnaires, show that organic farmers, in line with Rogers description of innovators and early adopters, are more educated (see table 3).

Education level	All	Organic farms	Conventional farms
No school	4	1	3
Primary school	15	5	10

Secondary	7	4	3
Higher education	4	3	1

Table 3. Education level depending on the type of farming

Among the farmers we interviewed, one especially stood out as a very clear *innovator*; Panupong. He is a trained engineer, who was working ten years in the Middle East, accumulating a significant amount of money. It was not until after approximately ten years time, that he started to make a profitable yield and today he is known in the entire region for his exemplary farm. Hence, this farmer complies with all the characteristics of the innovator; he has a larger farm, a higher education and is prosperous. However, we are not aware of the potential risk he ran, when he first started.

The farmer, from the latter section, also makes up the focal point of the following. In Chatzimichael et. al.s study, they established that farmers, in general, are more likely to follow or trust the opinion of a farmers, who they consider being successful. Also, they tend to imitate the behaviour of the successful farmers (Chatzimichael et. al., 2014). We made a very similar observation in our study. Four of the farmers we spoke with referred directly to the abovementioned farmer, Panupong, as an inspiration for venturing into organic farming. A young farmer, who had recently converted from growing flowers into organic vegetable farming, told us explicitly that his aspiration was to become like Panupong. This clearly shows how the success of one organic farmer is highly likely to be seen as an opportunity for other farmers to follow their lead and to procure similar successes.

One item in our data deviates from both Rogers theory and the research conducted by Chatzimichael et. al., regarding farm size. Our questionnaires showed that the conventional farms, on average,were twice the size of the organic farms (see table 4), which is virtually the opposite of the result Chatzimichael et. al. reached (ibid), and does not correspond with Rogers theory, that roughly states that your farm size decreases along with your innovativeness (Rogers, 1983).

Farm size (rais)	all	Organic farms	Conventional farms
Median value	14	9	19
average	/	14,4	40,3

Table 4. Farm size depending on the farming type

7.3.2 The Bell Curve

Rogers generated a diagram showing the percentage of adopters over a period of time. It visualises the normal process of adopting an innovation (see figure 9).

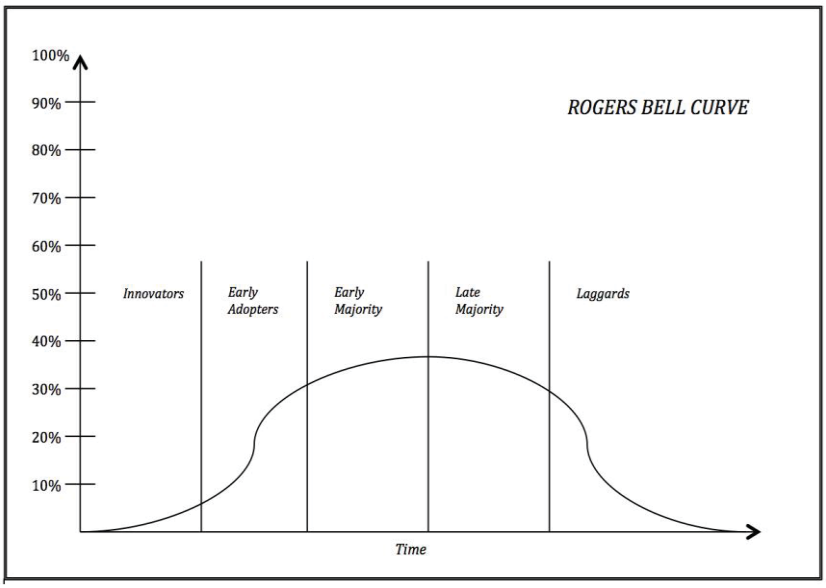

Figure 6 The bell-shaped frequency curve for an adopter distribution (Rogers, 1983)

Rogers argues, that new ideas may be propagated through a process of research and development activities, but can also grow out of the practical experience of certain individuals (Rogers, 1983). The latter being the case in Ban Suk Somboon. It is our assessment that organic farming has not been practiced long enough for the curve on the bell to start declining, thus we do not consider farmers, who have not converted, to be described as laggards or late adopters.

7.3.3 Homophily and heterophily

According to Rogers, it is a fundamental principle of human communication that people transfer their ideas to people who they are alike (ibid). He introduces the concepts of *homophily* and *heterophily* that defines the relationship between source and receiver. Homophily signifies a degree of similarity in certain characteristics (beliefs, education, social status etc.). When people share the same characteristics their communication will most often be more effective (ibid). Based on frequent observations of the farmers conversing together, it is our impression, that they seemed to have a good relationships with each other. Our data from the SSIs confirm, that the farmers to a high degree gained knowledge from other farmers as well as shared their own - though two of them admittedly kept the nuggets to themselves.

According to Rogers, new ideas generally enter a social system of higher status and more innovative members, and in the case of a high degree of homophily, the flow of innovation can be impeded. Members of higher status tend to mainly interact with one another and will therefore keep their knowledge to themselves (ibid). Though our data does not clearly show whether organic farmers can be said to have higher status, there are indicators, such as the conventional farmers all aspiring to converting into organic farming, which allows us to consider the organic farmers of a higher status, just in this regard. With reference to the abovementioned data, the theory that the two groups would not interact with one another and hence keep their knowledge to themselves, seemed to not be the case in Ban Suk Somboon.

7.3.4 Stages of Diffusion

Rogers argues that the process of diffusion extends over five different stages; *knowledge*, *persuasion*, *decision*, *implementation* and *confirmation* (Rogers, 1983).

Rogers five stages of diffusion is depicted in the figure 10 below.

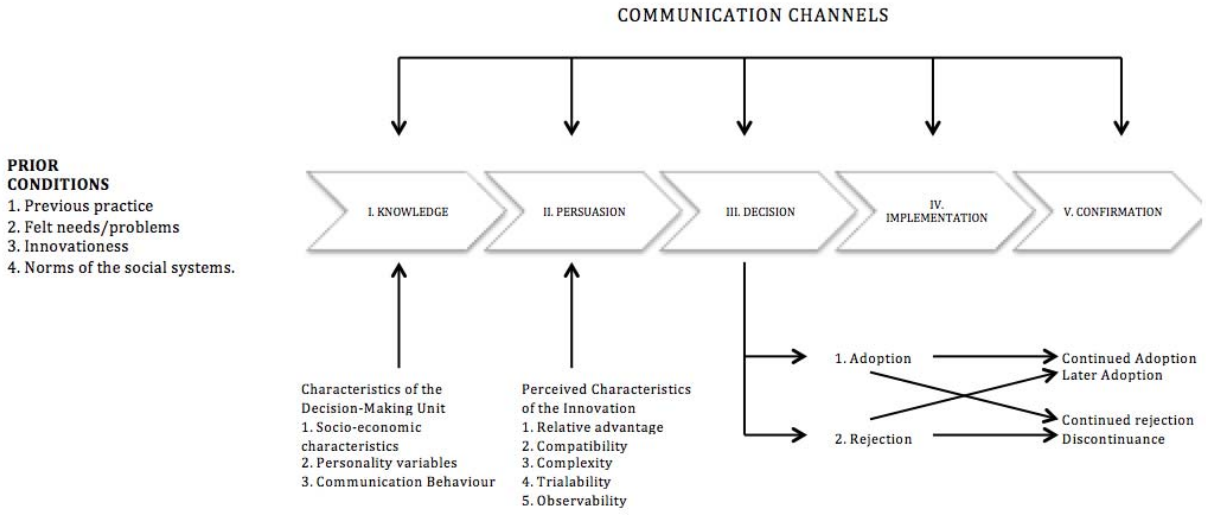

Figure 7. A model of stages in the innovation-decision process (Rogers 1983)

At this time in the report it is hopefully clear that altogether Ban Suk Somboon is quite far when it comes to converting into organic farming, on the share number of organic farmers alone. The next section will therefore only address knowledge, this being an essential topic in our data and a vital part of ever entering the process of diffusion (ibid).

The theoretical link between knowledge and technology adoption has long been well established (Chatzimichael et. al., 2014). According to the data from our SSIs, knowledge on organic farming is most often gained through sharing within farmer's networks, one-to-one or through tales of success stories. Also, the farmers of Ban Suk Somboon have the opportunity to acquire skills, knowledge and experience at the Non-Toxic Training Centre (ref.?), but this requires that they know of its existence - As Rogers says,

"It is argued that one becomes aware of an innovation quite by accident, as one cannot actively seek an innovation until one knows that it exists" (Rogers, 1983).

This brings us to the next topic regarding knowledge: A thing that was very hard to determine in the amount of time we had, was the scope of tacit knowledge among the farmers. Evenson and Westphal (1995) argue that there is a lot of tacit knowledge that is not readily transferable into a set of artifacts, such as a collection of machines, seeds or manuals (Evenson et. al., 1995 and Chatzimichael et. al., 2014).

8. REFLECTIONS

8.1 Reflection on the Sufficiency Economy Philosophy

In Thailand, the King Bhumibol Adulyadej, recently passed away after a 70-year long reign. He was, and still is, deeply loved and respected by the Thai people, which show a one year long mourning period. It is very common to see pictures of the king in in people's private homes as well as in public areas and Ban Suk Somboon was no exception. (PICTURE?)

After the Asian financial crisis of 1997, the King started to promote a philosophy named the Sufficiency Economy (SE). The aim was for the country to recover through a more resilient, balanced and sustainable development plan (Piboolsravut, 2004). As an effort to address the environment degradation and the natural resource depletion issue, agriculture is included in the philosophy of Sufficiency Economy (Mongsawad, 2010), in a program called New Theory of Agriculture (NTA). It consists of the promotion of integrated farming in general, including agroforestry, organic farming or natural farming (Mongsawad, 2010; Jitsanguan, 2001). Two of the interviewed farmers said that they got the idea of organic or integrated farming because of the SE philosophy, while another one said that he was following the King's project. Farmers seem to perceive organic farming as a mission, and as a way to get closer to their beloved king's philosophy.

The SE and particularly the NTA is an interesting conceptual framework to understand the farmers main motivations. The economic motivation is present in SE philosophy, since the aim of the latter is to recover and promote a sustainable economic development. A good example of the soil quality motivation is the aim of the NTA to reduce the environmental degradation and the natural resource depletion issue. Finally, the health motivation is also present in the NTA, since the aim of the sustainable agricultural systems is to improve the quality of life (Jitsanguan, 2001).

We did not think, before arriving in Thailand that the SE would be that important for some farmers. Therefore, we did not investigate that much towards it. However, as this reflection tries to show it, it might be interesting to have a more precise research about the influence of the previous king's philosophy on the adoption of OF in Thailand.

8.2 Group dynamics

From the beginning to the end, our group dynamic has been exceptionally good. A clear advantage was that all of us have different backgrounds and experience, thus each of us could bring different perspectives to the research. Not only do we come from different disciplines but also from different nationalities, which just added to make the entire process very enjoyable. We were able to learn from each other which made this research more interesting, enabling us to look at various and more diverse aspects that we otherwise would not have considered. Our group work process has been free of conflicts and everything progressed smoothly. We have supported each other during the fieldwork and writing process. E.g. we each wrote a section in the report and then circulated it so that everyone could comment, discuss and add to it, therefore making each section the work of the entire team. This was beneficial as it allowed each of us to bring our perspective on each section, which was invaluable in the construction of this report.

We have been laughing everyday the past two month, which might be why it all went so nice and smooth ☺

9. CONCLUSION

Development of organic farming in Ban Suk Somboon is on a very interesting path, and could at some point be taken as a good example of successful conversion into organic farming. Indeed, some factors are present in the village that make it easier for farmers to change their practices. The water availability due to the numerous ponds spread in the village allow the farmers to change their crops from cassava and maize to salads and vegetables. The close location of the Non-Toxic training centre and basically, the sharing of knowledge between farmers leads to better practices, and hence a faster improvement of the yields. We also realized that the majority of the organic farmers had financial advantages, allowing them to venture into organic farming. Finally, the proximity to Bangkok, as well as the tourism boom in the area, makes out for a good market opportunity. This allows most of the organic farmers to sell their products and to find a market that is completely different.

However, the high number of organic farms in the village has been favoured by the strong willingness of a few pioneers. Trying, doing mistakes, being judged by others, they managed to make their farming profitable, and are now considered an example in the village. This has lead to a virtuous circle of technology adoption, with more and more farmers adopting new organic practices.

The economic opportunity for them is important, because they have a broader variety of crops, a market where they can value their products. Also, because of greater consumer awareness about healthy food and environmental issues which leads to a continually increasing demand of organic products. Another motivation is health, which is important for those people living in Thailand, being the fifth biggest user of chemicals for agriculture. Finally, soil quality was also mentioned as a motivation to practice organic farming. Content with their increased yield, farmers consider organic soil to be better which appear to hold some truth. Our soil samples also correlate this.

One of the main challenge of our research has been to deal with a very different perception of organic farming. The type of farming was strongly related to the type of crop, the salad and vegetables being considered as the organic farming crops, while cassava and maize were considered as the conventional crops.

All the organic farmers that we met were pleased about their new farming practices. Therefore, it seems that the decision of converting is not surrounded by the same risks anymore. It might be a good choice for the next decades.

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11. APPENDIXES

- Appendix a. Malaysian water standards
- Appendix b. Thailand water standards
- Appendix c. Reflection on certification
- Appendix d. Methods table
- Appendix e. Final Synopsis
- Appendix f. Semi structured interview guide
- Appendix g. English questionnaire
- Appendix h.Thai questionnaire

Appendix a. Thailand irrigation water quality standards

Water Characteristics Discharged into Irrigation System		
Parameters	**Units**	**Standard Values (Range or Maximum Permitted Values)**
1. pH	-	6.5-8.5
2. Conductivity	µMole/cm	2,000
3. Total Dissolved Solids (TDS)	mg/l	1,300
4. Biochemical Oxygen Demand (BOD5)	mg/l	20
5. Suspended solids (SS)	mg/l	30
6. Permanganate (PV)	mg/l	6.0
7. Sulphide (as H2S)	mg/l	1.0
8. Cyanide (as HCN)	mg/l	0.2
9. Fat ,Oil and Grease	mg/l	5.0
10.Formaldehyde	mg/l	1.0
11.Phenol & Cresols	mg/l	1.0
12.Free chlorine	mg/l	1.0
13.Pesticides	mg/l	None
14.Radioactivity	mg/l	None
15.Colour and Odour	-	Not objectionable
16.Tar	-	None
17. Heavy metals - Zinc (Zn) - Chromium (Hexavalent) - Arsenic (As) - Copper (Cu) - Mercury (Hg) - Cadmium (Cd) - Barium (Ba) - Selenium (Se) - Lead (Pb) - Nickel (Ni) - Manganese (Mn)	mg/l	 5.0 0.3 0.25 1.0 0.005 0.03 1.0 0.02 0.1 0.2 0.5

Source : Royal Irrigation Deparment. (1989). Order No. 883/2532. Retrieved from : http://www.pcd.go.th/info_serv/en_reg_std_water04.html#s5

Appendix b. Malaysian water quality standard (class IV is irrigation water)

National Water Quality Standards

Parameters	Unit	Classes					
		I	IIA	IIB	III	IV	V
Ammoniacal Nitrogen	mg/l	0.1	0.3	0.3	0.9	2.7	>2.7
BOD	mg/l	1.0	3.0	3.0	6.0	12.0	>12.0
COD	mg/l	10.0	25.0	25.0	50.0	100.0	>100.0
DO	mg/l	7.0	5.0-7.0	5.0-7.0	3.0-5.0	<3.0	<1.0
pH	-	6.5-8.5	6.0-9.0	6.0-9.0	5.0-9.0	5.0-9.0	-
Colour	TCU	15.0	150.0	150.0	-	-	-
Electrical Conductivity*	umhos/ cm	1,000.0	1,000.0	-	-	6,000.0	-
Floatables	-	n	n	n	-	-	-
Odour	-	n	n	n	-	-	-
Salinity	%	0.5	1.0	-	-	2.0	-
Taste	-	n	n	n	-	-	-
Total Dissolved Solid	mg/l	500.0	1,000.0	-	-	4,000.0	-
Total Suspended Solid	mg/l	25.0	50.0	50.0	150.0	300.0	300.0
Temperature	°C	-	Normal +2°C	-	Normal +2°C	-	-
Turbidity	NTU	5.0	50.0	50.0	-	-	-
Faecal Coliform **	counts/ 100 mL	10.0	100.0	400.0	5,000.0 (20,000.0)#	5,000.0 (20,000.0)#	-
Total Coliform	counts/ 100 mL	100.0	5,000.0	5,000.0	50,000.0	50,000.0	>50,000.0
Iron	mg/l	Natural levels or absent	1.0	1.0	1.0	1.0 (Leaf) 5.0 (Others)	Levels above IV
Manganese	mg/l		0.1	0.1	0.1	0.2	
Nitrate	mg/l		7.0	7.0	-	5.0	
Phosphorous	mg/l		0.2	0.2	0.1	-	
Oil & Grease	mg/l		0.04; N	0.04; N	N	-	

Source : Malysian National water quality standards. (n.d.). Retrieved from : http://www.gunungganang.com.my/pdf/Malaysian-Policies-Standards-Guidelines/Standards/National%20Water%20Quality%20Standards.pdf

Appendix c. Overview of applied methods

Applied Method	Number conducted	Details
Questionnaires	30	Given to 30 farmers
Semi-structured interviews	11	7 farmers, Head of the Sub-district, Assistant Headman, Non-Toxic Training Centre, Public Health Officer
Transect walks	3	2 organic farms, one conventional farm
Participatory observation	2	1 organic farm, one conventional farm
Focus Group Interview	2	1 group of organic farmers, one ground of conventional farmers
Soil samples	6	3 organic farms, 3 conventional farms
Water samples	7	3 organic farms (4 samples), 3 conventional farms

Appendix d. Reflection on certification

Certified organic farming practices in Thailand, in general, conform to what European countries perceive to be organic. This entails farmers adopting a particular standard and specific techniques which, as a result, lead to farmers receiving higher prices for their products (Parrott *et al*., 2006). There are evidently different perceptions regarding what can be perceived as organic.

In Ban Suk Somboon there were few farmers that claimed to be certified organic. At the same time, the interviewed farmers claimed that everybody in the village has the same land rights, which makes it impossible to obtain the certification which is confusing.

It is also difficult to get the certification due to high costs (Pattanapant & Shivakoti, 2009). An uncertified organic farmer informed us that it costs 80,000 to 100,000 Thai Baht, and has to be renewed every three years. Therefore, whilst many farmers said they wanted this certification, they are unable to afford it. Perhaps if the demand were to increase, there would be greater financial incentives to gain certification.

Nonetheless, few interviewed farmers overcame the organic regulations and negotiated another type of agreement with bigger companies. Farmers were able to have their produce labelled as a kind of organic, while the quality was guaranteed by the company. This required the soil and the produce to be frequently inspected for residues.

The Sub-District Officer mentioned that certified organic farms exported their produce, whereas uncertified farmers mainly sold their produce on the local market. So forth the demand for the exportation of organic produce increase, the government would probably ease the process of obtaining a certification. However, this is not the case. One potential solution for

organic farmers on a local scale, could be a participatory guarantee systems, that is created by the farmers themselves to guarantee transparency and uniformity to the organic products (Luttikholt, 2007). This requires coordination and constructive collaboration between farmers, and may be a potential next step for Ban Suk Somboon, as implementing specific guidelines would be beneficial in creating uniformity between farmers' organic practices.

Appendix e. Final synopsis (starting next page)

IN WHAT WAY CAN ORGANIC FARMING HAVE A SOCIAL, ECONOMIC AND ENVIRONMENTAL EFFECT IN AND AROUND BAN SUK SOMBOON, THAILAND?

Interdisciplinary Land Use and Natural Resource Management- Synopsis

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Table of Contents

1. INTRODUCTION

Agriculture is a profitable livelihood for Thai farmers[1]. Different crops are grown in the course of different seasons depending on weather, suitability of crops and soil conditions (Timprasert et al., 2014). Due to Thailand's good agro-climatic conditions, the country is known for its global exportation of rice, but also fish, tapioca, grain and cane sugar (OEC, 2014). As with elsewhere in the world, agriculture in Thailand face challenges such as insects destroying crops. Nowadays, the most common way of dealing with this problem is the use of pesticides. Farmers frequently use them in order to protect their crops but excessive use of pesticides in farming can cause adverse effects on ecosystem and human health (Timprasert et al., 2014). Thailand is the 5th biggest user of chemicals for agriculture in the world (Ekachai, 2016). Recently, the worldwide growing trend of switching from conventional produce to organic produce is observed. Increased consumer awareness towards the quality of the food, health concerns as well as environmental awareness contribute to this tendency (Ellis et al, 2006).

The market of organic produce in Thailand is relatively small, mainly due to higher prices (Sriwaranun et al., 2014). Despite this, there are farmers who are taking on the challenge of growing organic. According to Setboonsarng (2006), organic farmers who joined contracted groups or organic cooperatives benefit more financially than conventional farmers, which contributes to reducing poverty in rural areas. In 2005, in response to the new Free trade Agreements in Asia and the new European law about traceability and residues in food, the government of Thailand introduced the National Agenda on Organic Agriculture (Ellis & Lorlowhakarn, 2005). The purpose of the programme was to support farmers in using organic fertilizers, alongside reducing the importation of pesticides and promoting organic export (Ellis et al., 2006). The programme includes only farmers with Organic Agriculture Certification Thailand (ACT). ACT is the only organic certification body in Thailand which is internationally recognized (Ellis et al., 2006). However, the area covered by organic farming remains very low in Thailand, despite the efforts announced within politics (Ei Win, 2017).

Ellis et al. (2006) considers that the increasing popularity of organic farming originates from three major trends: (1) the public awareness of healthy living, associated with organic farming, (2) the crisis faced by the farming sector due to the increase of larger international markets and decreasing prices, and (3) the environmental issues. In other parts of the world organic farming has shown to have a significant influence on, not only economic and environmental aspects, but also on social conditions such as improved livelihood, gender equality, labour rights etc (Eisses & Chaikam, 2002; Shrek et al., 2006).

Development of organic agriculture appears in Thailand in two streams: the business oriented organic programmes and the rural development oriented. The first one is led by large scale farmers - local entrepreneurs and companies who have noticed national trend for organic produce and see a business opportunity in it. These farmers export the goods to overseas markets. Lack of knowledge on organic production leads farmers to engage government agencies and local researchers in helping them with conversion. These farmers also use foreign organic certifications in order to gain trading partners. In the second stream farmers and NGOs are the key stakeholders. Their goal is to support smaller farms to follow sustainable farming practices to improve both livelihoods and agro-ecological conditions in the rural areas. Their change strategies were based on raising awareness on the negative effects of overuse of

[1] Note : in this synopsis, the word 'farmer' is used as a gender-neutral term.

pesticides, unnecessary dependency on external market and providing knowledge of sustainable farming practice by research, seminars or study tours. Unfortunately this programme had a limited success and NGOs had to promote new strategies. One way was to introduce a local organic certification body who could issue certification services and conduct inspections for better market access. As a consequence more farmers had joined the organic programmes (Win, 2017; GNC, 2017).

At present, organic farming in Thailand, from a researcher point of view, can be seen in two ways: certified organic farm and uncertified. According to Green Net Cooperative statistics from 2010, areas under organic farming are constantly growing, as is organic production. (GNC, 2017) The number of farmers who consider themselves organic but not registered is unknown. There may be significant misinterpretations in the perception of organic practice, on a national level, which may raise many questions. What does it mean to grow organic produce for people in rural areas of Thailand and what implications does it have on their livelihoods?

The aim of this paper is to evaluate the socio-economic and environmental effects of organic farming practices. The research will be conducted in Ban Suk Somboon, a village situated in Wang Nam Khiao District in Nakhon Ratchasima province of Thailand.

Our research question will be:

Can organic farming be considered to have a social, environmental and economic effect in and around Ban Suk Somboon, Thailand?

To explore this question, our sub-questions will be:

1. Who are the organic farmers in Ban Suk Somboon, and how do they understand and practice organic farming?
2. How can organic farming be considered to have a social effect on a household level?
3. How is the farmer economic situation related to organic farming?
4. Are there water and soil quality differences between organic and conventional farming?

2. STATEMENT OF PURPOSE

Organic farming has a significant influence on not only economic and environmental aspects, but also on social conditions. Eisses & Chaikam (2002) show that organic farming may help to balance gender roles, increasing the men's role in helping with household activities. Therefore, we seek to find out if farmers and their household feel social improvements on subjects such as improved livelihood, gender equality, labour rights etc. Also we seek to find out if health has been an incentive for the organic farmers in their decision to convert. To research this further, we consider asking conventional farmers who have chosen not to partake in organic farming the reasons for this. However, because we do not yet know the scale of Organic Farming in the village, we do not know to what degree they will be relevant to research further.

We would like to find out whether the organic farmers incentives for converting were or are fully or partly financially driven. If that is the case, we would also like to hear if they have gained the expected profit. We want this data to try and determine the incentives and whether they have shown to be realistic. Finally, we want to know if there are any barriers for the farmers to convert to organic farming. Therefore, it might be interesting to look whether this is related to the risks or the investments caused by the conversion to organic farming.

Organic farming appears to have positive effect on the environment (Timpraser, 2014). Organic farmers who have the national certification are supposed to have a soil free from chemicals. In order to see if the restrictions are fulfilled and that farmers fully follow the rules, we would like to take the soil samples from the farms. There might be some differences between the types of organic agriculture in the village. It would be useful to try to differentiate the types of organic farming (uncertified) by looking at the quality of the soil. The parameters of the soil might indicate how environmental-friendly the organic farmers are and how reliable the certifications are.

In reality all the concepts are most often intertwined and muddled. We are aware that researching them so clearly divided as we have described it above will not be possible.

3. METHODOLOGY

Our aim is to form an overview of the organic farmers in an empirical sense. We wish to get data on who is practicing organic farming, why they chose to convert from conventional farming into organic farming (so forth that is the case), how many years they have been farming organic, their level of education/experience, what their incentive is/was (moralist, idealist etc.) and so forth. Once this is established we will select whom (or which farms) we want to go for e.g. the more experienced, the ones assessed to have a bigger economic potential etc. We will of course make sure to argue why select the ones we do, since this will have a profound significance for the later analysis. We are planning to collect this data using semi-structured interviews and questionnaires.

A range of different natural and social science techniques will be used to get both qualitative and quantitative data, as this will provide the data necessary to answer the research sub-questions.

In order to have a large amount of sources, we will try to vary the different methods. The sustainable livelihood framework will be used to investigate livelihoods within the context of mediating organisations, institutions and the social, economic and political situation. Initially we want to understand the current situation of organic farming in the village, including who is practicing organic farming, the scale and social networks of organic farming in the village and what they get out of organic farming. We also want to get a more in-depth understanding to the determine the social, economic and environmental effects of Organic Farming. Therefore, the following methods were deemed the most appropriate to obtain the relevant information.

4. METHODS

Questionnaires

Questionnaires are a useful method to gain a basic background of the local area and farming practices, and are used in many livelihood studies (Nepal & Spiteri, 2011; Dovie et al., 2006). A focused uniform questionnaire will be given to a number[2] of the local population to gain general information about their livelihoods, and also to gather information on whether they purchase or are interested in organic produce. A focused questionnaire will also be given to farmers to gain general information and to get a basic understanding of how many and which crops are grown and whether they farm organically. Thai interpreters will be used to translate the questionnaires to the farmers, and will act as a social filter. We will try to identify the

[2] The number of people will be determined according to the entire population of the village

situation of organic farming in the village, which will enable us to select a number of organic farmers to conduct a more in-depth analysis, such as through conducting semi-structured interviews, focus groups and using Participatory Rural Appraisal (PRA) methods.

Semi-structured interviews

Building on the data received from the questionnaire, a more in-depth semi-structured interview will be conducted on selected locals and selected farmers to get further qualitative data on farmers viewpoints. An advantage of semi-structured interviews is that this method allows questions to be formulated beforehand, allowing the interviewer to be prepared for the interview (Cohen & Crabtree, 2006). Conducting Semi-structured interviews to villagers will help us to determine what "organic" farming means to them, to differentiate this from the Western perspective, and to determine the interest in organic farming. Thai interpreters will be used to translate the questionnaires to the farmers, and will act as a social filter. The location of the interview will be important, and we hope to have an informal interview. For example, if they are a farmer, the interview may include a tour of the farm so they can talk us through which crops they are growing. A challenge of semi-structured interviews is that respondents may have conflicting claims, or that respondents may say things that they want you to hear that may not necessarily be true. Therefore, consideration of the credibility of interviews is important.

Daily Activity Agenda

This will determine what farmers and household members do on an individual basis to give an overview of their daily activities. This method will involve spending a period of time helping the individual with their daily tasks to get practical experience. This method will be conducted alongside transect walks.

Seasonal Calendar

Seasonal calendars will determine the growing seasons of particular crops, potential seasonal difficulties and environmental effects which may influence crop yields.

Transect walks

Transect walks will be conducted to observe different resource and land uses. This will include drawing the layout of the farm, which crops are grown and will involve interactions with farmers to understand about how the farm operates. This will also give us information on the farmers daily activities.

Focus group interviews

Two focus group interviews will be carried out, one with farmers (note: this will include female farmers) and one with women only. This will give us information on farming practices and on women's roles, respectively. One member of our group will facilitate and guide the discussion so that all topics are addressed and ensure that all participants contribute.

> *Farmers*: We hope that there may be an opportunity to bring a group of organic farmers together and convene a discussion based on why they transitioned to organic farming, whether there were any national incentives and the main benefits of organic farmers. We also hope to discuss the relative challenges of organic farming and how these challenges have been overcome.
>
> *Women*: We hope to make a focus group interview with a female group of the population and get views on whether organic farming has enabled them to be more involved in

farming activities and enabled gender roles to become more balanced. This is dependent on how long organic farming has been going on.

GPS and mapping

GPS will be used for several activities; to map the locations of organic farms, locations of where the semi-structured interviews are conducted and locations of soil and water samples. Areas of farms will be also calculated with a GPS to determine the scale of farms. GPS coordinates will be transferred to Google Earth for further analysis.

Participatory observation

To see what farmers are growing in their farms, the participatory observation method will be carried out. Working with the farmers, we hope to closely examine their agricultural fields and understand their activities in detail. GPS will be used to map the fields.

Soil analysis

We will conduct soil analysis on a number of organic farms and conventional farms to find out soil parameters (pH, organic matter, C/N ratio) and nutrients and to find out whether there is a significant difference in quality. A study by Marcinelli et al. (2006) compared the soil quality of organic farms and conventional farms and showed that the organic soil produced more biomass, contained more nutrients, and had increased nitrogen levels and held more phosphorus and nitrates. Therefore, it would be useful to see whether the soils from the different farms within and around Ban Suk Somboon reflect the same pattern. Before we take soil samples we will talk with the farmers because they know their own land and may help us understand where the best place to take soil samples from. However, we should take into consideration that the sites recommend by the farmers may not necessarily be the best sites to sample. We will determine the number of farms and holes needed to sample and the horizon depth of our samples. GPS will be used to map the locations of soil samples. However, a limitation of soil analysis is the length of time that organic farming has been occurring, because if farms have only started transitioning to organic practices, the soil analysis may not reflect these changes.

Water analysis

We will determine the presence of pollution in water. For example, if there is an organic farm in close proximity to a conventional farm, is there pollution originating from the conventional farm, or vice versa. If there is pollution close to the organic farm, how can they be sure that they are farming organically? Before we take water samples we will talk with the farmers because they know their own land and may help us understand where pollution may be occurring and the best places to take water samples from. GPS will be used to map the locations of water samples.

Triangulation

To avoid as much as we can bias of all kind, we plan to triangulate our collected data by the use different methods mentioned before. Information gathered from one specific method will act as a contributing tool for other data, so that comparisons can be made between the data.

5. CONSTRAINTS

We realize that we have made an ambitious program but have decided that it is better to scale down once we are there and can assess what is relevant. Therefore, we have prioritized our

tasks in the calendar into three categories; 1. important, 2. important if relevant and 3. not critical.

In general, we are aware that all the informations are subject to biases and people's perceptions. We tried to summarize the limitations in our matrix data (see appendix n°XX).

Also, we do however realize that economic effects can be difficult to determine, since we would have to find data on e.g. costs of production, the amount of time the farmer have been farming organically and so forth. Unfortunately, time restrictions do not allow us to fully research the economic advantages. Therefore, we will not be able to make a clear conclusion, but hopefully we will be able to draw an assumption that will add to the full picture of the effects of organic farming.

The use of interpreters is beneficial for us, as they will be able to know customs and the best means to obtain information. However, the limitation of interpreters as a social filter is that there may be information that is lost in translation or we may not receive all that is being conversed.

6. FIELDWORK CALENDAR

Prioritization of assignments (under 'To do'): (1) **important**, (2) important if relevant and (3) *not critical*.

Week 9				
Date	**Appointments**	**To do**	**Notes**	**Thai-Students**
Wed. Mar. 1.	*9.00-12.00*	Introduction Day at Kasetsart University in Bangkok: - Danish students arrive at KU-SLUSE - Welcome by KU-SLUSE Chairman - Ice-breaking	Wear nice clothing :-)	Present
	Midday			
	Evening			
Thur. Mar. 2.	*9.00 - 12.00*	Visit to the selected study location		
	13.00 - 16.00	Group work: Finalize research proposal		
	20.00 - 22.00	- Presentation of research proposal - Hand in of research proposal (English)		
Fri. Mar. 3.	*Morning*	OBS: Make appointments with farmers, teachers, head of village, participant observation, etc. **Transect walk** **Observation**	Wear proper shoes. Bring notebooks and pens.	
	Midday	**Daily Life Agenda** Mapping of farms (farmers) **Observation**	Bring notebooks (or a good piece of paper for the farmer to draw and write on) and pens.	
	Evening	Transect walk *Mapping of farms (us)*	Wear proper shoes. BRING GPS! - and camera.	
Sat. Mar. 4.	*Morning*	Participant observation.		Present in the field
	Midday			
	Evening			
Sun. Mar. 5.	*9.00 - 12.00*	Presentation of the progression of field work (what has been done, what will be done, limitation for field work, and what supervision be required)		
	Rest of the day...	Discuss and **process the data**, we've collected so far. →	→ Try to do so within the Sustainable Livelihood Framework - what info or further data could we use/do we need?	Present in the field

Week 10				
Date	**Appointments**	**To do**	**Notes**	**Thai-Students**
Mon. Mar. 6.	*Morning* *Midday*	Soil samples *Water samples* Questionnaire: **- Farmers** *- Locals*	Bring: rings, plastic bags, pens, shovel, GPS(!) Bring questionnaires.	
	Evening			
Tues. Mar. 7.	*Morning*	Semi-structured interview: - Head of village	Bring interview guide and dictaphone.	
	Midday *Evening*	Semi-structured interview: *- Teachers?*	Bring interview guide and dictaphone.	
Wed. Mar. 8.	*Morning* *Midday* *Evening*	Focus group interview: **- Conventional farmers** **- Organic farmers**	Bring interview guide and dictaphone.	
Thur. Mar. 9.	*Morning* *Midday*	Discuss and **process the data**, we've collected so far.	→ Try to do so within the Sustainable Livelihood Framework - what info or further data could we use/do we need?	
	Evening			
Fri. Mar. 10.	*Morning*	Semi-structured interview: **- Farmers** *- People from the institutions* OR *- Other household members*	Bring interview guide and dictaphone.	
	Midday *Evening*			
Sat. Mar. 11.	*Morning*	Focus group interview: **- Women**	Bring interview guide and dictaphone.	Present in the field
	Midday *Evening*			

Sun. Mar. 12.	*9.00 - 18.00*	Community Meeting		Present in the field
	19.00 and the rest of the evening...	- Closing ceremony - Farewell party		

Week 11				
Date	**Appointments**	**To do**	**Notes**	**Thai-Students**
Mon. Mar. 13.		**LEAVING FIELD FOR BANGKOK**		

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8. APPENDICES

a) Data matrix

Sub-question (1) : Who are the organic farmers in Ban Suk Somboon, and how do they understand and practice organic farming?

Concept : Organic farmers

Objective	**Questions**	**Methods proposed**	**Data wanted**	**Limitations**	**Material**
To distinguish the different types of farm amongst the organic farms	Several questions about the village and the farms (see the questionnaire in the appendix).	Questionnaires with the farmers; Transect walks; Interview with the head of the village; GPS	Size of the farm; What crop is growing; How many different crops; Family size, age; Location of the farm; Location of the field(s); Presence of livestock; Type of housing; Farmer's level of education; How many people are working in the farm; Collecting seeds or buying them?;	Will be based on (farmers and head of the village) estimations and perceptions. Sample might be too small. The questionnaires are going to be translated. Needs to be pilot tested.	Questionnaires papers, pens, dictaphone
To evaluate the incentives to	What is organic farming? Are there certificates? Are there alternatives?	SSI Focus group	The farmer's conception of organic farming; The different "ways" to be organic	Farmers perceptions Might be answered knowing they are talking to western	SSI guides Paper and pen, dictaphone.

become an organic farmer				people, having another vision of organic Focus group : bringing all the people together	
	Why do they become organic?	SSI Focus group	The reasons of becoming organic	Idem as previous. Might be organic for some years,	SSI guides Paper and pen, dictaphone.
	Can any farmer become organic? Is there a selection?	SSI Focus group	Selection according to some criterias; The obstacles to become organic	Idem as previous; might not remember selection	SSI guides Paper and pen, dictaphone.
To know the different practices of organic farming	Are there any organic farmer association?	SSI Focus group	The way farmers work together or not	Farmer association definition	SSI guides Paper and pen, dictaphone.
	What is a normal day at the farm?	SSI Daily activity agenda Farm mapping	The agricultural practices of organic farmers	Variations with season, missing clarity	SSI guides Paper and pen, dictaphone.
	Are there any financial assistance or knowledge support?	SSI Focus group	The help received by the farmers; The origin of their organic knowledge	Farmer's willingness to give those informations	SSI guides Paper and pen, dictaphone.
	Are there any controls/regulatory systems?	SSI Focus group	The guarantees of organic farming; The certification reliability	Idem as previous.	SSI guides Paper and pen, dictaphone.
To know the locals awareness about organic farming	Do locals know about organic farming? Where do they buy their food? What kind of food do they buy?	Questionnaire	Opinion about organic farming; Origin of the popularity of organic farming	Definition of organic farming Size of the non-farming population	Questionnaires papers, pens, dictaphone

Sub-question (2): How can organic farming be considered to have a social effect on a household level?

Concept : Social

Objective	**Question**	**Methods proposed**	**Data wanted**	**Limitations**	**Material**
To have an overview of the farmer relations with their neighbours	What is the farmers' relation with their neighbours	SSI Farm mapping	Possible relationship related to the organic farm	Making difference between relations due to farming and other relations	SSI guides, papers, pens, Dictaphone
	Do the farmers have other occupations/leisure?	SSI Interview of the head of the village	Village life; Social web of the village including the farmers	Willingness of the farmer to give those informations	SSI guides, papers, pens, dictaphone
To evaluate the role and the impact of other activities on organic farms	Are farmers involved in the decisions in the village?	SSI Interview of the head of the village	Farmers political role; Way of taking the local decision	Institutions and governance in the village: we don't know how it basically works	SSI guides, papers, pens, dictaphone
	Is the farms affected by (eco)tourism?	Questionnaires SSI Interview of the head of the village	The way the village deals with farming and tourism; The inclusion of organic farming with (eco)tourism; The eventual benefits of (eco)tourism on organic farms	We can be seen as tourists	Questionnaires papers, pens, dictaphone
To see other opportunities in the family in the farm	What is the role of the women in the farm? How is their workload? How many farms are lead by women? Are there certain tasks divided between men and women?	Focus group with women	Women empowerment; How is the workload divided between gender; Gender differences	Women willingness to answer	papers, pens, dictaphone
	Is the whole family working in the field? What are the children doing? Do the	SSI with farmers	Education opportunities for the children	Farmers and family willingness to give those informations	SSI guides, papers, pens, dictaphone

	children want to be farmers? Would you want your children to become farmers?				

Sub-question (3) : How is the farmers economic situation related to organic farming?

Concept : Economics

Objective	**Questions**	**Methods proposed**	**Data wanted**	**Limitations**	**Material**
To evaluate the investments required by organic farming	What are the farms main expenses? What are the costs/investments related to the conversion to organic farming?	SSI with farmers	Approx. amount of money needed to start organic farming; Overview of the farms main expenses	Farmers willingness to give this information	SSI guides, papers, pens, dictaphone
To determine the different risks related to organic farming		SSI with farmers	Low yield risk; Solution to face bad season	Farmers perceptions Might be organic for a too short time	SSI guides, papers, pens, dictaphone
	How sensitive are the crops to unusual climate event (drought, heavy rain,...)? Did the farm experiment issues due to crop sensitivity?				
To have an overview of the farmer's access to the market	Who is the farmer selling the products to?	Questionnaires SSI	Fate of the production (export, local market etc.)	Complexity of production chain could make this data hard to use	Questionnaires, SSI guides, papers, pens, dictaphone

To evaluate the source of income of the farms	Do the farmers sell all of the production, or do they keep a part for domestic use?	SSI with farmers	Domestic food provenance; Amount of production that is actually sold.	Farmer perception and honesty Willingness to give this information	SSI guides, papers, pens, dictaphone
	Are there other sources of income in the family? How important are they for household income in comparison to farming?	SSI with farmers	Resilience of the farm; Variety of activity in the family; Time required by the farming activity	Idem. Forbidden/Illegal activities	SSI guides, papers, pens, dictaphone
	Do the farm process some of the products?	SSI with farmers	Variety of activity in the farm		SSI guides, papers, pens, dictaphone
	Are the postharvest losses important? What are the main losses from the seeds to the crops?	SSI	Opportunity gains Crop production issues	Might not be measured	SSI guides, papers, pens, dictaphone

Sub-question (4) : Are there water and soil quality differences between organic and conventional farming?

Concept : Environment

Objective	**Question**	**Methods proposed**	**Data wanted**	**Limitations**	**Material**
To assess the environmental effect of organic farming compared to conventional farming	Does organic farming improve the soil field and local water quality?	Soil sampling and water sampling	Soil : pH, OM, exchangeable cations, C/N ratio Water : Nitrate, Phosphorus, cations, heavy metals, pesticides remains	The farms could be organic for a too short period to make any conclusion. Farmers may only allow us to dig on best part of the soil.	Shovel, sampling bags, sampling rings, pens, paper, hiking shoes

b) Sampling strategies

- Sampling for questionnaires

It is possible that the number of organic farms in Moo 2 is low. Consequently, we won't have to make a sample since it will be possible to give the questionnaire to all of them. If it is not the case, we will choose to make a stratified sampling (Bernard 2011:117). After a transect walks and a GPS mapping of the village, we will be able to select farmers from different location in the village. Stratified sampling according to the location is chosen here because it is the only informations we can easily have about the farms without meeting them before.

If the fields of one farm are spread in and around the village, we will take it into account, considering the location of the household and of each field as different factors.

- Sampling for semi structured interviews

According to the results from the questionnaires, we will try to make interview with as many various type of organic farmers as possible. Once again, a stratified sampling will then be applied.

- Sampling for soil

It is likely that each field soil is homogenous, since it has been treated similarly within the disturbance type. Therefore, random sampling can give us an approximation of the soils average characteristics (Carter, 1993).

According to Carter (1993), 5 samples for a small field (0,5 ha) is a minimum. We plan to dig three holes of around 50 cm/ fields and take two samples in each (horizon A and horizon B).. Also, we will try to compare three organic fields and three conventional fields, giving a total amount of 36 soil samples.

c) Questionnaire for farmers

We are four Masters students from the University of Copenhagen, looking into the social, economic and environmental effects of Organic farming. Participants will remain anonymous. We thank you very much for your time and help with this study.

Address / household:	GPS:

Personal details of respondent

1. Gender:
   - Female ☐
   - Male ☐
   - Other ☐

2. Age:
   - < 20 ☐
   - 20-29 ☐
   - 30-39 ☐
   - 40-49 ☐
   - 50-60 ☐
   - +60 ☐

3. Level of education:
   - Primary school ☐
   - Secondary school ☐
   - University ☐

4. How long have you been living in the village?
   - < 5 years ☐
   - 6-10 years ☐
   - 11-20 years ☐
   - +20 ☐

Questions	**Male**	**Female**
5. How many people are there living in your household?		
6. How many people are contributing to your household income?		
7. No. of children (<18) / elders (+55)	*Children (<18)*	*Elders (+55)*
8. No. of members with education: P, S, U (e.g. 2S)		

9. No. of family members involved in farm work		

Farming

10. Apart from family members, do you have other employees working on the farm?

- Yes ☐
- No ☐

11. If yes to the previous question, how many?

No.

12. What is their yearly workload?

- Seasonal ☐
- Yearly ☐

13. How long have you been a farmer?

- < 5 years ☐
- 6-10 years ☐
- 11-20 years ☐
- + 20 years ☐

14. What type of farming do you do?

- Subsistence ☐
- Cash crops ☐
- Both ☐
- Other ☐

15. What is your main crops?

(If more, the main three types)

1. _____
2. _____

3. _____

16. Do you have livestock?

- Yes ☐
- No ☐

17. If yes to the previous question;

- What kind: _____

- And approximately how many? | No. |

18. What is the approximate size of your farm? _____

19. Are your fields adjacent or spread wider apart?

- Adjacent ☐
- Spread wider apart ☐

20. If spread wider apart; how far away is the field furthest away? _____

21. Is farming your only source of income?

- Yes ☐
- No ☐

22. If no, what other income sources do you have? _____

23. Is your farm organic?

- Yes ☐
- No ☐
- Partially ☐

*** If no, end of Questionnaire ***

24. If yes, how long have you been an organic farmer?

- < 1 years ☐
- 1-2 years ☐
- 2-5 years ☐
- +5 years ☐

25. Did any of the the following statements influence your decision to change into or begin with organic farming? (Note to group: needs to be altered – perhaps in a scale)

- Hoping for a larger economic yield ☐
- Health-issues ☐
- Environmental reasons ☐
- Opportunity for getting financial help from organisations/state ☐
- An opportunity for investment ☐

26. Did you have other reasons or motivations for changing than the ones stated above?

- Yes ☐
- No ☐
- If yes, please specify what: _____

27. Do you have Organic Agriculture Certification?

- Yes ☐
- No ☐
- Don't know ☐

28. Which certification body issued your certification: _____

29. If you have previously farmed conventionally, do you find organic farming to be more expensive to produce?

- Yes ☐
- No ☐
- Don't know ☐

30. Do you consider organic farming to have a higher crop yield?

- Yes ☐
- No ☐
- Don't know ☐

Market

31. Where/to whom do you sell your products?

- Locally; e.g. in the village or neighbouring villages ☐
- Through government agencies ☐
- To private companies (contract farmer) ☐
    - Which: _____

- Others ☐
    - Please specify: _____

*** End of Questionnaire ***

d) Questionnaire for locals

We are four Masters students from the University of Copenhagen, looking into the social, economic and environmental effects of Organic farming. Participants will remain anonymous. We thank you very much for your time and help with this study.

Address / household:	GPS:

Personal details of respondent

1. Gender:
   - Female ☐
   - Male ☐
   - Other ☐

2. Age:
   - < 20 ☐
   - 20-29 ☐
   - 30-39 ☐
   - 40-49 ☐
   - 50-60 ☐
   - +60 ☐

3. Level of education:
   - Primary school ☐
   - Secondary school ☐
   - University ☐

4. How long have you been living in Ban Suk Somboon?
   - < 5 years ☐
   - 6-10 years ☐
   - 11-20 years ☐
   - +20 ☐

Questions	**Male**	**Female**
5. How many people are there living in your household?		
6. How many people are contributing to your household income?		
7. No. of children (<18) / elders (+55)	*Children (<18)*	*Elders (+55)*
8. No. of members with education: P, S, U (e.g. 2S)		

9. Are you involved in agricultural practices, or have you previously been involved in agricultural practices?

- Yes, I am currently involved in agricultural practices ☐
- Yes, I have previously been involved in agricultural practices ☐
- No, I am not, and have never been involved in agricultural practices ☐

10. Have you ever purchased Organic produce?

- Yes ☐
- No ☐
- Don't know ☐

11. If yes, what were your reasons for purchasing organic produce?

- Health concerns ☐
- Environmental concerns ☐
- Other (Please specify):

  _____

12. How do you agree with the following statements;

a. Organic produce is better for your health than conventional produce:

Strongly disagree ☐	Disagree ☐	No opinion ☐	Agree ☐	Strongly agree ☐

b. Organic produce taste better than conventional produce:

Strongly disagree ☐	Disagree ☐	No opinion ☐	Agree ☐	Strongly agree ☐

c. I think organic products are too expensive:

Strongly disagree ☐	Disagree ☐	No opinion ☐	Agree ☐	Strongly agree ☐

d. I think organic farming is better for the environment than conventional produce:

Strongly disagree ☐	Disagree ☐	No opinion ☐	Agree ☐	Strongly agree ☐

13. In your opinion, do you think the demand for organic produce has increased recently? (On a local/national scale)

- Yes locally, but not nationally ☐
- Yes nationally, but not locally ☐
- No, on neither level ☐
- Yes, on both levels ☐

14. How often do you purchase organic produce?

- Less than once a month ☐
- Approx. once a month ☐
- Approx. once a week ☐
- Several times a week ☐
- Always ☐
- Don't know ☐

*** End of Questionnaire ***

e) Head of the village interview guide

Will be conducted during the transect walk around the village

Introduction

Basic question

1. How long have you been head of the village?
2. How long have you been living here?
3. Do you know approximately how many people are living in Ban Suk Somboon?

Village question

1. Do you have a lot of tourists? - All year or seasonal?
2. If yes, why do people come here?
3. How does the decisions-process work?
4. Do you have any relation/collaborations with neighbouring villages (economic, social events,...)

Organic farming

1. Do you know how many organic farms there is in the village?
2. Do you know when organic farming first started here?
3. Do you know what the incentives were for farmers to convert from conventional to organic? (national incentives?)
4. Are there organisations involved in promoting/helping organic farming?
5. Do you know of any certification-controls or regulations?

f) Farmers interview guide

During the semi-structured interview, we will ask the farms to draw a map of their exploitation.

Introduction

Basic information

1. Personal basic information (age, time of stay in the village)
2. Family information (size, ages)
3. Household information (how many people in the household, are those people from the family, what are the children doing? Do they want to be farmers?)

Organic farming

1. Are you an organic farmer? Do you have any certifications?
2. How long have you been organic? Did you convert from conventional farming?
3. What does organic farming mean to you?
4. Why did you become organic? What were your motivations? Did you receive any help?
5. Has it been necessary to adapt or change anything regarding crops, size, finance or other?
6. What do you consider being the main benefits of organic farming?
7. What limitations/ barriers do you see in being an organic farmer?
8. Are you working in association with other farmers?
9. Are there task especially done by men or women?

Social life

1. Do you know your neighbours? Do you have any closer relations with them?
2. Do you have any leisure? Hobbies?
3. Are you involved in the decision making of the village?
4. Are you part of any specific group/institution that encourages organic farming? (name of group?)
5. Do you know how many organic farms there is in Ban Suk Somboon?
6. Do you feel an effect from (eco)tourism? Is it an opportunity for you?
7. What are your children doing? Do they want to be farmer?

Economic aspects

1. Are there any investments related to organic farming? (equipment etc.)
2. What are the main expenses related to the farming activity? (seeds, fuel etc.)
3. Do you have other sources of income?
4. Do you sell your entire production or do you keep a part of it?
5. Do you process any of your products? Why?
6. Do you have any postharvest losses?

Appendix f. Farmers SSI Guide: Version 2

Research Question

1. Perceptions

How do you consider organic farming to be different from non-chemical?

Is there a difference? Is one better than the other?

How do you consider non-chemical farming to be different from traditional farming?

Is there a difference? What is good about traditional farming? What is good about non-chemical farming?

2. [Organic] Do they really NOT use chemicals?

Is there any crop that you need to provide chemicals/pesticides? Do you find that you need to use chemicals/pesticides in different seasons (e.g. in dry or rainy season)? What do you use for farming – e.g. organic fertilizer, manure, effective microorganism or other? What are the limitations/barriers of doing organic farming?

How do other people/farmers perceive you? Do they agree with non-chemical farming being a good idea? Do they support you? Have they always perceived you like *this(?)*?

Are you certified? Would you like to be certified? What would it require to become certified? Would it mean that you could sell your products at a higher price?

3. Motivations: What have been the main motivations for them to practice non-chemical farming?

Health

Do you have problems with coughing? Do you have allergies? Have you or anyone in your family experienced any health issues that you believe to be related to chemical farming? Do you know of anyone (in or outside the family) who has experienced any health issues that you believe to be related to chemical farming? What kind of problems? Have you experienced any health issues related to non-chemical farming?

If you had the opportunity to farm with chemicals <u>safely</u>, with the right equipment, would you do so? And why (not)?

[What are they using? How do they use it?]

Soil

Have soil quality been an issue for you? Have it influenced your decision to change? What do you consider being good soil? What impact does good/bad soil have?

Have you seen any change (improvements/lack of improvements) in your soil? How do you measure / assess your soil quality?

Economic opportunity

How do you market your products if you are not certified? Do you sell your products for a higher price than the "chemical"/traditional products? Do you know if your products are sold to a higher price in the supermarket? How do you manage to make the non-chemical products more valuable? Do you have a higher yield?

4. Which factors are prerequisite when intending to change into non-chemical farming?

Knowledge? From where do get it?

Economic background/current situation

How was your financial situation before changing? Did you struggle? Where you well off? Where did you get your money? Did you need money to make this change? Do you consider yourself poor, well-off or rich?

What do you need to have? What resources? Land? Money? Seeds? Knowledge?

What would you recommend a farmer that have decided to convert or venture into non-chemical farming?

How was it to convert? Was it easy or hard?

Appendix g. Questionnaire for farmers

We are four Masters students from the University of Copenhagen, looking into the social, economic and environmental effects of Organic farming. Participants will remain anonymous. We thank you very much for your time and help with this study.

Address / household:	GPS:

Personal details of respondent

1. Gender:
   - Female ☐
   - Male ☐
   - Other ☐

2. Age:
   - < 20 ☐
   - 20-29 ☐
   - 30-39 ☐
   - 40-49 ☐
   - 50-60 ☐
   - +60 ☐

3. Level of education:
   - Primary school ☐
   - Secondary school ☐
   - University ☐
   - Other;

     _____

4. How long have you been living in the village?
   - < 5 years ☐
   - 6-10 years ☐
   - 11-20 years ☐
   - +20 ☐

Questions	**Male**	**Female**
5. How many people are there living in your household?		
6. How many people are contributing to your household income?		
7. No. of children (<18) / elders (+55)	*Children (<18)*	*Elders (+55)*
8. No. of members with education: P, S, U (e.g. 2S)		
9. No. of family members involved in farm work		

Farming

10. Apart from family members, do you have other employees working on the farm?
    - Yes ☐
    - No ☐

11. If yes to the previous question, how many?

No.

12. How long have you been a farmer?

- < 5 years ☐
- 6-10 years ☐
- 11-20 years ☐
- + 20 years ☐

13. What type of farming do you do?

- Subsistence ☐
- Cash crops ☐
- Both ☐
- Other ☐

14. Do you have livestock?

- Yes ☐
- No ☐

15. If yes to the previous question;

- What kind: _____

- And approximately how many?

No.

16. Land use

Plot	**Area**	**Slope (code A)**	**Location**		**Land use (code B)**	**Ownership (code C)**	**Holding type (code D)**	**Rent (baht)**
			In the village	Outside the village				
1.								
2.								
3.								
4.								

Code A	Code B	Code C	Code D
0 = flat 1 = slope 2 = both	0 = abandoned 1 = housing 2 = vegetables 4 = maize 5 = cucumber 6 = cassava 7 = fruit 8 = Rubber tree 9 = Others : specify	0 = got for free 1 = Rent from others 2 = lent 3 = Owner 4 = Others : specify	0 = No Sor 3 1 = Por Bor Tor 5 2 = others : specify

17. What is your main occupation? Mention the 2 most important
- … Farming
- … Hired Worker
- … Selling
- … Others. Specify :

18. What kind of farming do you do? *(Several answers are possible)*
- Traditional ☐
- Conventional farming ☐
- Organic (certified) farming ☐
- Organic (non-certified) farming ☐
- Pesticide-free farming ☐
- Integrated farming ☐
- Conservation farming ☐
- Other, and if so what?

_____

19. Have you changed your practises from e.g. traditional farming into organic?
- Yes ☐
- No ☐
- Don't know ☐

20. If yes, how long have you farmed the way you are doing now?
- < 1 years ☐
- 1-2 years ☐
- 2-5 years ☐
- +5 years ☐

21. Did any of the following statements influence your decision to change into or begin with your current form of farming practices? *(Several answers are possible)*
- Hoping for a larger economic yield ☐
- Health-issues ☐
- Environmental reasons ☐
- Opportunity for getting financial help from organisations/state ☐
- An opportunity for investment ☐
- Other ☐ - And if so what?

  _____

22. Do you have Organic Agriculture Certification?
- Yes ☐
- No ☐
- Don't know ☐

23. Do you have any other form of certification?

- Yes ☐
- No ☐
- If yes, which:

_____

24. If you have previously farmed traditional/conventionally, do you find your current practices to be more expensive to produce?

- Yes, is more expensive ☐
- It's the same ☐
- No, it's cheaper ☐
- Don't know ☐

25. Do you use chemicals?

Yes ☐ No ☐

26. If yes, which amount?

Low ☐ Medium ☐ high ☐

27. Do you use effective microorganisms?

Yes ☐ No ☐

28. What level of fertilizer do you use?

☐ 1. Chemicals only
☐ 2. Chemicals > organic fertilizers
☐ 3. Chemicals = organic
☐ 4. Organic > Chemicals
☐ 5 organic only

29. If you answer 3 to 5, what are the main advantages? Ranking.

… Higher prices
… Health
… More productivity
… tourism
… others, please specify

30. Farm total income …….. baht

1. In farm income

Plot	Crop	Area (rai)	Seasonal production	Yearly production	Selling price	Income (baht)
1.						
2.						
3.						
4.						

2. Off-farm income

31. Farm total expenses …… baht

1. In farm expenses

Plot	Crop	Area	Soil preparation	Seeds	Insecticides	Chemical fertilizer	Organic fertilizer	Wages	Household wages	Total
1.										
2.										
3.										
4.										

2. Off farm expenses

32. Do you consider your current practices to have a higher crop yield?

- Yes ☐
- It's the same ☐
- No ☐
- Not comparable, since it's not the same types of crops ☐
- Don't know ☐

33. Do you consider your income to have increased since you have changed your agricultural practices?

- Yes, it has increased ☐
- It's the same ☐
- No, it has not increased ☐
- Don't know ☐

Market

31. Where/to whom do you sell your products?

- Locally; e.g. in the village or neighbouring villages ☐
- Through government agencies ☐
- To private companies (contract farmer) ☐
  - Which:

    _____

- Others ☐
  - Please specify:

    _____

*** End of Questionnaire ***

Appendix h. Thai questionnaire

เลขที่ ....

<u>แบบสอบถามเกษตรกร</u>

พวกเราทั้งสี่คนเป็นนักศึกษาปริญญาโทจาก มหาวิทยาลัยโคเปนเฮเกน และนักศึกษาจากโครงการ SLUSE โดยพวกเราจะหาข้อมูลเกี่ยวกับผลกระทบของการทำเกษตรอินทรีย์ทางด้านสังคม เศรษฐกิจ และสิ่งแวดล้อม ซึ่งยังไม่มีการระบุผู้เข้าร่วมทำแบบทดสอบ พวกเราขอขอบคุณทุกท่านเป็นอย่างสูงที่ได้สละเวลาและมีส่วนร่วมในการทำให้งานวิจัยชิ้นนี้ประสบความสำเร็จ

ที่อยู่/ครัวเรือน:	**ระบุตำแหน่งโดยการใช้จีพีเอส** (GPS):

ข้อมูลส่วนตัวของผู้ตอบแบบสอบถาม

1. เพศ:
   - หญิง ☐
   - ชาย ☐
   - อื่นๆ ☐

2. อายุ:
   - น้อยกว่า 20 ปี ☐
   - 20-29 ปี ☐
   - 30-39 ปี ☐
   - 40-49 ปี ☐
   - 50-60 ปี ☐
   - มากกว่า 60 ปี ☐

3. ระดับการศึกษา:
   - ประถมศึกษา ☐
   - มัธยมศึกษา ☐
   - มหาวิทยาลัย ☐
   - อื่นๆ: ______________________

4. ท่านอาศัยอยู่ที่หมู่บ้านนี้มานานเท่าไหร่
   - น้อยกว่า 5 ปี ☐
   - 6-10 ปี ☐
   - 11-20 ปี ☐
   - มากกว่า 20 ปี ☐

คำถาม	**เพศชาย**	**เพศหญิง**
5. จำนวนสมาชิกในครอบครัว		
6. จำนวนสมาชิกที่หารายได้ให้ครอบครัว		
7. จำนวนบุตร (ต่ำกว่า 18 ปี) / ผู้สูงอายุ (มากกว่า 55 ปี)	จำนวนบุตร *(ต่ำกว่า 18)*	จำนวนผู้สูงอายุ *(มากกว่า 55)*
8. จำนวนสมาชิกที่ได้รับการศึกษา: ประถม, มัธยม, มหาวิทยาลัย		
9. จำนวนสมาชิกที่มีส่วนร่วมในการทำเกษตรกรรม		

การทำเกษตรกรรม

10. นอกจากสมาชิกในครอบครัว ท่านมีลูกจ้างในการทำเกษตรกรรมหรือไม่
    - มี ☐
    - ไม่มี ☐
11. ถ้ามี ท่านมีกี่คน

จำนวน

12. ท่านเป็นเกษตรกรมานานเท่าไหร่
    - น้อยกว่า 5 ปี ☐
    - 6-10 ปี ☐
    - 11-20 ปี ☐
    - มากกว่า 20 ปี ☐
13. ท่านทำเกษตรกรรมประเภทไหน
    - หาเลี้ยงชีพ ☐
    - เพื่อการค้า ☐
    - ทั้งคู่ ☐
    - อื่นๆ ☐
14. ท่านทำฟาร์มปศุสัตว์หรือไม่
    - ใช่ ☐
    - ไม่ใช่ ☐
15. ถ้าใช่
    - ระบุ:_____
    - จำนวนโดยประมาณ

จำนวน

16. การใช้ที่ดิน

แปลงที่	พื้นที่ (ไร่)	ลักษณะพื้นที่ (รหัส ก)	ที่ตั้งของแปลง		ลักษณะการใช้ที่ดิน (รหัส ข)	ลักษณะความเป็นเจ้าของ (รหัส ค)	ประเภทการถือครอง (รหัส ง)	ค่าเช่า (บาท)
			อยู่ในหมู่บ้าน	อยู่นอกหมู่บ้าน				
1.								
2.								
3.								
4.								

รหัส ก	รหัส ข	รหัส ค	รหัส ง
0 = ที่ราบ 1 = ลาดชัน 2 = ทั้ง 2 ชนิด	0 = ทิ้งร้าง 1 = ที่พักอาศัย 2 = ผัก 3 = ข้าวโพด 4 = ข้าว 5 = ปลูกแตงกวา 6 = มันสำปะหลัง 7 = ไม้ผล 8 = ยางพารา 9 = อื่นๆ (ระบุ)	0 = ได้ทำฟรี 1 = เช่าจากผู้อื่น 2 = ให้ผู้อื่นเช่า 3 = ความเป็นเจ้าของ 4 = อื่นๆ (ระบุ)	0 = นส.3 1 = ภบท.5 2 = อื่นๆ (ระบุ)

17. การประกอบอาชีพหลักในปัจจุบัน (เลือกเพียง2อันดับแรก)

- ..... ทำนา
- ..... รับจ้าง/กรรมกร
- ..... ข้าราชการ
- ..... ธุรกิจส่วนตัว/ค้าขาย
- ..... อื่นๆ ระบุ.....

18. ท่านทำเกษตรกรรมประเภทใด (ตอบได้มากกว่า1ข้อ)

- เกษตรกรรมเชิงเดี่ยว ☐
- เกษตรกรรมเคมี ☐
- เกษตรอินทรีย์ (มีใบรับรอง) ☐
- เกษตรอินทรีย์ (ไม่มีใบรับรอง) ☐
- ปราศจากยาฆ่าแมลง ☐
- แบบผสมผสาน ☐
- เกษตรอนุรักษ์ ☐
- อื่นๆ (ระบุ) _____

19. ท่านได้เปลี่ยนรูปแบบการทำเกษตรกรรมของท่านหรือไม่ เช่น จากการทำเกษตรแบบดั้งเดิมมาเป็นการทำการเกษตรอินทรีย์

- ใช่ ☐
- ไม่ใช่ ☐
- ไม่ทราบ ☐

20. ถ้าใช่ ท่านเปลี่ยนรูปแบบการทำเกษตรกรรมของท่านมานานเท่าไหร่แล้ว

- น้อยกว่า 1 ปี ☐
- 1-2 ปี ☐
- 2-5 ปี ☐
- มากกว่า 5 ปี ☐

21. ปัจจัยใดบ้างดังต่อไปนี้ที่ส่งผลต่อการตัดสินใจของท่านในการเปลี่ยนหรือเริ่มทำเกษตรกรรมในรูปแบบปัจจุบัน (ตอบได้มากกว่า1ข้อ)

- คาดว่าจะได้ผลตอบแทนสูงขึ้น ☐
- ปัญหาสุขภาพ ☐
- เหตุผลด้านสิ่งแวดล้อม ☐
- โอกาสในการได้รับความช่วยเหลือด้านการเงินจากภาครัฐและองค์กร ☐
- โอกาสในการลงทุน ☐
- อื่นๆระบุ _____ ☐

22. ท่านมีใบรับรองมาตรฐานเกษตรอินทรีย์หรือไม่

- มี ☐
- ไม่มี ☐
- ไม่ทราบ ☐

23. ท่านมีใบรับรองอื่นๆหรือไม่

- มี ☐
- ไม่มี ☐
- ถ้ามี ระบุ _____

24. ถ้าท่านเคยทำเกษตรกรรมแบบเชิงเดี่ยวหรือแบบสารเคมีมาก่อน ท่านคิดว่าเกษตรกรรมในปัจจุบันของท่านมีค่าใช้จ่ายมากกว่าหรือไม่

- มากกว่า ☐
- เท่าเดิม ☐
- น้อยกว่า ☐
- ไม่ทราบ ☐

25. ในการทำการเกษตรของท่านมีการใช้สารเคมีในการกำจัดวัชพืชและฆ่าแมลงหรือไม่

☐ ใช้ ☐ ไม่ใช้

26. จากคำถามข้อ 25 ถ้าใช่มากน้อยระดับใด

☐ น้อย ☐ ปานกลาง ☐ มาก

27. ในการทำการเกษตรของท่านมีการทำน้ำหมักชีวภาพไว้ใช้เองหรือไม่

☐ มี ☐ ไม่มี

28. ในการทำการเกษตรของท่านมีการใช้ปุ๋ยในระดับใด

☐ 1. ปุ๋ยเคมีอย่างเดียว
☐ 2. ปุ๋ยเคมี > ปุ๋ยคอก
☐ 3. ปุ๋ยเคมี = ปุ๋ยคอก
☐ 4. ปุ๋ยเคมี < ปุ๋ยคอก
☐ 5. ปุ๋ยคอกอย่างเดียว

29. จากคำถามในข้อ 28 หากท่านเลือกตอบข้อ 3-5 ท่านคิดว่าส่งผลด้านอะไรมากที่สุด (เรียงลำดับจากมากไปน้อย)

..... ได้ราคาสูงขึ้น
..... สุขภาพของเกษตรกรดีขึ้น
..... สิ่งแวดล้อมดีขึ้น
..... คุณภาพดินดีขึ้น
..... ผลผลิตได้มากขึ้น
..... เป็นที่ต้องการของนักท่องเที่ยว
..... อื่นๆ (ระบุ).....

30. รายได้ทั้งหมดของครัวเรือนบาทต่อปี .....บาท

1. รายได้ภาคการเกษตรบาทต่อปี..... บาท

ลำดับ	ชนิดพืช	จำนวนพื้นที่ปลูก (ไร่)	ปริมาณผลผลผลิตต่อรอบ	ปริมาณผลผลิตต่อปี	ราคาขายต่อหน่วย	รายได้ (บาท)
1.						
2.						
3.						
4.						

2. รายได้นอกภาคการเกษตรบาทต่อปี..... บาท

31. รายจ่ายทั้งหมดของครัวเรือนบาทต่อปี.....บาท

1. รายจ่ายภาคการเกษตรบาทต่อปี..... บาท

ลำดับ	ชนิดพืช	จำนวนพื้นที่ปลูก	การเตรียมดิน	ท่อนพันธุ์/เมล็ดพันธุ์	สารกำจัดแมลง/สารกำจัดวัชพืช	ค่าปุ๋ยเคมี	ค่าปุ๋ยชีวภาพ	ค่าจ้างแรงงาน	แรงงานในครัวเรือน	รวม
1										
2										
3										
4										

2. รายจ่ายนอกภาคการเกษตรบาทต่อปี..... บาท

32. ท่านคิดว่าการทำเกษตรกรรมรูปแบบปัจจุบันของท่านได้ผลผลิตมากขึ้นหรือไม่

- มากขึ้น ☐
- เท่าเดิม ☐
- น้อยลง ☐
- ไม่สามารถเปรียบเทียบได้ เพราะประเภทของพืชไม่ใช่ประเภทเดียวกัน ☐
- ไม่ทราบ ☐

33.ท่านคิดว่ารายได้ของท่านเพิ่มขึ้นหรือไม่ หลังจากเปลี่ยนรูปแบบการทำเกษตรกรรม

- เพิ่มขึ้น ☐
- เท่าเดิม ☐
- ไม่เพิ่มขึ้น ☐
- ไม่ทราบ ☐

การตลาด

34. ท่านขายผลผลิตที่ใด/ให้ใคร

- ในท้องถิ่น เช่น ภายในหมู่บ้าน หรือหมู่บ้านข้างเคียง ☐
- ผ่านตัวแทนรัฐบาล ☐
- บริษัทเอกชน ☐
  - ระบุ: _____
- อื่นๆ ☐
  - ระบุ: _____

* จบคุณภาพ/ครับ *