

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATION

#### 5.1 Conclusions

The Thai Government's strategy has accelerated economic growth, but it did not take into consideration the longer negative impacts. A multitude of problems have emerged and dominate further development of the agricultural sector. These problems include the exploitation and degradation of natural resources, environmental degradation affecting the quality of life, deforestation, rural poverty, and social imbalances resulted from income disparity.

Having developed more recently an awareness of these negative impacts, the Ministry of Agriculture and Co-operatives has changed the direction of agricultural development by emphasizing sustainability and enhancing the development of the "fanner" and the agricultural sector, conservation and protection of "natural resources and the environment". The sustainable agricultural development strategy encompasses three key elements: i) restructuring agricultural production from conventional farming to "sustainable agricultural farming", ii) natural resource conservation and sustainable use of natural resources, and human resources and iii) development of agricultural institutions. This study investigated organic vegetable production in Chiang Mai, Thailand to help determine whether it is appropriate for adoption to transit into "sustainable agriculture".

The objectives of this study on the knowledge and adaptability concerning organic vegetable farming in Chiang Mai; were to explore farmers' practice and identify farmers' knowledge and adaptability regarding organic vegetable farming in Chiang Mai. The study was conducted in randomly selected farmers in Phrao, Mae-Taeng and Samoeng District who belonged to Chiang Mai Organic Agriculture Cooperative. The sample size for organic farmers of Chiang Mai Organic Agriculture Cooperative which included 2013 was memberships calculated based on Yamane's

formula and the data were collected mainly through questionnaire interviews in the target area (farmers, key informants). Multiple regression analysis depicted that a number of factors were influencing the adaptation into organic vegetable farming systems.

Based on the findings of this study, it can be concluded that the sampled farmers were mostly men, married and illiterate. Agriculture is the main occupation of the majority of farmers. Most sampled farmers in the three studied areas had 5-6 household members. Farm sizes were below 1-2 rai. Most farmers had off-farm income less than 10,000 baht. Farmers' farm income especially from organic vegetable farming and animal raising of all households under study was averagely 60,001-80,000 baht. Most farmers borrowed money from their cooperative, and they made loan repayment 200-500 baht per week depending on their income. In general, kinds of livestock that farmers are rearing in the studied area are pig, cow, chicken and buffalo. The majority of farmers had high perception and adaptation of organic vegetable farming and favorable perception towards organic farming in the studied area. The findings are in agreement with the findings by Kantharaj (1980) and Dube and Sawarkar (1992) who reported that the majority of farmers had medium level to high level of knowledge. The majority of respondents in the present study belonged to high to medium level of overall knowledge regarding organic farming practices. The farmers who had high and medium knowledge levels were familiar with the use of and advantages of compost, green manure and bio-extract, the advantages of intercropping with legumes, crop rotation and bio-compost and how to produce organic vegetable in the sustainable way.

Results of multiple regression analysis depicted that a number of factors were influencing the perception of organic vegetable farming systems. Among all independent variables, five independent variables included in the model are significantly affecting farmers' perception of organic vegetable production.

The perception of the farmers who responded in the survey on organic vegetable production concepts, their attitude towards an organic farming system is also mixed. Many of the farmers have good practices like soil management, using trap methods for controlling pests, sequential cropping etc. but in some important cases, farmers do not use good practice such as using biological insects for predation on

other insect pests, intercropping or mixed cropping, using irrigation systems, and applying rouging to obtain good yields. However, they did use more organic matter (for example, animal manure and plant manure) to fertilize their plants at least in the last 12 months. It is essential to make farmers aware of the benefits of organic vegetable production. Perception on organic vegetables especially at a high level is required to understand the systematic management of organic vegetables in these areas.

**Age of farmer** was negatively and significantly associated with farmers' perception of organic vegetable production meaning that the younger farmers can perceive organic vegetable production better than the older farmers. Therefore, the government agencies should promote younger farmers to practice more organic farming since the number of the younger farmers in presently significantly less than their older counterparts.

The coefficient of **education** was positive and significantly related to indicated farmers' perception about organic vegetable production thus indicating that the group of educated farmers can perceive organic vegetable production in advanced level. For this reasons, the government agencies should promote and support all group of farmers to gain more knowledge related to their fields of farming.

The coefficient of **labor** had positive sign and significant correlation with farmers' perception of organic vegetable production suggesting that labor availability takes an important part in organic vegetable production and influences farmers' perception.

The coefficient of **income** had positive sign and significant correlation with farmers' perception of organic vegetable production. This shows that farmers with high income can perceive organic vegetable production as favorable since they can spend more money on the early stage of organic farming development. The government agencies can also play an important role to help farmers by subsidizing.

**Extension visit** to organic farmers was negative and significantly affected farmers' perception about organic vegetable production. Specifically the extension workers' visits had no effect on organic vegetable production perception because the extension officers did not provide or support what farmers needed for organic farming.

According to organic vegetable farmers, they adapted their management practices following knowledge from training and learning from experiences such as weed management, pest management and nutrients and organic fertilization management. Results of multiple regression analysis depicted that a number of factors were influencing the adaptation into organic vegetable farming systems. Among all independent variables included in the model, four were significantly affecting farmers' adaptation toward organic vegetable production.

The positive and significant relationship between the **education level** of farmers and farmers' adaptation into organic vegetable farming made the education of the rural farmers particularly necessary. The improvement of the literacy skills of farmers will improve their knowledge level. Education raises the productivity of farmers, increases the profitability of production and soil conservation technologies.

The coefficient of **experience** had positive sign and significant correlation and it indicated that experience was associated with farm practices attended farmers had received more knowledge and opportunity to exchange the ideas among all farmers as well as successful farmers.

The negative and significant influence of **natural water** in level of farmers' adaptation into organic vegetable farming as demonstrated by the regression result meant that natural water does not have effect on farmers' adaptation toward organic vegetable farming. On the contrary irrigation and ground water have more effect on farmers' adaptation into organic vegetable farming.

The coefficient of **farmers' networks or membership** in organic vegetable production had positive sign and significant correlation with farming adaptation and it indicated the important role of farmers' network or membership in convincing and encouraging farmers' adaptation into organic vegetable farming.

Consequently, it was concluded that the organic vegetable farmers will be able to succeed and obtain reasonable profitability in organic vegetable farming by carrying out adaptation and organic management. Furthermore, training and information about organic farming, standard and technology are very important for farmers to change their practices to enhance knowledge on farming, technology, and production and market situations. Networking and organic farming model should be encouraged for the sharing to organic agriculture knowledge and the promotion of

network among different farmers groups, including government agencies and private sectors. The factor of land preparation was positive and significantly contributed to farmer's adaptation toward organic vegetable production.

The value of organic production differed among farmers having different historical times in initiating the practices to transform into organic way. It was found that farmers in organic agriculture for over 10 years had given significant consideration to organic products and sustainable production by using a combination of approaches, resolution of social, cultural and environmental, rather than economic factors. This is different from the group recently modified production for 1-2 years in which farmers have economic venture into organic farming. Price incentives as well as favorable marketing and distribution factors are the part that pushes farmers to grow organic products extensively today and the various purchase of those involve.

After reviewing previous researches and studies related to perception and adaptation of organic vegetable farmers to finally convert into and engage in a truly organic farming. Most empirical results can be summarized as follows:

1. Conventional farmers have poor information in many areas including managerial and technical practices, marketing and regulations. That is the big reason to convert to organic vegetable farming systems.
2. The institutions related to organic farming are very useful in providing information about organic farming. Organic farmers were the most useful information source for conventional farmers. Meetings, training, conferences, workshops about organic farming and organic farming associations are all important for farmers.
3. Lack of perception and skills needed to manage an organic farm is the most important reason for not using organic farming practices.

The farmers in this study reported implementing a range of sustainable agricultural practices that they perceived and adapted for organic vegetable farming such as organic soil enhancement methods, crop rotations, tillage, land preparation and water conservation strategies. Although it was reported that some strategies were implemented with constraint and risk reduction in mind, many of the farmers argued that the nature of their system provided long-term adaptation benefits for constraints vulnerability reduction. They implement many of these strategies primarily as long-

term sustainable practices that allow for adaptation to organic production and other fluctuations.

Some long-term sustainable practices also enable farmers to make short-term adaptations during time of problems. For example, crop rotations are a long-term strategy for building soil health requiring an investment in time toward developing markets or market contacts for a variety of crops, as well as time and money to acquire the necessary knowledge, equipment and experience to raise a variety of crops. These long-term strategies and investments allow producers to make short-term adaptations during practice such as planting more drought-resistant crops or varieties because equipment and agronomic knowledge are already in place. Farmers' adaptive capacity to constraint may be increased through education about using sustainable practices as a long-term adaptation and about how sustainable strategies might be used to maximize short-term flexibility during organic practices.

Based on perception and adaptation of organic vegetable farming found in the studied areas, it can be concluded that Phroa District is the plain area where farmers learned about organic management from NGO training and farmers' own experiences including soil preparation, pest management, weed management, harvesting and marketing. To address these barriers, farmers' adaptive capacity to organic production may be increased through research and policy initiatives to improve the economic feasibility of using organic adapted practices. Policy needs may include programs that provide financial incentives in the way of capital assistance for adaptation and farm program support for alternative crop and sustainable agriculture techniques. Further research assessing the effects of specific farm and policies on farmers' organic adaptive capacity is required.

In Mae Taeng District, the lack of capital and the need to maximize crop production and produce for existing markets can be large barriers that keep farmers from implementing more strategies to perceive and adapt toward organic vegetable production. Among other barriers, farm and disaster policies that implicitly encourage farmers not to plan ahead for constraints that financially penalize farmers for taking action to reduce impacts that decrease farmers' options during production and that lead to impaired soil health and less farm diversity which were also seen as barriers for reducing impacts.

In Samoeng District, farmers explained that he started increasing the diversity of his crops to fill in gap areas or to keep continuous work, as year round work was available for the people working on the farm. Another strategy that these farmers described is having a diversity of tasks that workers can do in a given day. On one organic strawberry farm, farmers will typically work on several different operations in a single day even though the farmer noted this makes supervision more complicated. Those are perception and adaptation in organic vegetable farming among farmers, enabling them to integrate organic farming in their livelihood strategy in a sustainable way.

Finally, in-depth interviews with organic farmers in the studied areas confirm that there are certainly exceptions to the patterns found in this short questionnaire. As well as social asset where farmers join together and receive the certificate standard for high market and group member in value added of vegetable production. Physical asset such as soil fertility and transportation needed to support livelihoods, such as affordable transport, secure shelter and buildings, adequate water supply and sanitation, clean, affordable energy and access to information. Its influence on the sustainability of a livelihood system is best fit for representation through the notion of opportunity costs or trade-offs as a poor infrastructure can preclude education, access to health services and income generation. Human asset characterizes the skills, knowledge, ability to labor and good health that together assist people to pursue different livelihood strategies and achieve their livelihood aims. Natural asset is the term used for the natural resource stocks from which resource flows and services (such as land, water, forests, air quality, erosion protection, biodiversity degree and rate of change, etc.) useful for livelihoods are derived. It is of special importance for those who derive all or part of their livelihoods from natural resource-based activities, as it is often the case for the poor farmers, but also in more general terms, since a good air and water quality is a basis for good health and other aspects of a livelihood. Financial asset indicates the financial resources that people use to achieve their livelihood objectives and it comprises the important availability of cash or equivalent, which enables farmer to adopt different livelihood strategies.

## 5.2 Recommendation

Local organization and Chiang Mai Organic Agriculture Cooperative should be organized to access various sources to gain knowledge and information from public and private sectors and to share knowledge by implementing joint activity program with extension officers. By entering as members of Chiang Mai Organic Agriculture Cooperative, farmers can gain information and knowledge from farmer to farmer knowledge exchange activities and develop their farming experience. Farmers' organizations and networks should be empowered with active participation of farmers to share farming experience and information, to make their decision and to solve their problems from their fellow farmers' help and support.

To increase the number of organic vegetable farmers in the study areas due to a support program launched by the government is impressive. This includes financial assistance to primary producers during the first few years of conversion, as well as training and advice on organic methods.

There are different factors that influence knowledge of organic farming directly or indirectly through reciprocal action. Further study is recommended among agricultural professionals at the national level, as it is expected to provide considerable evidences regarding the role of other variables such as moral norms on organic knowledge.

Thai policy-makers would have to evaluate the opportunity to help the intermediaries improve their efficiency and their capacity to process information, understand marketing and management, and develop strategies that not only focus on price and finance, but also integrate the emergence of quality and alternative food. Support and budgets for consultancy, training and coaching by independent players (government, NGOs and transnational companies) could be a solution. In any case, it is vital for the country to keep alive each agricultural and supply chain system, (conventional and alternative products, short and long supply chains) by maintaining a range of various practices capable of responding to any unpredictable economic changes (environmental change impact, oil and commodities prices, currencies exchange rate, agricultural and trade policies, etc.). The success of farming required undertaking all practices with true knowledge and there must be collaboration on all



systems which must operate concurrently; for example, creating a farming plan to provide sufficient volume, improving waste reduction practices throughout the supply chain, and direct access to markets in order to promote success. Some constraints and problems of organic vegetable farming not only occurred at the farm level and in the marketing system but also in the vegetable system resulting in obstacles to the expansion of organic farming to conventional vegetable farms.

The sharing of problems, knowledge, and the exchange of know-how among farmers and with processors or traders should be considered. At the same time, farmers and processors need to understand problems and be able to manage them as well as apply knowledge to solve them. To improve their lack of capacity, strategies should be advocated, such as a production plan for farmers, including techniques for reducing a company's costs of production and developing the ability for farmers to manage their own problems.

According to sustainable development that focused on self-reliance, each farmer should reduce expenditure and increase income. This research found that agricultural sustainability and its relationship with organic agricultural approaches encompass many different production methods, systems, and approaches that aim to meet the goals of profitability, stewardship, and quality of life. In another way, not all organic produce is grown on a small family farm. It can be produced by large corporations, although sustainable organic production is largely carried out by small farmers and families who live on the land where they farm.

Organic vegetable farming seems to be a particularly suitable option for smallholder farmers, who could not benefit from adopting Green Revolution practices. Their lack of production means and capital is counterbalanced with the availability of underutilized family labor and the ability to produce inputs on the farm itself. Once production costs are reduced and incomes increase, organic farming can even help these farmers to invest in intensifying their production and opening up off-farm income sources. The challenge in utilizing the potential of organic vegetable farming for achieving development goals therefore lies in enabling poor farmers to overcome the obstacles of the conversion period so that they can benefit in the long term. Appropriate extension approaches that facilitate conversion, and mechanisms for bridging the initial income gap are thus needed. The experience of successful

organic vegetable initiatives in these target areas provides ample material to study how project support could be further improved.

Motivated by the positive experience of organic vegetable farmers in their areas, increasing numbers of conventional farmers in the target study areas have decided to convert to organic farming. The challenge of sustaining the household during the conversion period thus prevents those farmers from adopting organic vegetable farming who could benefit most of it, farmers with small holdings, few resources, comparatively high debt burdens and mainly family-own labor. As their basic livelihood is secured, they are more prepared to take the risk of adopting an agricultural innovation of which the outcome is uncertain.

Livelihood assets in this study affect to sustainable development by farmers' practice. Natural resources are fit for organic vegetable farming because of good soil, appropriate inputs and enough water. Financial assets such as cash, credit, savings and debt, farmers can manage expenditure and farm income means producing the correct amount of the correct product correctly at the lowest possible cost.

Social networks appear to be more diverse in study areas in that place have a higher degree of membership of such groups. Agriculture-based groups seem to be especially strong. Physical asset is land that farmers have enough land to cultivate and supply to market. And human asset provides people's productivity is increased by their capacity to interact with productive technologies and with other people. Leadership and organizational skill are particularly important in making other resources more valuable.

Concerns about sustainability in organic vegetable production in the study areas, based on the need to develop technologies and practices that do not have adverse effects on environmental goods and services, are accessible to and effective for farmers, and lead to improvements in livelihood. Organic vegetable farming are needed that will integrate biological and ecological processes into production, minimize the use of those non-renewable inputs that cause harm to the environment or to the health of farmers and consumers, make productive use of the knowledge and skills of farmers, so substituting human capital for costly external inputs, and make productive use of people's collective capacities to work together to solve common agricultural and natural resource problems, such as for pest, watershed, irrigation,

forest and credit management. These principles help to build important capital assets for agricultural systems: natural; social; human; physical; and financial capital. Improving natural capital is a central aim, and dividends can come from making the best use of the ecological conditions under which they are grown or raised. Sustainable agriculture outcomes can be positive for farmers' livelihood. Significant challenges, however, remain to develop national policies to support the wider emergence of more sustainable forms of organic vegetable production.

From the above discussion, it is recommended that farmers should be given skill-based training on the principles of organic vegetable production; be conveyed the right information from other developed countries about pest management systems; receive training on managing organic matter and making compost; assisted in building groups for cooperation and sharing knowledge; be shown the comparable benefits from reducing undesirable attitudes; and be shown that good prices are a sound outcome from the good practice of organic vegetable farming. Moreover, the ways to reduce the constraint on economic constraints that farmers try to solve by using their household labor, using native inputs, sharing the gas and cars for selling their products in the city market. Bio-physical constraints, farmers have the clarifier for water storage and observation leading to increased awareness in pest management. Trial and error processes for leading to technical improvement on weed problem. And knowledge constraint on propagation, farmers need to have producers who can identify the best locations in terms of a low disease pressure; adjusted threshold values for marketing organic seed contaminated with seed-borne diseases should be developed and try to keep seed by their own for the next season.

### **5.3 Recommendation for further study**

The study of farmers' perception and adaptation of organic vegetable in Chiang Mai is intended for increasing farmers' perception of organic farming methods to grow high quality organic products. Since lack of extension is a constraint in developing organic agriculture in the studied areas, it is important to understand what factors determine 1) farmers' perception of organic farming methods, 2) their attitudes toward such methods, and 3) their adoption of the methods. So further study should be

undertaken to determine farmers' perceptions of organic vegetable production and the factors limiting their acceptance of organic farming, or to assess comparative environmental factors between two systems, and transition costs for switching conventional system for organic one.

Furthermore, it would be more interesting to study the relationship between organic vegetable farmers' knowledge and attitudes towards climate change and how to increase yields and reduce losses within organic production.

Although the organic market is a new market for farmers in Thailand, there is a growing trend of the market and health-conscious consumers while organic food producers are limited. The production of organic products to the market of Thailand has brighter potential than continuing to produce general products to compete with cover cost producers in other countries such as China, India or Vietnam. Conversion to produce organic products will make Thailand have greater export opportunities.

Moreover, Thailand is an agricultural country that has an advantage in terms of geography and climate, as well as a major manufacturer and exporter. It can have the opportunity to develop the capacity to manufacture organic products as one of the world's major producers. It is essential that the Government give serious support such as understanding and knowledge to farmers and issue certification standards that have been accepted by other countries. Organic agriculture can be the new choice for farmers in Thailand to add value for food and agricultural products of the country. Meanwhile, it will also support the government's Food Safety policy to be successful even more and have a positive effect on the quality of farmers' life from the increased farm revenue and generate indirect benefit to the society and natural environment.

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