Doctoral Thesis

Development of Good Agricultural Practices (GAP) in Thailand: A case study of Thai National GAP selected products

タイにおける Good Agricultural Practices (GAP)の発展
―GAP 対象品目に関する事例研究―

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Abstract

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Purpose and Objectives

Good Agricultural Practices or GAP is a global appropriate cultivation method for the farmers to conduct food safety. It is an appropriate on-farm into farm gate cultivation management included, farm inputs selection, farm management, until post-harvest management. GAP aims to encourage the farmers to produce the safety agricultural products for the consumers. After FAO introduced GAP for a period of time, it become one of the minimum requirements for the agricultural trades in global market to secure the food safety and sustainable issues at the farm-level production. Many countries adopted the FAO GAP guidelines and established food security framework, including Thailand. Although there was the clear framework for the MOAC to implement GAP into farmers, halves of them stopped to maintain their certificates with in last 3 years. The reducing in the numbers of GAP certified farmers in Thailand shown the changing in direction of GAP development in the future. The evaluation of success of GAP development in Thailand still is on the discussing. This dissertation focused to identify the current situation of GAP development in Thailand.

This dissertation has four specific objectives: 1) To examine the factors affecting the farmers' practical perception on their GAP understanding; 2) To assess the situation of private standard dual-GAP development in Thailand, and to determine the opportunities of the practical collaboration between private and government sectors on the GAP development; 3) To expose the GAP realistic economic incentives from farmers' GAP

experiences in the important export commodity; and 4) To define the current situation of GAP-based marketing and to identify the buyers' attitudes towards GAP-based product.

Methodology

The series of this study were conducted in the eastern and southern part of Thailand namely: Chumphon and Chanthaburi provinces. Three districts of both provinces were selected. Sawee, Tasae, and Pato districts were selected in Chumphon province, while Khlung, Tha Mai, and Makarm were selected in Chanthaburi province. This study focused on the fruit commodity which is directly consumed. That means it also takes the highest risk for food safety. Therefore, GAP has been widely promoted among these commodities. Interviews were conducted basically using in-depth and face-to-face interviews by using structure questionnaires. Group discussion were also designed and implemented to explore the current situation, and problems between farmers and GAP stakeholders. Random sampling method was adopted. In Chumphon province, the total samples was 184 from coffee farmers; 56 respondents from GAP farmers and 128 for 4C farmers. In Chanthaburi province, the sample were collected from 112 mangosteen farmers. The primary data were conducted during 2012 to 2014. This research adopted the following analysis tools: (1) descriptive statistics analysis, and (2) inferential statistics analysis.

Factors Affecting the Implementation of Good Agricultural Practices (GAP) among Coffee Farmers in Chumphon province

Thai coffee farmers have exerted much effort to develop GAP-based Robusta coffee production since 2008. However, they still lacked knowledge and experience. Their conventional farming activities are often in conflict with GAP system, which might be caused by the limitation of GAP extension procedure. The objectives of this study were to investigate the current perceptions of GAP Coffee Farmers (GCF)'s understanding of GAP, and to identify the factors affecting such perceptions. A series of surveys were conducted in Chumphon province by using structured questionnaires which were administered to fifty-

six (56) coffee farmers who applied for GAP certificates in 2013. This study found that farmers' GAP self-confidence positively affected, while farmers' GAP experiences had negative impact to the farmers' understanding of GAP. This showed the lacking of continuity of GAP extension service, although the GAP promotion was an important factor to increase the farmers' GAP understanding. The very small number of agricultural extension officers was cited as a detrimental factor. The GAP manual should also be simplified to suit the GCFs educational background.

Coffee farmers' attitudes toward the 4C process in Chumphon province

4C is the private sector standard implemented in Thailand since 2010 which aimed to improve the sustainability of coffee farmers. The present study seeks to investigate the farmers' attitude towards 4C and GAP satisfaction and examine the critical role of the private sector towards achieving success following 4C guidelines which it has actively supported. Structured questionnaires were distributed to 128 coffee farmers in seven villages of two districts in Chumphon province which is the biggest coffee cultivation area in Thailand. 4C could easily be adapted by Thai coffee farmers. The main reason of some farmers (21.8%) for following 4C's procedure was because 4C contents were not much different from their conventional farming. The 4C extension service could encourage the farmers' participation because they could increase productivity through the 4C services which had much more flexibility than GAP services' procedure. In addition, the famers did not need to pay any cost for the 4C registration. 4C has advantageous points because of provided specific market, extension services of 4C unit, and easy to adopt with conventional farming methods.

Cost efficiency of Thai National GAP (QGAP) and mangosteen farmers' understanding in Chanthaburi province

GAP has been implemented in mangosteen commodity, which is the important export commodity in Thailand since 2003. The direct market for GAP –based mangosteen has not

yet developed. Therefore, the farmers could not get a direct benefit from GAP adoption, and they believed that GAP could not give them any visible benefits. The present study seeks to expose the GAP realistic economic incentives from farmers' GAP experiences in mangosteen commodity. One-hundred and twelve (112) respondents were randomly selected from 1,968 GAP mangosteen-certified farmers in Chanthaburi province which is the biggest mangosteen cultivation area in Thailand. This study reviewed that GAP certified farmers were satisfied with income from their investment more than the ordinary farmers (cost efficiency = 1.74 and 1.27, respectively). However, the production cost per rai was 11,554.7 THB/rai, higher than the ordinary farmers' cost (7,007.9 THB/rai). The GAP standard itself provides direct incentive through its knowledge and appropriate farming techniques which are classified as non-economic incentives. The proportion of high-quality mangosteen can be increased if the farmers effectively practice GAP on their farms.

Marketing of Thai National GAP (QGAP) mangosteen in Chanthaburi province

The farmers who implemented GAP on their farm might had the opportunity to access the valuable price market. However, there was no direct/specific market for GAP products. Current market accessed might reduce the farmers' interesting on GAP. The objectives of this study were to define the current situation of GAP-based marketing and to identify buyers' attitudes towards GAP-based products. This study focused on 2 respondent groups. One-hundred and twelve (112) respondents were randomly selected from 1,968 GAP mangosteen-certified farmers. The exporter (1), packaging company (6), and mobile merchants were selected for the main important buyers in this area. The study reviewed that GAP-based product were mix with the ordinary product in the market. The buyers preferred the HQ mangosteen which was produced from GAP-based farmers. If the market was divided into early and late market of harvesting season, GAP was clearly contributed the income for farmers in the early harvesting season. The market can provide both direct and indirect incentives for the farmers. These incentives positively influenced the farmers' HQ product ability. Therefore, GAP-certified farmers can improve their farm cultivation

techniques to produce HQ product. As well as, they can increase their income from the current market situations through their GAP implementation, even if there is no specific market for GAP product.

Conclusion and recommendation

After FAO introduced GAP for a period of time, it become one of the minimum requirements for the agricultural trades in global market to secure food safety and sustainable issues at the farm-level production. Many countries have adopted the FAO GAP guidelines and established food security framework, including Thailand. There were many obstacles on policy, extension services, research, and farmers' implementation levels during GAP developing process. The success of GAP is depended on the effectiveness of farmers' implementing GAP procedures. The farmers will increase their GAP standard attention when they can get premium price from selling their GAP-based product. In general, consumers markets have not yet developed enough mature to deal in GAP labelled products in some countries. Farmers might ignore this standard. Food safety issues including GAP are not cared at a farm-level. As a result, like Thailand, food safety of agricultural product is not reliable in the global trades.

Actually GAP gave both direct and indirect incentives to farmers, but they tend to believe that GAP can secure little incentive for them, in cases where a direct market for GAP-based product has not yet become mature in economic terms. Therefore, private sector need to generate a dual-GAP standard which will secure food safety and keep a certain level of product quality. Some dual-GAP standards labelling (such as 4C, GlobalGAP, etc.) have already be accepted widely in the global markets. Farmers can gain visible benefits (normally is premium price) from implementing such standards, and learn how to improve their food safety production on their farms.

However, it is also difficult to promote new dual-GAP standards. Private company have expanded the fundamental GAP knowledge among farmers through dual-GAP standard.

This knowledge expanding becomes the best way how private company explore their new standard. Any dual-GAP standard needs the development of GAP as an essential requirement. GAP standard also needs the dual-GAP standard for the market access. Each standard cannot stand alone in market. This mutual-relationship positively motivates the development of both GAP and dual-GAP standards. This relationship inspires the farmers to improve their sustainable cultivation which positively affects the Thai agricultural food safety reliability in the global trades.

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Abbreviations

4C : Common code for coffee commodity
ACFS : National bureau of agriculture and food standard
AFTA : ASEAN Free Trade Agreement
CCP : Critical Control Points
COAG : Committee on Agriculture
CP : Control Points
CSI'a : The current situation of standard implementation analysis
DOA : Department of Agriculture
DOAE : Department of Agriculture Extension
Dual-GAP : The standard that developed together with GAP in the same commodity
FAO : Food and Agriculture Organization
FGD : focus group discussion
GAP : Good Agricultural Practices
GCF : GAP coffee farmer
HACCP : Hazard Analysis & Critical Control Points
HQ : High Quality
IPM : Integrated Pest Management
LQ : Low quality
MOAC : Ministry of Agriculture and Cooperatives
MV : Moving document
QGAP : Thai National GAP
QMS : Quality Management System
SARD : Sustainable Agriculture and Rural Development
UNCED : United Nations Conference on Environment and Development
WTO : World Trade Organization

Chapter 1 Introduction

1.1 Background

Good Agricultural Practices or GAP is a global appropriate cultivation method for farmers to conduct food safety. It is an appropriate on-farm into cultivation management including inputs selection, farm management, and post-harvest management. GAP aims to encourage the farmers to produce safety agricultural products for consumers (Pongvinyoo et al., 2014). GAP was developed by FAO. It started from early discussions focused on the work of visiting scientist David Connor who proposed some "common principles of good agricultural practices". Guidance on GAP was received from the 17th Session of the Committee on Agriculture (COAG) in April 2003. The ultimate goal of FAO GAP is to assist developing countries in generating appropriate protocols and processes which would fit into local context, with a special focus to ensure that small and medium-holders can participate in GAP-orientated markets. GAP will continue to be of major importance in the global food system.

Most agronomists believe that many smallholders can benefit from engaging in the analytical process of GAP whether or not it gives them access to high valuable price markets. Since the early 1990s, the concept of sustainable agriculture has helped immensely in shifting the attention of the community development and the agriculture sector.

GAP approach should be seen in the context of Agenda 21, the global plan of action for sustainable development adopted in 1992 at the United Nations Conference on Environment and Development (UNCED, or the Earth Summit) in Rio de Janeiro. Chapter 14 of Agenda 21pertaining to Sustainable Agriculture and Rural Development (SARD) is directly relevant, and Chapter 4, titled "Changing consumption patterns", states that:

4.20. The recent emergence in many countries of a more environmentally conscious consumer public, combined with increased interest on the part of some industries in providing environmentally sound consumer products, is a significant development that should be encouraged. Governments and international organizations, together with the private sector, should develop criteria and methodologies for the assessment of environmental impacts and resource requirements throughout the full life cycle of products and processes. Results of those assessments should be transformed into clear indicators in order to inform consumers and decision-makers.

4.21. Governments, in cooperation with industry and other relevant groups, should encourage expansion of environmental labelling and other environmentally related product information programmes designed to assist consumers to make informed choices. (Poisot et al., 2004)

Consumers trend for safety consumption is increasing epecially in the developed/agriculture imported countries, because of the illness caused by their consumption (Vermeir and Verbeke, 2006). FAO reponsed to provide the essential information and guided the agriculture producer countries to produce safe agricultural commodities. Many countries including Thailand have adopted the guideline of FAO to develop their own food safety procedures. Governments are main actors to provide services, guidance, and promoting this standard to the local farmers. However, local market chain's stakeholders are supporters to encourage and increase the willingness of the farmers to participate in GAP extension procedures.

1.1.1 GAP in Thailand

Thailand, as a member of the World Trade Organization (WTO), has adopted the Agreement on the Application of Sanitary and Phytosanitary Measures and the Agreement on Technical Barriers to Trade. In response to international food safety and quality

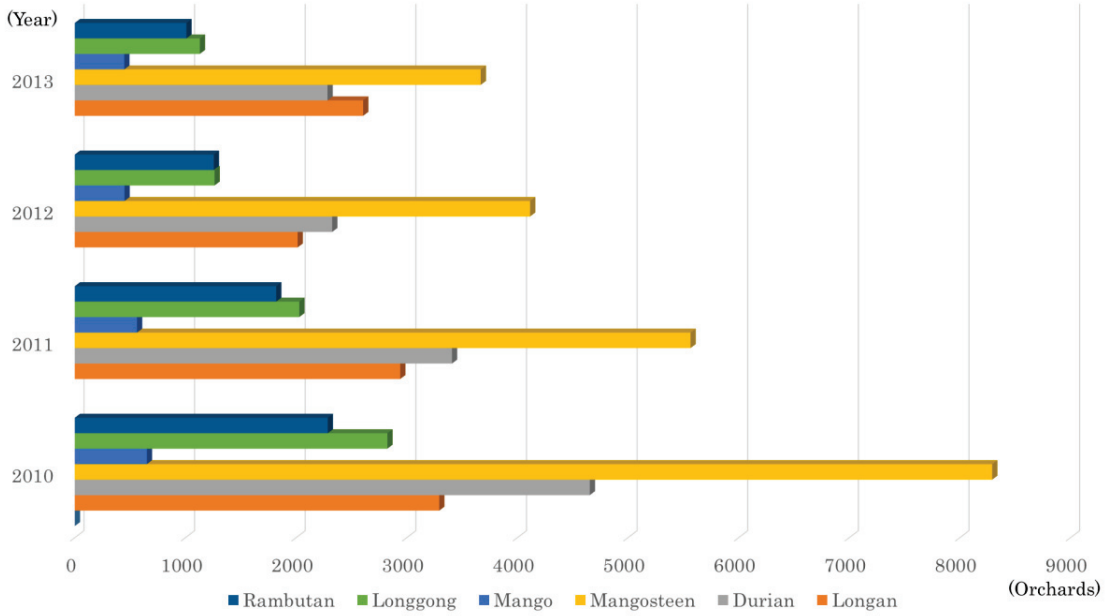
concerns, Thai Ministry of Agriculture and Cooperative (MOAC) has implemented GAP programmes of food crops as the first step towards food safety and trade facilitation (Mankeb et al., 2009).

There were 2 main GAP certifications in Thailand (Thai GAP and Thai National GAP). As the guideline of GAP by FAO, Government should have main responsibility for the national GAP development to increase the capacity of the farmers to compete in the domestic market. MOAC provides the accreditation body under the National bureau of agriculture and food standard (ACFS) as a third-party independent organization that guarantees the GAP reliability in Thailand. MOAC give the authorities to the other sectors for the implementation in term of advisor and inspection services (Salakpetch 2004).

1.1.2 Farmers' motivation to conduct GAP in practices

According to the statistical data of Thai Ministry of Agriculture and Cooperatives (MOAC, 2013) the number of farmers had dramatically increased in the first 10 years, however, the number of Thai National GAP-based (QGAP) farmers sharply fell down in the last 3 years (Figure 1-1).

Figure 1-1 : The number of GAP farmers in important commodity, eastern Thailand



Source: Chanthaburi Provincial Agricultural and Cooperative office, 2013

MOAC provided clear framework for promote GAP into farmers; however, halves of farmers stopped to maintain their certificates with in last 3 years. The number of issued certificates decreased, thus cause to the two results as follows:

1. *Positive*: A case study of lychee producer in Madagascar (Subervie, 2012) GlobalGAP development brought the farmers to access the global accepted standard which can provide economic incentive from its specific niche market together to ensure the food security. Therefore, GAP farmers adopted their GAP knowledge into other standards which would be accepted in a niche market. The number of GAP-certified farmers were reduced.

2. *Negative*: Increase in the production costs of case study of GlobalGAP development without market support in the early stage of its development, influenced the permanent decrease in number. Farmers haven't developed their farm cultivation (Hobbs 2003).

The reduction of GAP certified farmers in Thailand showed the changing of GAP development in the future. According to the previous studies (Hobbs, 2003; Subervie, 2012), there were two main factors affected the reduction in number of certified farmers which were the farmers' incentive from conducting GAP-based product, and GAP supported market's conditions.

Hobbs (2003) classified GAP economic incentives for farmers into two main categories. The first incentive was reducing the farmers' production costs such as efficient use of labors, input selection, and sustainable farm management methods. In a case study in Kenya (Jaffee, 2003), GAP significantly improved the producers' cost effectiveness in a competitive fresh vegetable market. The producers could also improve farming methods in terms of social, environmental, and economic aspects. GAP instructions led the farmers to control their production costs by implementing appropriate farming techniques. The second incentive was the premium price for GAP-based product. Its quality might be more acceptable than ordinary product (Hobbs, 2003). It was expected that farmers could easily access to a premium market, in cases where it provided a satisfactory price for the product quality. This is a kind of GAP economic incentives. Such an expectation appeared at the beginning of GAP extension, but when it extended widely, a premium price may disappear. This is an economic and competitive principle in markets.

A case study in Tanzania (Mushobozi 2010) showed the market enforcement positively influenced the GAP development. GAP established to provide sustainable cultivation methods. Hence, farmers repeatedly adopted appropriate cultivation methods to supply safe food in markets. The supporting from market was a great obstacle for farmers to fulfill distributors and consumers' increasing concern about food safety. It is the win-win situations for the farmers and stakeholders in the safety food chain. Therefore, market situation supports the farmers to implement GAP system on their farm. Gazi (2012) studied on the exported tomatoes and GAP development in Malaysia; high-quality product for export were mainly produced by GAP-certified farmers. Consequently, market demands

encouraged the farmers to participate on the GAP scheme. Naturally, market mechanism was an important factor for GAP development in agricultural producing countries.

1.2 The statement of problems

The effectiveness of GAP development in Thailand

The number of GAP-certified farmers dropped almost 50% after 2010. At that time, Thai agricultural product export volume were expanded. It was difficult to evaluate the success of GAP in Thailand by using only one indicator (number of certified farmers or export market expansion). MOAC concisely provided the GAP extension procedure in terms of services, knowledge, and human resources for farmers. However, this extension procedure could not prevent the decrease of GAP-farmers.

GAP mainly aimed to guide an appropriate farming and post-harvest methods not only for farmers but also for any intermediaries who are engaged in trading and processing. However, certificate was likely to be used as a minimum requirement mainly for farmers to access a valuable price market. The reducing in the number of GAP-certified farmers showed that the farmers might not achieve their expectation after implementing GAP standard on their farms. It might be caused by inefficiency of extension procedure to promote the GAP standard to the farmers. Or else the market did not encourage the farmers to conduct GAP which different from FAO GAP ultimate goal. Therefore, the evaluation of direction of GAP development was needed to identify the current situation of GAP development in Thailand.

Provided framework and implementation were appropriate or inappropriate?

Thai MOAC adopted original GAP guideline from FAO. The adopted contents were not flexible and adjusted for the farmers' practices. They faced many difficulties from GAP implementing because of its complexity. It was conducted by eight elements to improve

control over the production process of target agricultural products. You cannot say now, because you did not analysis at this moment.

The problems also occurred in the certification process. For example, GAP farmers had a short period to maintain certifications (2 years), and GAP certification took time for more than 1 year to issue the certificate paper. Thai farmers could not use the certificate paper to access the valuable price market that required the GAP certificate paper. They lost their market opportunity, then GAP standard was less attractive from the farmers' perspective. This ineffective certification raised up the difficulties for the GAP extension methods to implement new knowledge for Thai farmers who familiar with the conventional livelihood. This means the farmers' GAP perception was automatically reduced which was also affected their GAP understanding.

It was one of challenges that Thai National GAP was facing in the developing process. Therefore, the evaluation of current factors influenced the farmers perception on GAP was needed for GAP development in the future.

Development of Dual-GAP standards

The private sector developed its own standard and promoted that standard for GAP-based farmers. It seems the private company participated in agricultural standard development as a GAP competitor. However, private company targeted on the current GAP farmers who had already experienced on agricultural standard. It seems GAP standard was targeted as the essential standard which can develop into the other global acceptable standards. The rapid expansion of private standard farmer-members presented its compensations and opportunities to promote agricultural standard in practices.

Practical GAP incentives have not yet classified

Available incentive from implementing GAP was not classified in terms of production cost and return. In general, farmers always expected economic incentives from implementing any standard. However, GAP extension services has not provided the data base of GAP economic incentive. The farmers develop their own thought by themselves, while accepting advices. There was no direct market for GAP products in Thailand, but actually, there are many stores to see this label products at a higher price. So the farmers might not receive the visible premium price for GAP practices. It might brought down the farmers' interesting on the GAP standard. Therefore, providing the actual incentives information from GAP implementation was needed for farmers for the GAP development in the future.

The farmers realized that current market did not supported/encourage GAP product

In general, high quality product were focused by the traders for export. GAP provides a framework of production process which must be fitted into the consumers' and buyers demand in foreign countries. The farmers who implemented GAP on their farm might had the opportunity to access the valuable price market. However, there was no direct/specific market for GAP products. Current market accessed might reduce farmers' interesting in GAP. Classification of the actual benefits GAP brings are needed, thereby making famers understand GAP's direct and indirect benefits.

1.3 Research questions

The market for GAP products in Thailand did not provide the additional price for the farmers' GAP-based products. Farmers' believed that GAP was the useless standard for their economic expectation. Farmers' motivation to conduct GAP was reduced or disappeared. It could lead to the difficulties of GAP extension procedure. Therefore, the case study of GAP developing system in Thailand which is unique and priory engaged with

the practical obstacles, can be apply as the model of GAP development system for the other countries.

The evaluation of success of GAP development in Thailand still is on discussing. This dissertation focused on the following questions in order to identify the current situation of GAP development in Thailand which are the general objective of this study.

1) What factors are affecting farmers' practical perception on their understanding of GAP?

2) What are the private sector roles on dual-GAP standard development in Thailand?

3) What are practical incentive from GAP for the farmers?

4) What are current marketing conditions of GAP-based product, and buyers' purchasing attitudes?

1.4 Research objectives

According to four specific questions, four specific objectives of this study were set up. The purpose of this dissertation is to evaluate the current situation of Thai National GAP development in Thailand. To approach the purpose, this dissertation has 4 particular objectives, as follow:

1) To examine factors affecting farmers' practical perception on QGAP understanding

2) To assess the situation of dual-GAP standard development in Thailand, and to determine the possibility of the practical collaboration between private and government sectors on the GAP development

3) To expose the GAP realistic economic incentives from farmers' GAP experiences in important export commodities

4) To define the current situation of QGAP-based marketing and to identify buyers' attitudes towards QGAP-based products

1.5 Summary of dissertation

The summary of dissertation will be described in following paragraph:

Chapter 1 describes the current GAP development in Thailand. MOAC is responsible for establishing Thai national food safety framework. GAP framework in Thailand has been continuously developed since 2003. The farmers receive the GAP standard information from DOAE, and adopt GAP with their conventional farming methods. After that, they are certified as GAP-certified farmers by DOA. GAP development in Thailand has ACFS to accredit the GAP development with the other acceptable GAP such as ASEANGAP and GlobalGAP. This chapter also explains the trend of certified farmers under GAP system. Although MOAC prepared an appropriate structure of food safety framework, the number of certified farmers during the last 3 years dramatically reduced. It possibly shows a change of GAP development direction in a near future. The reduction of number of GAP-certified farmers can be influenced by two main current situations which are the farmers' incentive from conducting GAP-based product, and GAP supported market's conditions. Finally, this chapter conveys the statement of problems, research questions, general objective, specific objectives, and summary of dissertation.

Chapter 2 concerns a theoretical review to lead the study to the challenge and success. The developing of "*The current situation of standard implementation analysis (CSI'a)"* to apply for the research framework of this study is a focal point in this chapter. The development of GAP and its definitions, the farmers' farm structure changed by GAP are discussed. Many GAP development cases which were influenced by the farmers' incentive,

and market access are explored. The farmers' understanding on GAP is a connection between GAP extension procedures and their practical implementation. This connection can be supported by the farmers' market access. The direct market for GAP product has not yet developed in Thailand. Therefore, the development of GAP in Thailand is unique. Finally, research framework are provided by using the CSI'a to explain the mechanisms of contents in this study.

Chapter 3 conveys the detail information of research site on geographical, and socio economic aspects. The justifications for selected products were explained. Survey, sampling, focus group discussion, were used to collect primary data. This research adopted the following analysis tools: (1) descriptive statistics analysis, and (2) inferential statistics analysis. The most important is inferential statistics analysis.

Chapter 4 analyzes the factors affecting the implementation of GAP among coffee farmers. In the beginning of this chapter, Thai National GAP Scenario was described. Market condition is an important factor that influenced farmers' GAP perception. However, GAP could not provide a direct market for GAP product itself, this is the weakness of public agricultural standard development. The details of internal and external factor influenced the farmers' GAP perception are explained in this chapter.

Chapter 5 investigates the development of dual-GAP standard among coffee farmers. Common Code for Coffee Community (4C) was selected as a case study of dual-GAP standard. 4C standard rapidly developed in Thai coffee community. The main reasons for the success of 4C are a specific market is provided for high quality coffee, and useful services are also delivered for the farmers. 4C provides a *win-win situation* for a private company and coffee farmers. In addition, it also encouraged the farmers to participate in the GAP standard. The opportunities of 4C standards development in the coffee community are discussed in this chapter.

Chapter 6 observes how farmers got practical incentive by adopting GAP. In general, economic incentive was the first farmers' expectation to adopt any standards on farm. The incentive can be classified into two categories which are costs reduction and premium prices. The production costs of mangosteen farmers and cost efficiency will be described in this chapter. The farmers increased their costs and income by adopting GAP standards on their farms. The farmers' economic incentives were classified into direct and indirect incentives which will be also explain in the late of this chapter.

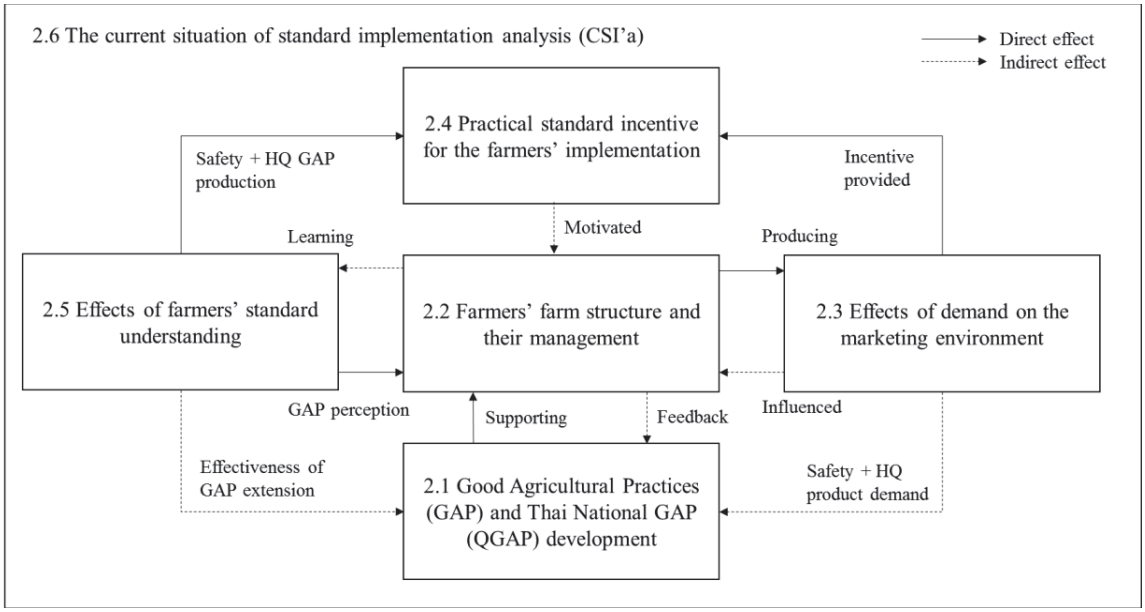
Chapter 7 evaluates the current market situations for GAP mangosteen product. The previous study evaluated the market for any product by using the once time analysis. This study separated the market into two periods (early and late part market of harvesting season). This study found that the farmers took the benefits from GAP adopting in the market in term of knowledge and premium price for the HQ production. Finally, the market for GAP products in Thailand classified into 4 stages according to the production volume and exported volume. The characteristics of these 4 stages are discussed in the late of this chapter.

Chapter 8 provides a summary conclusions, and recommendations for improve the effectiveness of MOAC's GAP promoting and implementation. According to two case studies of coffee and mangosteen, this study can approach to the actual situation of GAP development in Thailand. The "*Model of Dual-GAP standard development for low competitive commodity"* are explained how the private section can assist the development of GAP in practice by using the relationship between demand and supply in the market, which is shown in this chapter.

Chapter 2 Theoretical reviews

The main purpose of this study was to evaluate the direction on GAP development by identify the current situation of GAP development in Thailand. The core of literature focused to find out the linkage between the current GAP-based farmers situations, their economic incentives, and market situations. The structure of literatures are shown in Figure 2-1 as follow:

Figure 2-1 : The structure of literature reviews



GAP was promoted to support the farmers' valuable price market access with the safe food qualification. For export market especially EU, products must be certified GAP. GAP is a standard-requirement for food safety. Nowadays, GAP and other standardized certificates are widespread through world, regional and even domestic trade. Conventional farming techniques and new knowledge from GAP standard were two main sources of the farmers' cultivation. The output of production could measure by the production volume and quality. The buyers' attitude become a good indicator to classify the current situations of GAP

market, especially for the exported commodities which GAP was developed to support the export market assessment.

The figure 2-1 showed the current farmers' GAP situation and possible influenced environment to the farmers' GAP adoption. GAP was developed to support the farmers in term of safe agricultural production and economic incentives (2.1).The middle sector in the figure indicates farmers' farm structure which was directly influenced by the GAP extension procedure (2.2). In general, the main farmers' motivation to apply a new farming technology was the current market conditions. The market conditions was the main farmers' motivation that influenced the farmers' awareness to conducting GAP on their farm (2.3). Market provided the expected incentive which is the motivation for the farmers to conduct GAP on their farm (2.4). The GAP system encouraged farmers to perceive and learn the new appropriate knowledge for their cultivation (2.5). The current situation of standard implementation analysis (CSI'a) were created to evaluate the current situation of standard development by using the essential components of standard implementation (2.6).

In case that, there was no specific market for the GAP-based product. The farmers will select the greatest premium market for themselves. Coffee community standard development in Thailand was in this case. The farmers could not reach their economic incentive from the specific market. The private section developed and extended their private standard (Common Code for Coffee Commodity: 4C) which is not so farm from the GAP standard to the GAP-based farmers to conduct the high quality coffee and supplied to their chain. Therefore, private standard as the dual-GAP development (4C) were included on the structure of this literature too.

The outline of literature reviews are showing as follow:

2.1 Good Agricultural Practices (GAP) and Thai National GAP (QGAP) development
    2.1.1 GAP's definition
    2.1.2 Incentive from GAP adopting for the farmers

2.1 Good Agricultural Practices (GAP) and Thai National GAP (QGAP) development

GAP has been implemented in the early of 21st century because of changes in globalizing food economy and as a result of the concerns and commitments of a wide range of stakeholders about food production and security, food safety and quality, and the environmental sustainability of agriculture (Committee on Agriculture, 2003). In an early stage of GAP development, many developed countries provided guidelines for farmers and livestock producers (Poisot et al., 2004). The main purposes of GAP were to increase their productivity, improve natural resources, generate a higher farmer income and provide safe food producing methods. Such FAO's recommendations for GAP growers/producers were generally organized following the sequence of activities and choices in the production process, such as: crop rotation considerations, land preparation, plant nutrient requirements (fertilizer kinds and amount), crop establishment methods, weed control, pest and disease control with Integrated Pest Management (IPM) principles, water management and irrigation, harvest methods, livestock rations and feeding systems and on-farm storage methods.

During 1980s, perceived failure of research and extension in developing countries to disseminate these codified 'good' practices to farmers and to take into account the variety of farmers' situations and local and indigenous knowledge has given rise to the

development of approaches of participatory technology development, Knowledge Attitudes and Practices and farmers to farmer extension, in order to more effectively identify and support better farming practices.

FAO has responded to requests from developing country governments as regards technical assistance aimed at optimizing and transferring crop, livestock, forestry or aquaculture recommendations in their local context (Neely et al., 2003). Nowadays, within this context, there is a very high demand from many import country members for assistance in particular on horticulture and livestock-based production chains but also on sustainable forest products and fisheries, as countries try to enter global markets (which are increasingly requiring food safety, and, more recently, environmental and social considerations) and to meet their direct food security needs and improve the income of the rural. Various units of FAO have specialized in optimization of components of production recommendations, such as IPM for pests; Integrated Plant Nutrient Management (IPNM) for fertilizer inputs, or no-tillage based conservation agriculture for land preparation. Research programs from the CGIAR and National Agricultural Research Systems (NARS) generate new varieties, animal strains or agronomic practices that can be and are integrated into the GAP process.

GAP was firstly introduced by David Connor who proposed some "common principles of good agricultural practices". Guidance on Good Agricultural Practices from the 17th Session of the Committee on Agriculture (COAG) in April 2003 led to an expert consultation on GAP in 2003 and the definition of a GAP concept for FAO. At that time, COAG tried to emphasize that a GAP approach should not create new barriers to trade and thus undermine poverty alleviation efforts and be consistent with the existing regulatory instruments, such as Codex, IPPC, and OIE (Poisot et al., 2004).

2.1.1 GAP's definition

The concept of GAP as presented in the COAG paper was too wide and undefined. However, the original entry point, based on technical aspects of crop and livestock

production to ensure food safety, environmental protection, economic and social equity remains clear, and was confirmed at the Expert Consultation on GAP which was held in Rome in November 2003. Experts agreed that the concept of GAP should, to the extent feasible in a given farming system, seek to include the following aspects (Poisot et al., 2004):

1. *Three pillars of sustainability*: Good Agricultural Practices should be economically viable, environmentally sustainable, and socially acceptable; inclusive of food safety and quality dimensions,
2. *Farmers' farm management level*: the focus should be on primary production, within a given incentive and institutional context;
3. *Competent authorities*: take into account existing voluntary and/or mandatory codes of practices and guidelines in agriculture.

GAP was established within the framework of Sustainable Agriculture and Rural Development (SARD). GAP and SARD used the same three pillar of sustainable (economic, environment, and social aspects) (Committee on Agriculture, 2003). However, SARD focused on the sustainability of rural development which is broader than GAP. GAP was specifically developed under SARD which covered the majority of agriculture sector under rural development. COAG also stated that GAP could not cover the whole food supply chain. It was covered the farm-level part of the chain (Hobbs, 2003; Poisot et al., 2004).

There are several broad definitions of Good Agricultural Practices or GAP. Hobbs (2003) defined that, the term GAP can refer to any collection of specific methods, which when applied to agriculture, produce results that are in harmony with the values of the proponents of those practices. There are numerous competing definitions of what methods constitute "Good Agricultural Practices", so whether a practice can be considered "good" will depend on the standard itself was applying.

We realize the elasticity of GAP in practical. GAP can be adopted into a wide range of standard for agricultural practices because it is not fixed concept. The GAP practical implementation was depend on the community cultivation procedure. GAP adopted many kinds of methods for their owned standard.

Mushobozi (2010) mentioned that GAP is a collection of principles to apply for on-farm production and post-production processes, resulting in safe and healthy food and non-food agricultural products, while taking into account economic, social and environmental sustainability. GAPs may be applied to a wide range of farming systems and at different scales. They are applied through sustainable agricultural methods, such as integrated pest management, integrated fertilizer management and conservation agriculture.

This statement confirmed Hobbs (2003) GAP broad definition that GAP could adapt into wide range of agricultural community and flexibility was depended on the availability in each culture. For the specific definition, GAP are Practices that address environmental, economic and social sustainability for on-farm processes and result in safe and quality food and non-food agricultural products.

Amekawa (2010) defined GAP as a public food safety program for field-level quality assurance. It relates to farmers safety and environmental conservation mainly through the enhanced control over the use of agrochemicals and alternative production inputs. The study classified the GAP as one of the agricultural enhancement public standard from the producers. This definitions was not different from Gazi (2012) , defining GAP as a tools to improve the farmers' cultivation methods to conduct the high=quality agricultural production in Malaysia.

Such specific definition focused the two main points in agriculture extension which are "Three pillars of sustainable" and "on-farm process" for the results of agricultural food efficient (*food security, food safety, and food quality*) (Unnevehr, 2003).

According to some definitions above, this thesis identified GAP definition as

"*GAP is the global appropriate cultivation methods for the farmers to conduct food safety. It is the appropriate on-farm into farm gate cultivation management methods included, farm inputs selection, farm management, until post-harvest management. GAP aims to encourage the farmers to produce the safety agricultural products for the consumers*" (Pongvinyoo et al., 2014). This definition only covered for the agriculture sectors. This definition is limited, because this definition does not cover the interests of consumers.

2.1.2 Incentive from GAP adopting for the farmers

Amekawa (2013) defined GAP as public approaches to field-level quality guarantee. Also Mankeb et al. (2009) mentioned that GAP can be defined as one of useful programs as the first step towards food safety and trade facilitation. Same as Suppadit et al. (2006) stated that GAP defended the domestic cattle beef domestic producers from high world competitive markets. In this regard, GAP implementation was related with "safety producing methods" and "market conditions". GAP standard directly affected the farmers' incentives from their implementation. Hobbs (2003) and Rejesus (2009) identified the farmers' incentive and disincentive from GAP adoption into three categories, such as economic, regulatory/legal, and human capital.

Hobbs (2003) classified economic incentive as the farmers' economic structure empowerment from their GAP adoption. Economic incentives were increasing and/or stabilizing revenue, production costs reduction, enhanced market access, increased capital estimation of farm assets, reduced weakness of unappropriated agricultural practices of other farmers; regulatory or legal incentives were the farmers' community development from their GAP adoption, including changes in ownership rights, responsibility rules, subsidies; and human capital incentives were farmers' human capital enhancing, including farmers' skills improvement.

GAP disincentive were the possible disadvantages from GAP adoption. It could be classified to three categories as the opposite site of economic incentives. Economic disincentive are such as increased production costs, investment in assets that were specific to one buyer and/or could not be recovered if the buyer-seller relationship breaks down; institutional constraints including insufficient quality monitoring arrangement, weak public institutions for supervision GAP, and; human capital constraints such as farmers limitation on documentation capabilities; constraints on labors intensive, weak public extension, etc. These cases were occurred because GAP is not widely accepted in markets. This means farmers' motivation were cut off from their consideration.

The practical farmers' GAP implementations have both pros and cons for them. GAP product is driven by retailers and consumers mainly in developed economies, where they demand food safety and food quality assurances. In a much contrast, marketing and supply chains in many developing countries cannot afford to distinguish GAP and non-GAP product through full traceability and uniqueness of GAP output. This situation negatively affects farmers' incentives and reduces their willingness to remain GAP producing (Pongvinyoo et al., 2014).

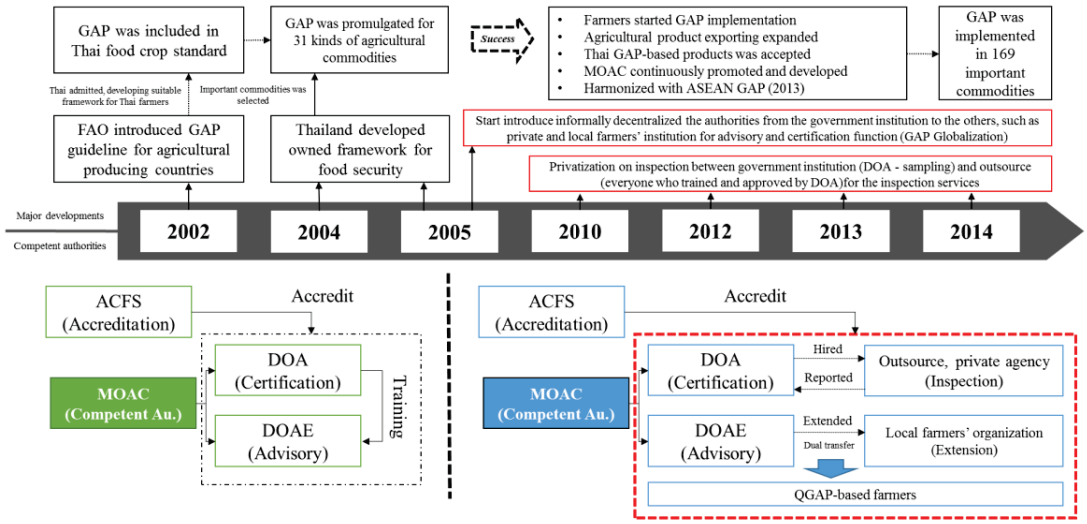
According to the previous studies, GAP provided both economic and non-economic benefits for the farmers. However, the linkage between both incentives was not classified in terms of direct or indirect benefits. In the practical market, GAP product did not increase the consumers' food safety demand. However, GAP provided the market access for the farmers who produced food safety commodities under GAP procedure. GAP also provided the knowledge and appropriate farm cultivation methods. Therefore, the appropriate farm methods might be direct incentive to increase market access opportunities for farmers.

2.1.3 QGAP development, and certification procedure

GAP-established practical manuals have been promoted by governments especially in ASEAN countries including Thailand (Amekawa, 2013). The Ministry of Agriculture and

Cooperatives (MOAC) first instituted GAP under its Agricultural Commodity Standard on Good Agricultural Practice for Food Crops in 2003 (Wannamolee, 2008). Since then, the Agricultural Standards Committee has revised some standards for better acceptance in terms of both quality and safety of Thai agricultural products (Salakpetch, 2004). This is to keep up with rapidly changing global standards and to improve product competitiveness in the world market (Amekawa, 2013). The development of QGAP are shown in Figure 2 – 2.

Figure 2 – 2 : General timeline of QGAP development during 2002 – 2014



Source: Mankeb, 2012; Amekawa, 2014; Surmsuk, 2005; GAP standard 2009, 2010; Field survey 2012, 2013, 2014

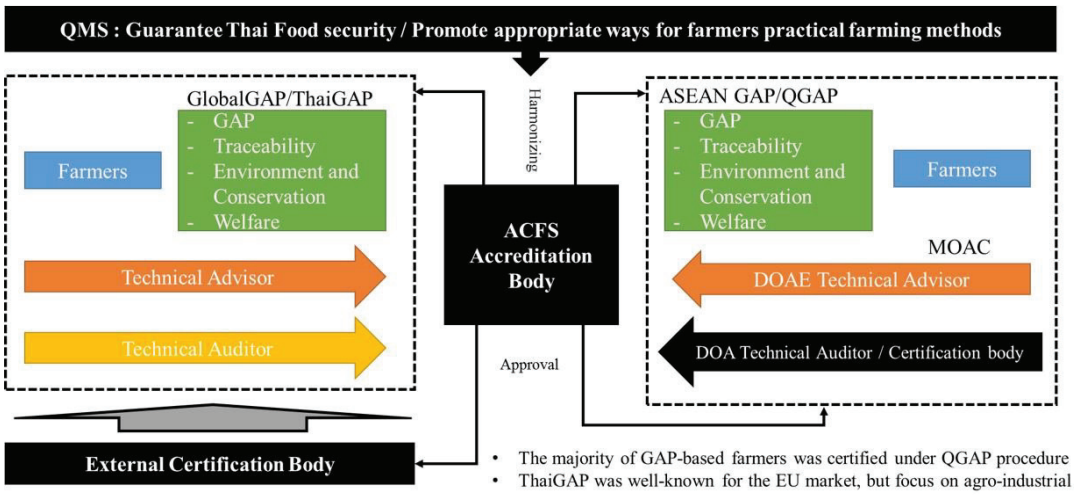
After FAO introduced GAP in 2002, National Bureau of Agricultural Commodity and Food Standards (ACFS) was established in 2002. One of the main ACFS responsibility is to develop national standards of agricultural commodity and food product. The standards have been developed largely in harmony with requirement of FAO/WHO and partly based on the previous existing GAP standards for the same kinds of DOA. For example, The National GAP for Food crops 2003 (TACFS 9001-2003) have been largely set out as those in FAO/WHO (2001) and DOA (2003). The basic GAP requirements was included production process for reasons of food safety, health, environmental protection. The standards also ensure that all stages of production, processing and marketing are subject to inspection and

being met with GAP requirements. Thailand adopted that FAO GAP, and promoted for 31 kind of important food crops in 2004. The number of GAP-certified farmers was rapidly increased during that time. MOAC which was the main competent authority for GAP promotion developed and promoted QGAP for 169 kind of important commodities to increase the safe food producing and competitiveness for farmers.

Thai food safety regulation is based on Quality Management System (QMS). Within the QMS, three important bodies under the supervision of the MOAC have been established with specific advisory, certification and accreditation roles (Salakpetch, 2004). The Department of Agriculture (DOA) is mainly charged with an advisory function in encouraging and training farmers for the adoption of GAP. The Department of Agriculture Extension (DOAE) is tasked with the initial certification process after compliance. The National Bureau of Agricultural Commodities and Food Standards (ACFS) has responsibility to assist GAP-certified farmers and their products to ensure products rigidly maintain GAP standards and are certified safe for the consumption. The certification procedure was largely developed in 2005. Decentralization of GAP inspection and extension function was transferred to private sector and farmers' organization (such as agricultural cooperatives). In this case, GAP inspectors might be trained and certified by the MOAC before got the inspection authorities in practices.

There were 2 main GAP certifications in Thailand (Thai GAP and Thai National GAP). As the guideline of GAP by FAO, Government should have main responsibility for the national GAP development to increase the capacity of the farmers to compete in the domestic market. MOAC provides the accreditation body under the National bureau of agriculture and food standard (ACFS) as a third-party independent organization that guarantees the GAP reliability in Thailand. MOAC give the authorities to the other sectors for the implementation in term of advisor and inspection services (Salakpetch 2004). The flow of Thai GAP guideline are shown in Figure 2-3.

Figure 2 - 3: General GAP structure in Thailand



Under MOAC food security structure, Department of Agriculture (DOA) in place of the Certification Body, developed GAP guideline and inspection services for those farmers who register for QGAP certification. The Department of Agricultural Extension (DOAE) was authorized to extend GAP systems through the country as a whole. Since 2006, DOAE has launched the project “Promotion of Safe Agricultural Products” in 31 kinds of crops nationwide (Wannamolee, 2008), of which production processes are high food contaminate risks affected by direct consumption (Rejesus, 2009).

In response to quality and safety requirements of both export and domestic markets, the Government of Thailand has made significant steps towards the development, introduction and implementation of quality and safety "Q" certification programs. A "Q" (quality) scheme has been developed to certify each step of food production safety with a "Q" logo used for all agricultural products (crops, livestock and fisheries). The Department of Agriculture grants several certificates including Q GAP, Q Packing house and Q Shop, among others. A Quality Management System: Good Agricultural Practice (GAP) for on-farm production was developed by modifying concepts of international standards with 3 levels of certification. Level 1 is pesticide-residue safe; Level 2 is pesticide-residue safe and pest free, and level 3 is pesticide-residue safe, pest free and with premium quality. The

standard contains 8 elements or principles (safety of water used, site, use of agrochemicals, product storage, data records, pest-free products, quality management, harvesting and post harvesting handling) (Wannamolee 2008). The majority of Thai GAP farmers certified under level 3 QGAP certification, accounting for 5% of total farmers in Thailand (Amekawa, 2010) while less that 10,000 farmers' in EU exported commodity (such as longan, mango, etc.) certified under Thai GAP certification. The general comparing between ThaiGAP and QGAP are shown on below table.

Table 2- 1 General comparison between ThaiGAP and QGAP

Content	ThaiGAP	QGAP (Thai National GAP)
Number of farmers	< 10,000 farmers	5% of Thai farmers
International GAP harmonizing	GlobalGAP	ASEANGAP
Main market	Europe, USA, Canada	No specific
Main commodity	Longan, mango, niche market	No specific
Competent authorities	ACFS, third-party private inspectors, and private technical advisor	MOAC (DOA, DOAE) and ACFS
Qualification	> 90% of CCP	> 50% of CCP
Period of certificate	2 years	2 years

The main differences of ThaiGAP and QGAP are the qualification from expected markets for export. ThaiGAP was an acceptable standard for EU or markets which strictly require agricultural safe food qualification. ThaiGAP harmonizes with the GlobalGAP. More than 90% of ThaiGAP control points are checked by inspector for farmers' ThaiGAP standard qualifications. Thai National GAP (QGAP) was established to encourage the farmers' agricultural food safety issues. It developed both farmers' domestic and exporting competitiveness. QGAP has been widely promoted in many commodities by Thai government under the responsibility of MOAC. The competent authorities of both GAP (ThaiGAP and QGAP) were different, although the accreditation body of both is ACFS. QGAP inspection body is reposed by DOA, and advisory body is responded by DOAE, while both ThaiGAP and QGAP's advisory and inspection bodies are responded by third-party, private organizations. Because of strict qualification, ThaiGAP has not yet extended widely throughout export-oriented commodities.

Farmers who like to acquire QGAP certificate have to submit the application to the local DOA or DOAE. The farmers were trained and instructed about GAP standard by the extension officers through many kinds of extension activities without any registration fee. The local DOAE officials then inspect the farmers' orchards and submit approved farmers list to the local DOA. DOA officers who are qualified as GAP inspectors would directly make an appointment with each farmers for inspection. Afterwards, the farmers are checked for their GAP implementation on their farm site based on 86 control points (CP), and 22 critical control points (CCP) of the GAP requirements. Those control points consisted of 8 GAP elements which are water resource, cultivation site, use of agricultural substance, product storage and on-site transportation, disease and pest-free production, management of quality production, harvesting and post-harvesting handling, and data recording. Those farmers who accept and practice at least 51% of these control points are qualified as GAP farmers. The contents of GAP in each elements are shown in Table 2-2.

Table 2-2 : Number of CP and CCP in each Thai National GAP (QGAP) eight elements

GAP element	CPs (%)	CCPs (%)	Total (%)
water resource	9 (10.7%)	2 (9.1%)	11 (10.2%)
cultivation site	9 (10.7%)	2 (9.1%)	11 (10.2%)
use of agricultural substance	10 (11.9%)	2 (9.1%)	12 (11.1%)
product storage and on-site transportation	12 (14.3%)	3 (13.6%)	15 (13.9%)
disease and pest-free production	11 (13.1%)	2 (9.1%)	13 (12.0%)
management of quality production	21 (25.0%)	8 (36.4%)	29 (26.8%)
harvesting and post-harvesting handling	9 (10.7%)	2 (9.1%)	11 (10.2%)
data recording	5 (5.9%)	1 (4.5%)	6 (5.5%)
Total	**86 (100.0%)**	**22 (100.0%)**	**108 (100.0%)**

Approximately 20% of total control points of QGAP standard are CCPs, while the rest are CPs (Figure 2 -2) . There are eight elements in QGAP standards. Within these eight elements, they could be classified for CCPs and CPs. About 30% of QGAP total control points focused on "management of quality production" topic. CCPs are the points that the farmers' needed to strictly implement on their farm. Of course, the QGAP inspectors also strictly check these CCPs of farmers' conditions after farmers applied for QGAP certificate. CCPs are the strong standard conditions to guarantee QGAP reliability for certified farmers' food safety production. CPs are the points to distinguish the level of farmer's QGAP

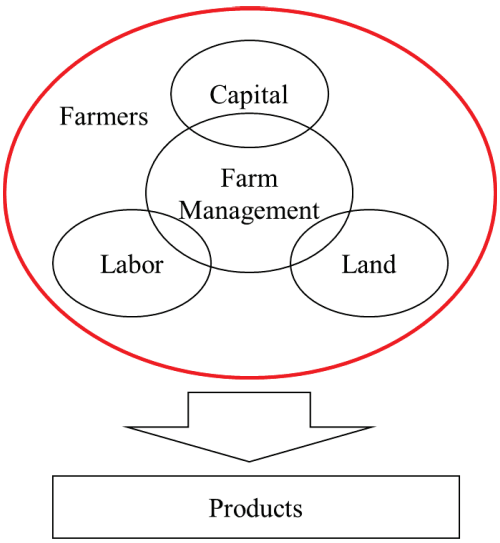
certificate. The farmers need to be approved their farm practice under CPs at least 51% for first level of QGAP certificate.

2.2 Farmers' farm structure and their management

2.2.1 Farm structure definitions and its components

The structure of agriculture referred to the number and size of farms; ownership and control of resources and the managerial, technological and capital requirements of farming (Knutson et al., 1990). Farm Structure referred to farm size and numbers, tenure patterns, legal organization (sole proprietorship, partnership or corporation), the market arrangements under which farmers buy and sell, and the institutional arrangements (including the public sector) influencing the farming industry (Food and Agricultural Committee, 1984). Changing of farm structure were influenced by changing distributions in an industry context, production decisions and organization, and resource ownership and control (Stanton, 1990). Farmers' farm structure in each area were different. It is depended on their culture, commodities, and supported policy in each area. The general farm structure are shown in Figure 2-4.

Figure 2-4: General farmers' farm structure



There are four components (land, labor, capital, and management) occurred in every farmers' farm structure. Farm management are the most important component for the farmers to use the resources for the maximum efficiency. GAP provides an appropriate farming method which directly influences farm management. Farm structure may be directly influenced by the GAP standard adopted. Moreover, differences on farm structures influence farmers' GAP implementation which depends on farmers' understanding on QGAP, which will be explained in the next section.

2.2.2 Farmers' farm structure and their standard adopting

Schreinemachers et al. (2012) studied on the lychee cultivation in northern Thailand. They found that GAP farmers used lesser pesticides than ordinary farmers, while there was not much difference as regards income between both. This was because GAP can improve farmers' cultivation through accessing appropriate farming techniques such as input control and farm management. According to their study, GAP standard did not change the farmers' product itself. But GAP improved their knowledge and vision to improve quality of

product. This means that GAP directly influenced the farmers' capability, and indirectly affected their farm structure.

Gazi (2012) reviewed GAP for Tomato commodity, and found that the farmers' behaviors were changed after they had implemented GAP standard on their farm. Valuable markets were available for those farmers who were certified as GAP farmers. This study argued that, farmers' market accessibility was changed by their product quality improvement after GAP implementation. High quality product markets searched the GAP certified products. Information on product qualification was provided and distributed to the farmers. They could adapt their farming farm structure to standardized-requirements. GAP itself does not provide any specific market, but it provides reliability for the stakeholders on a global scale. The effects of demand or GAP product on market environment will be explained in the next section.

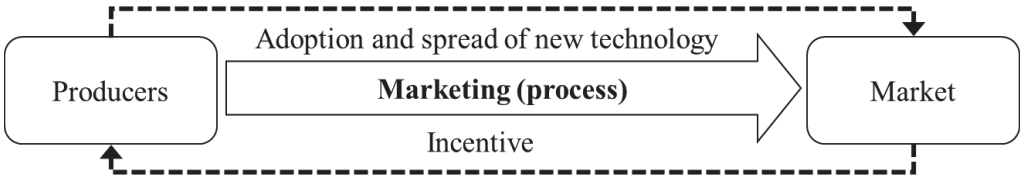
2.3 Effects of demand on marketing environment

Broadly defined, marketing is a social and managerial process by which individuals and organizations obtain what they need and want through creating and exchanging value with others. In a narrower business context, marketing involves building profitable, value laden exchange relationships with customers (Kotler and Armstrong, 2012). Marketing is the performance of business activities that directs the flow of goods and services from producers to users.

Agricultural marketing plays an important role not only in stimulating production and consumption, but in accelerating the pace of economic development. Its dynamic functions are of primary importance in promoting economic development. For this reason, it has been described as the most important multiplier of agricultural development. One of the importance of agricultural marketing is the adoption and spread of new technology. The marketing system helps the farmers in the adoption of new scientific and technical knowledge. New technology requires higher investment and farmers would invest only if

they are assured of market clearance at remunerative price (Kotler et al., 2002). The outflow of marketing effects on the farmers' production are shown in Figure 2-5.

Figure 2-5 : Marketing effects on farmers' production



GAP was promoted to support farmers' market access with the safe food qualification. For export market especially EU, products must be certified GAP. GAP is a standard-requirement for food safety. According to the Figure 2-3, there were 2 ways of relationship between market and producers on any farmers' standard practices. GAP is required by a supply chain in order to secure food safety. Markets strongly demand standardized-products as regards food safety. The farmers would improve their production methods once the market provided the premium price for them. GAP itself contained the techniques and knowledge to improve the farmers' ability for producing safe food and adopting standardized-requirements, through which the farmers can improve product quality. Valuable price market normally accepted the HQ product for the farmers. Therefore, this study evaluated the GAP as a new appropriate method which would motivate farmers to conduct sustainable farming. They might learn GAP for increasing of their income. We can summarize that, there were two incentives the farmers could receive from the GAP implementation (knowledge and income). Therefore, market environment could automatically support the farmers to conduct safety agricultural product.

2.4 Practical standard incentive for farmers' implementation

Hobbs (2003) classified GAP economic incentives for farmers into two main categories. The first was from cost reduction. Adoption of GAP could reduce production costs such as

efficient use of labors, input selection, and sustainable farm management methods. In a case study in Kenya (Jaffee, 2003), GAP significantly improved the producers' cost effectiveness for their survival in a high competitive fresh vegetable market. They also improved farming methods in social, environmental, and economic aspects. GAP instructions led the farmers to control production costs by appropriate farming techniques.

The second incentive was that farmers might obtain additional price for GAP product. GAP-based production needs farmers' awareness to cultivate agricultural products in proper way to achieve standardized qualification. This was because the contents of GAP were adopted with many kinds of standards, and some contents caused conflicts with conventional farming techniques. Hence, it was difficult for farmers to adopt this new standard with their conventional farming methods. However, they could improve quality of products through this kind of new technology adopted, according to their market accessibility. It was expected that, GAP-certified farmers might easily access to a premium market which would give satisfied price for the quality of product. Therefore, the farmers' GAP awareness was one of the factors to improve their market accessibility.

According to the previous studies, GAP incentive consisted of 2 categories. The first incentive is the direct one. *The direct incentive was an appropriate farming knowledge, management, or information.* This is because GAP has been developed by a wide varieties of global acceptable standards, such as HACCP and IPPM. However, GAP adopted those standards into the whole process of agricultural production. The adopted contents were transferred into a GAP manual which the farmers had to implement farming techniques. The second incentive is the indirect one. *This means the benefit that the farmers get after conducting GAP farming.* Farmers' adopting of new cultivation methods also could contribute the negative effect for them which classified as economic disincentive. The summation of economic incentive and disincentive is shown as cost efficiency which is the proportion of their income and production cost. However, their cost efficiency rational is driven by the market availability in the focused area. The farmer might achieve these benefits after their product were sold in the market.

A market did not fix a price for GAP product, but it gave additional price for HQ product. To improve the farmers' HQ product ability, the farmers needed to learn and understand GAP standard. However, the farmers who had different background could not equally perceive the same knowledge from GAP standard. That's mean their GAP standard understanding was different which was depended on their cultivation background.

2.5 Effects of farmers' GAP standard understanding

In general, farmers adopt a new technology with their conventional farming methods because of market availability and visible incentive (Hobbs, 2003). The majority of GAP product are exported to valuable price markets which motivate farmers to adopt GAP standard (Berdegué & Balsevich 2003). However, the farmers' level of standard implementation are different, which depends on their internal and external factors (Pongvinyoo et al., 2014). It is difficult to control quality of product, since agricultural product have many varieties. Therefore, the different level of farmers' GAP implementation differently influenced their product quality.

Hobbs (2003) concluded that, the farmers' understanding on agricultural standard directly influenced the level of implementation. Whereas the farmers improve their understanding of agricultural standard, they possibly adopted those knowledge into their conventional farming techniques to access a higher price marker. Therefore, the farmers' GAP understanding is one of the indicators to evaluate farmers' GAP practical implementation.

Sriwichailamphan et al. (2008) evaluated the factors that influence farmers' GAP adopting in pineapple farming in Thailand. This study revealed that, age, farm size, and contract situation (market assessment) influenced the farmers GAP understanding. Consistent with the study of Mankeb et al. (2009) that, the farmers' GAP understanding influenced by the farmers' background information (age, farming experiences, and education). Salakpetch

(2004) indicated that level of farmers' education and GAP extension services were important factors to improve the farmers' GAP understanding.

According to the model of motivation, perception is one of the learning processes, which leads to human behaviors/implementation (Buckley and Caple, 2007). GAP perception is an incentive which can lead to its implementation among farmer (Bandura, 1982). Perception in this study refers to the collection of GAP knowledge and its interpretation among the farmers who are ready to practice GAP farming. Some previous studies (Bandura, 1982; Gist, 1987) found that five components could influence human perception, including individual personalities, motivation, emotion, proficiency, and situation. Furthermore, self-confidence and mastery experiences played roles in increasing human perception (Amekawa, 2013; Gist, 1987). Farmers' self-confidence refers to the belief in themselves through their abilities to achieve personal goal (Benabou and Tirole, 2002). However, economic compensation and promotion motivated the farmers to practice conservation (Ryan et al., 2003).

GAP extension services and market conditions possibly motivates the farmers to acquire GAP knowledge for their future implementation. Therefore, perception is a motivation evaluator. Many previous studies on Thai national GAP revealed that the farmers' individual personality affected their perception (Amekawa, 2010; Kersting et al., 2012). Farmers field school (FFS) was also an influential factor that affected the farmers in implementing GAP knowledge on their pomelo orchards in Chaiyaphum province (Amekawa, 2010). Thus, farmers' different personality backgrounds might not have influenced GAP implementation rather than their opportunity or access to practices.

According to the previous studies, the factors influenced the farmers' GAP understanding could classified into 2 categories as follow:

1. *Internal factors*: These are the personal information of the farmers which included gender, age, year of school, cultivation area, experiences, and self-confidences, etc.

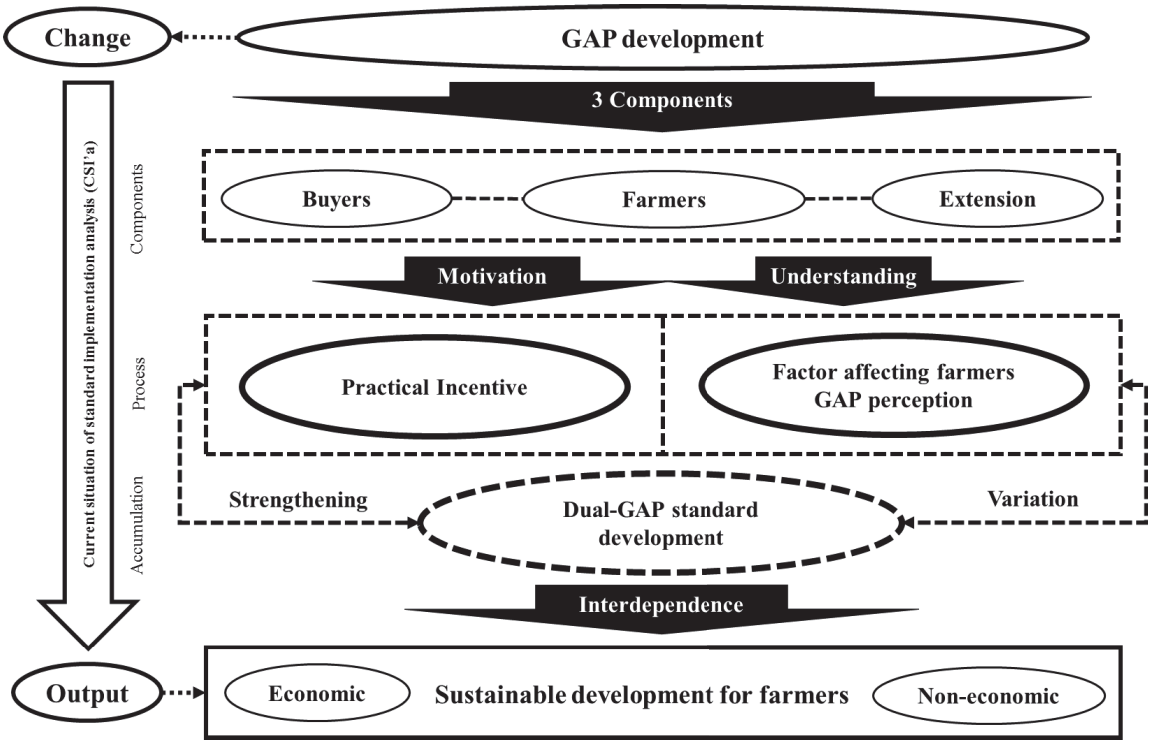
2. *External factors*: These include the GAP market situation and extension services for the farmers.

The previous studies indicated that, each of commodities had the different factors influenced the farmers' GAP understanding. Therefore, the farmers' GAP implementation was also different which depended on their GAP understanding.

2.6 The current situation of standard implementation analysis (CSI'a)

The main target of this study aimed to identify the current situation of GAP development in Thailand, focusing on the current farmers' GAP understanding, dual-GAP development, actual incentives, and market for GAP product market situations. The current situation of standard implementation analysis (CSI'a) were performed in this study. Farmers' incentive from GAP implementation or GAP motivation was the output of relationship between market and farmers. On the other hand, linkage between extension and farmers could indicate by famers' GAP understanding. The contents of thesis are shown in Figure 2-6.

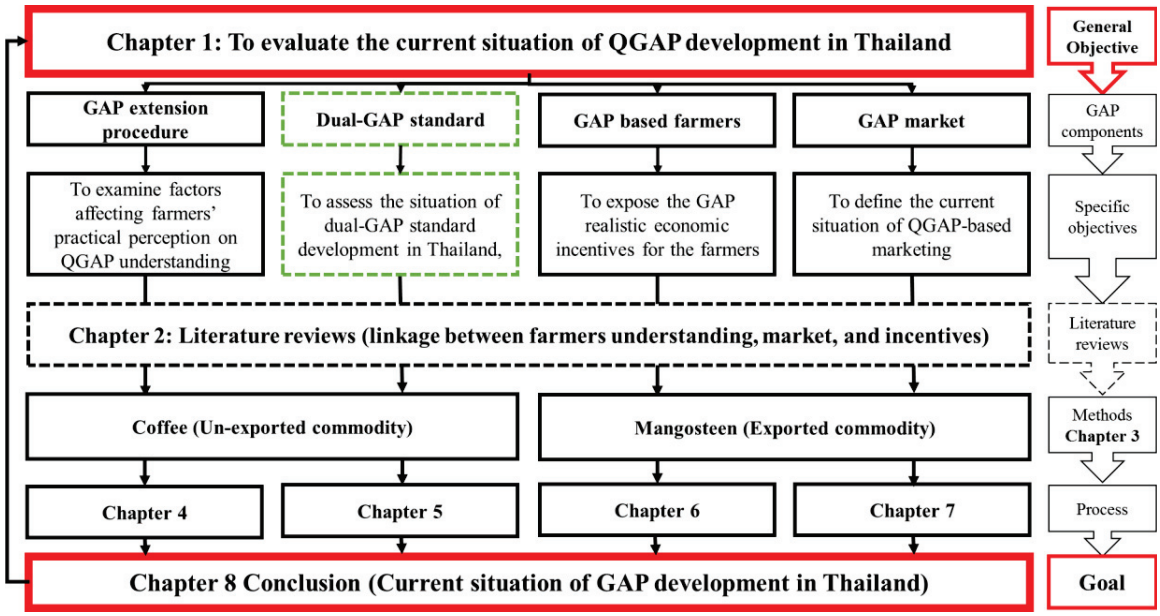
Figure 2-6 : The current situation of standard implementation analysis (CSI'a)



CSI'a based on the current practical famers' GAP practices. Therefore, cross-section data were mainly used for analyzing. The outflow of CSI's started from the top of the figure. The main stakeholders for the GAP system were classified as three pillars for its development which were farmers, traders (markets), and extension services. GAP methods were promoted by extension officers. Therefore, the efficiency of extension services could be evaluated by using the current level of farmers understanding on GAP standard. The farmers' GAP motivation was indicated by the current incentives. The output of both indicators (practical incentive and factors influenced farmers' perception) was shown on the second layers (process procedure). The third layers indicated the private sector intervention on the GAP standard development which could improve quality of product to compete in the global market. These advantages were investigated, which these advantages

were developed into the "*Model of Dual-GAP standard development for un-exported commodity*" in the last chapter.

2.7 Conceptual framework



The main purpose of this study was to evaluate the current situation of GAP development in Thailand. There were three components on the GAP development in this study which were GAP extension procedure, GAP-based farmers, and GAP-certified product market. GAP three components were investigated by the specific objectives for each components. Coffee was selected as un-exported commodity, while mangosteen was selected as exported commodity.

Farmers GAP understanding and factors influenced will show in Chapter 4. The dual-GAP private standard development were investigated to indicate the roles of private standard development in Chapter 5. The process of GAP implementation could indicate by GAP incentive for the farmers in Chapter 6. GAP current markets were evaluated and shown in

Chapter 7. Finally, we could estimate how the direction of GAP development in Thailand in each different commodity which are the main purpose of this study.

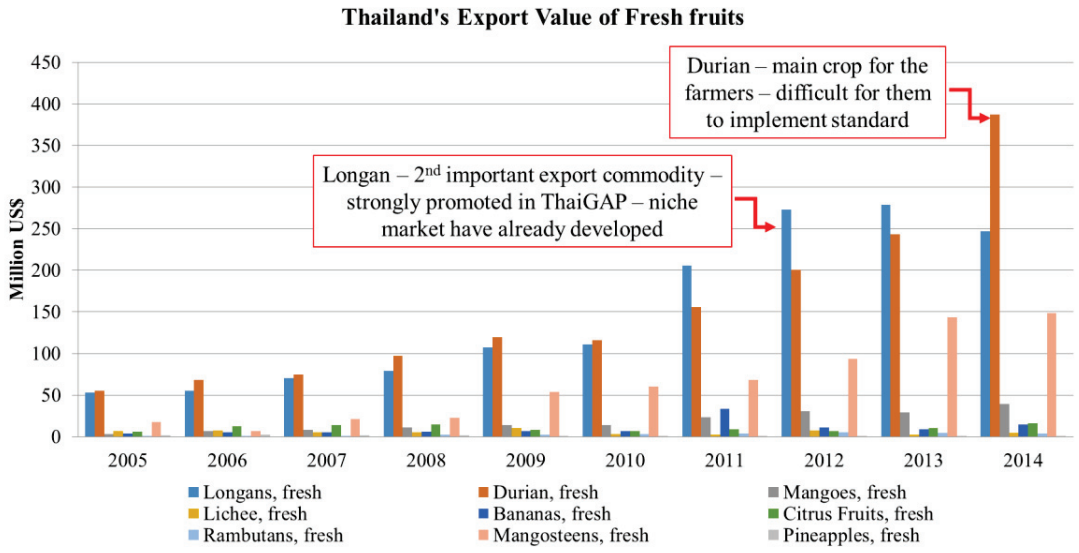
Chapter 3 Methodology

Detail geographical information on research field, primary and secondary data collection are firstly described below, and methodology adopted in this study will be discussed in depth.

3.1 Selected products

GAP established to support the farmers' conducting food safety. Improving of food safety producing to the global acceptable standard means the improving of farmer' export ability. So, GAP was one of the instruments to support the farmers' valuable price market accesses. Therefore, this study focused on the exported efficiency of the targeted fruit which have been implemented GAP. Since 2005, Thai agricultural export volume approximately had 10% market share of total Thai exported volume, while the value of agriculture export volume had about 70% of agricultural market share. Thai overall exported volume of important fruits commodity are shown on Figure 3-1.

Figure 3-1 : Thai overall exported volume of important fruits commodities (2005 – 2014)



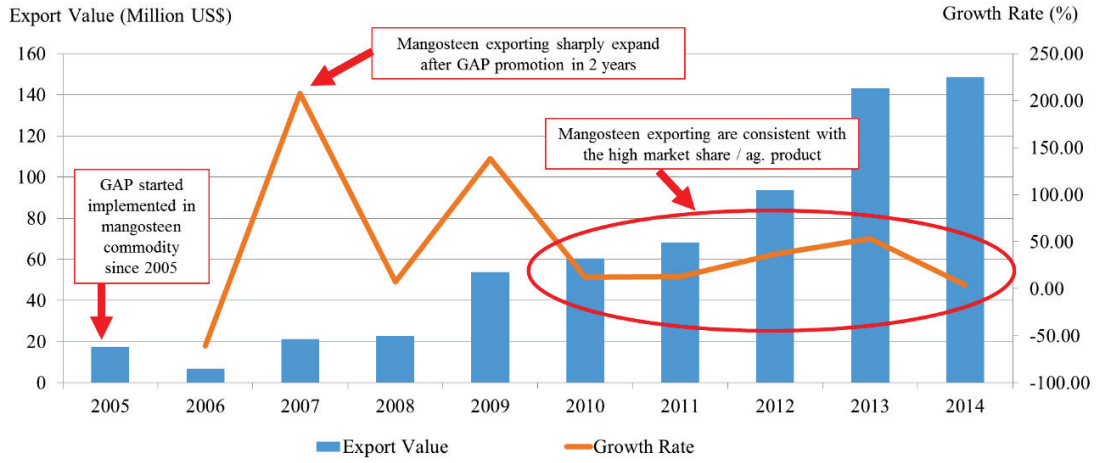
Source: Information and communication technology center with cooperation of the Customs department

Durian had the largest proportion of exported value compare with the others. In 2014, the exported volume of durian was 32.25 million USD, accounting for 2.23% of total agriculture exported volume, which was the first ranking of export tropical fruits. However, durian was not selected as the exportable commodity respondent, because it had many variesties which was not appropriate for the market analyzing from its price fluctuation, same as the longan commodity. GAP promoted the appropriate farming techniques to support the farmers' cultivation ability. Therefore, the lowest variety commodity was a good case study of export commodity to reduce the flactuation of market price.

3.1.1 Respondent of exported commodity: Mangosteen

According to Thai important fruit export, mangosteen were exported in the third rank for 148.62 USD in 2014. Mangosteen export value and its growth rate was shown in the below figure 3-2.

Figure 3-2 : Thai mangosteen exported value and its growth rate (2005 – 2014)

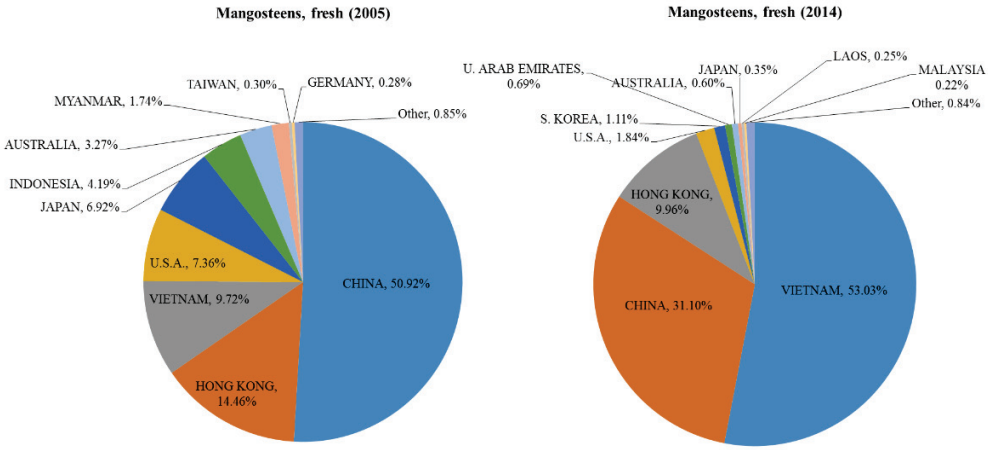


Source: Information and communication technology center with cooperation of the Customs department

Mangosteen was selected as the case study for exportable commodity because of its price stability. There was only one variety of mangosteen in the market. It was priced by its

product appearance, product quality, and market mechanism. Mangosteen has been implemented GAP since 2005. In 2007, Thai mangosteen exported for 21.15 USD which increased for 207.41% from exported value in 2006. GAP was the appropriate farming methods for the farmers to produce the quality safe food might influenced the market demand for the mangosteen in the global market. Its export value rapidly increased since 2007 after MOAC had promoted GAP for the farmers for 2 years. In 2014, it could export for 168.62 million USD. The exported destination of mangosteen of 2005 and 2014 are shown in below figure 3-3.

Figure 3-3 : Thai mangosteen exported destination in 2005 and 2014



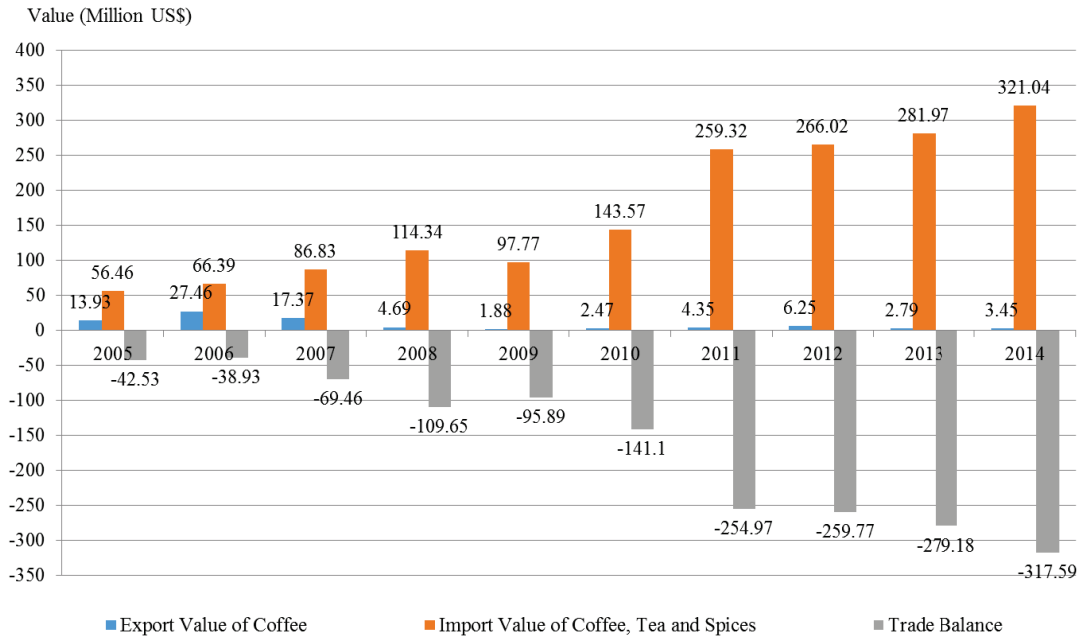
Source: Information and communication technology center with cooperation of the Customs department

Thai mangosteen main exported destination was China in 2005 with 50.92% of total export value. Although the main exported market was changed to Vietnam in 2014, the proportion of China export value was still increased. This was because Thai mangosteen production was increasing. China became the valuable price market for mangosteen, while Vietnam was the secondary market. GAP mangosteen was mainly targeted for export to China market. Therefore, GAP surely enhanced the farmers to supply their mangosteen product for China market.

3.1.2 Respondent of un-exported commodity: Coffee

In 2012, 169 kind of agricultural commodities was promoted under GAP standards. It was included the exportable and un-exportable commodities. Coffee were selected as the sensitive product under the WTO agreement by the MOAC. Sensitive products are the product that Thai government needed to control the imported volume to protect the farmers in their countries. Thai coffee trade balance are shown on the below figure 3-4.

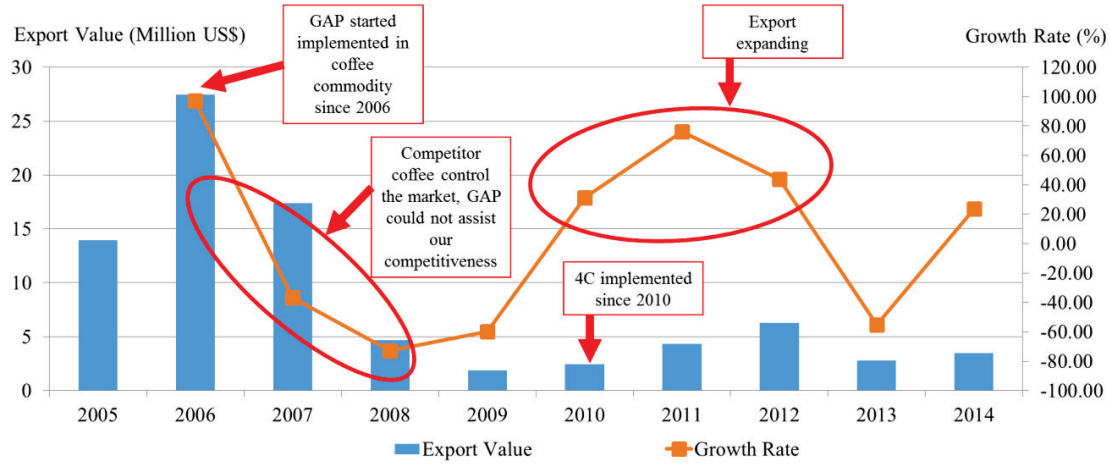
Figure 3-4 : Thai coffee trade balance (2005-2014)



Source: Information and communication technology center with cooperation of the Customs department

Thai coffee consumption was larger than production volume. It was because the limitation producing are and higher wage cost compare to the other countries. Thai needed to import a lot of coffee from abroad. Therefore, coffee was selected as one of the sensitive product since 2005. Coffee export value and its growth rate was shown in the below figure 3-5.

Figure 3-5 : Thai coffee exported value and its growth rate (2005 – 2014)



Source: Information and communication technology center with cooperation of the Customs department

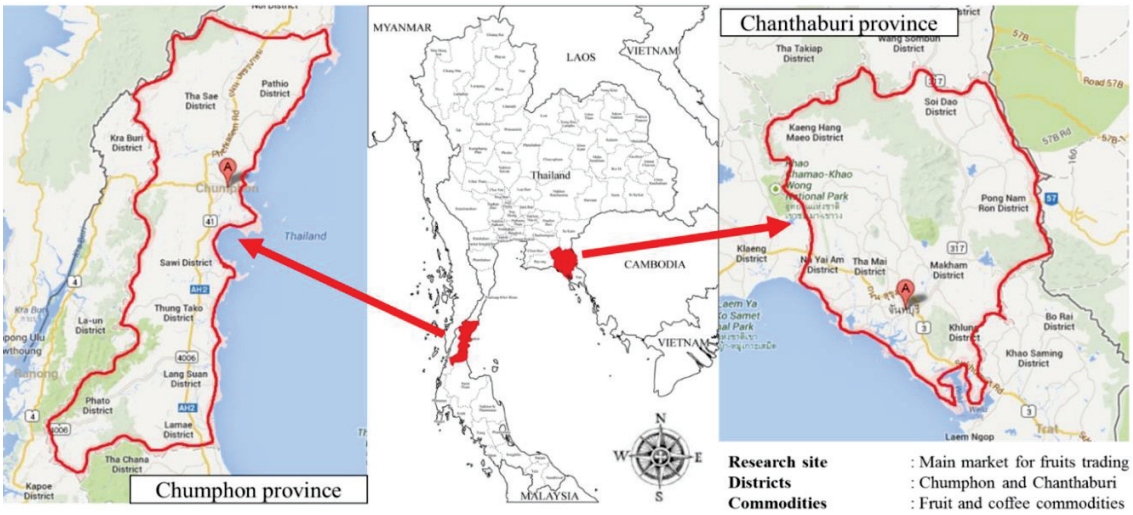
Dual-GAP standard is the standard that developed together with the GAP in the same commodity. Coffee was selected as the un-exportable case of this study because it clearly had the dual-GAP standard development (4C). 4C is the dual-GAP specific sustainable standard for coffee commodity. GAP was implemented in coffee commodity since 2006. The export value was not affected by GAP implementation. In 2007, export volume was sharply decreasing. However, during 2010 – 2012, Thai coffee could expand export value after 4C started implementing in 2010. Therefore, dual-GAP standard for coffee commodity might influence coffee export structure.

3.2 Study area

The series of surveys included in this study was conducted in two provinces located in the eastern and southern parts of Thailand (Figure 3-6), namely, Chanthaburi and Chumphon provinces, respectively. Three districts of each province were selected. Sawee, Tasae, and Pato districts were selected in Chumphon province. While, Khlung, Tha Mai, and Makarm were selected in Chanthaburi province.

This study focused on the fruit commodity which is directly consumed. That means it also takes the highest risk for food safety. Therefore, GAP has been widely promoted among these commodities. The majority of Thai fruit orchards always cultivated under inter cropping system which cultivate fruit more than one type in one area. Inter-crops which is cultivated together with the main crop in the farmers' orchard were focused in this study. It was difficult for the farmers to adopt standards with their conventional farming techniques in the large inter crops area because many standards are decided for mono cropping system. Consequently, farmers preferred to apply the standard on their separated area or inter crop. Therefore, inter crop is effective to implement the agricultural standard than the primary or main crop.

Figure 3-6 : Map of Thailand showing the two study provinces



Source: Google Map, and www.freemap.jp (10th November, 2013)

3.2.1 Study areas in Chumphon province

Chumphon is the fourth biggest southern province with approximately 6,010 square kilometers land area. It is located along the west coast of the Gulf of Thailand with an eastern coastline length of 222 kilometers. Its neighboring provinces are Prachuap Khiri

Khan, Surat Thani and Ranong to the northeast, south and southwest, respectively. To the northwest it also borders the Burmese province of Tanintharyi.

Chumphon is under the influence of the southwest and northeast winds. As a result, there are only two seasons in Chumphon. First is the summer season which starts from February to the middle of May. It is the time of seasonal change after the northeast wind recedes in strength. The rainy season starts from the middle of May to the middle of December. It is the time when the southwest wind from the Andaman Sea turns into a highly-humid air mass and changes to become the northeast wind which brings heavy rain. The rainfall is approximately 1,553-2,344 millimeters a year. The average temperature in Chumphon is around 27.3 degrees Celsius, with an average high temperature of 34.8 degrees Celsius. The average low temperature is 21.6 degrees Celsius. The average high relative humidity is 97%, with the average low relative humidity is 49%. The average relative humidity throughout the year is 81%.

Chumphon province was selected as one of the case study sites because of the following justification:

1. *It is the 2nd largest fruit cultivation area in Thailand*: accounting for 17.5% of the total Thai fruit cultivation area
2. *Biggest coffee cultivation area in Thailand*: 176,307 rai (1 rai = 0.16 ha) or accounting for 55.6% of the total Thai coffee cultivation area
3. *Importance of coffee commodities*: coffee is 1 out of 4 sensitive products on the FTA in 2010. Coffee strategy was introduced to implement the standardization of coffee production, including GAP
4. *Private standard is widely implemented in this area*: This special situation could clearly illustrate the differences between private and public standard practical implementation

Coffee commodity were chosen as the product of focus, because there are two standards being developed and implemented for this commodity (GAP and 4C). Three major coffee production districts were chosen for sampling. The survey covered two, three, and two villages in Sawee, Tasae, and Pato districts, respectively. These three districts were the representative of farmers' standard implementation for Thai coffee commodity where farmers applied both standards. The coffee market emphasis changed from the domestic market into overseas markets. This means the farmers' standard implementation influenced their livelihood in practices. Moreover, Chumphon province is the pilot area for Thai Coffee Strategy which is aimed to improve the quality of coffee production in Thailand.

A pre-survey was conducted on 10 coffee farmers in Sawee, Tasae and Pato districts. There was not much difference as regards to coffee cultivation, socio-economics perceptions and opinions on GAP standards among the farmers interviewed. Due to the homogeneous distribution of the respondents, structured questionnaires were administered on 56 GAP coffee farmers (GCFs), accounting for 13.6% of 411 GAP-practicing farmers in seven villages in the province. These farmers had expressed their willingness to renew their GAP certificates in 2013. The chosen respondents still remembered the GAP contents and were familiar with its instructions which were extended by the government officers. Extension officers were also interviewed about the local extension methods used during the same period.

Not only GCFs, but also 4C farmers were also included in this study as representatives of private standards farmers. One-hundred twenty eight (128) 4C farmers were interviewed by using structured questionnaires, accounting for 31.1% of the population, who were randomly chosen from 411 GAP and 4C practicing farmers in seven villages in the province. The respondents were interviewed in-depth by the research team at their farms and village education center. The structured questionnaires were used to collect the information on farmers' socio-economic background, 4C farming practices, current market situation, practical extension services methods and their attitudes towards QGAP and 4C

satisfaction. In addition, 10 coffee farmers were chosen for focused group discussion (FGD) with the cooperation of GAP promotion officers and traders.

3.2.2 Study areas in Chanthaburi province

Chanthaburi is located in the east of Thailand, bordering on the northeastern the shore of the Gulf of Thailand (Figure 3-6). The southwestern part of the province faces the Gulf of Thailand and thus is mostly coastal alluvial plains, while its hinterlands are quite mountainous. It is bounded by Battambang and Pailin of Cambodia to its northeast side and by the Thai province of Trat on the southeast. Sa Kaeo province lies to the north of Chanthaburi.

It is a major production area of tropical fruits in eastern of Thailand. In 2007, it produced nearly 380,000 tons of durian, which was 45.0% of Thailand's total durian production, approximately 27.0% of the entire world's production.

Mangosteen (*Garcinia mangostana*) recognized as “Queen of fruit”, is a highly prized fruit in Southeast Asia. In 2012, Thailand produced 278,919 tons from 65,448.32 hectares (1 hectare = 6.25 rai) (Agricultural Statistics of Thailand 2013), accounting for more than 50.0% of global output. The major production areas of mangosteen were in the eastern and the southern parts of Thailand. Thailand has a 90.0% of share in world market (FAO, 2011).

Mangosteen production did not much fluctuate much in this decade. The planted area ranged between 64,000 – 80,000 hectares, while the harvested area dramatically increased from 43,797 hectares in 2004 to 65,448 hectares in 2013, with a 49.4% of growth (Agricultural Statistics of Thailand, 2013). Increasing demand for mangosteen in the world caused such a rapid growth of production. The majority of Thai mangosteen was exported to China which is the largest tropical fruit importer in Asia. The export to China rose from 34,709 tons in 2005 to 127,992 tons in 2009.

Chanthaburi province was selected as one of the case study area because of the following justification:

1. *It is the first biggest fruit cultivation area in Thailand*, accounting for 29.6% of the total fruit cultivation area.
2. *Strategic area for Thai Fruit Strategy 2010-2014*, QGAP was widely and aggressively implemented in this area.
3. *Mangosteen* commodity was the biggest QGAP certified product in this area.
4. *There were the varieties of farmers in this area*, in term of socio-economic background, farmers' organization, and differentiation on QGAP practical implementation in this area.
5. *Biggest fruit markets in Thailand*, three biggest fruit export companies targeted Chanthaburi province as the first priority for fruit production area and a number of terminal points have been established in this province.

Chanthaburi is one of the strategic areas for GAP implementation due to its highest proportion of the fruit producing area in Thailand (Agricultural Statistics of Thailand, 2013). In 2013, Chanthaburi farmers cultivated mangosteen in 21,961 hectares with the total production of 105,929 tons, accounting for 37.8% of the total production in Thailand (Agricultural Statistics of Chanthaburi province, 2014).

Although the number of mangosteen GAP-certified farmers declined, 3,670 mangosteen orchards were still inspected and certified for QGAP certification. They were 64.0% of the total number of fruit orchards in this province (Chanthaburi provincial agricultural extension office, 2014). GAP was widely extended to Chanthaburi farmers (Department of Agriculture, 2009). In 2010, the number of mangosteen GAP-certified farmers decreased to 8,210 orchards in eastern Thailand; however it still was the highest number followed by durian and longkong.

Based on the diversity of mangosteen farmers in this area, the population of this study was active mangosteen growers who were certified by the DOA. The population consisted of 1,968 farmers (Department of Agriculture, 2014). The sample size of 112 growers was calculated by using the formula (Yamane, 1973). The respondents were randomly selected by simple sampling methods in Tha Mai (33), Khlung (46) and Makham (33) districts which are the biggest mangosteen cultivation areas in Chanthaburi. The proportional sampling depended on the size of the GAP-certified farmers in each district. These three districts are placed on the borders between Chanthaburi and Trat provinces, where a large number of traders/exporters opened buying points to collect mangosteen. A number of exporters opened purchasing stations in Khlung district, while Tha Mai district attracted retailers including national super markets. In Makham district, the provincial agricultural cooperative established a business link with one of the three biggest exporters who collected high-quality mangosteen. QGAP-certification was a requirement for those farmers who would market high-quality products for export-traders.

3.3 Survey procedure

Data collection was conducted during three periods: March to April 2012, October 2013, and April to May 2014. Interviews were conducted by using semi-structured and structured questionnaires, by using qualitative and quantitative questions including open and close ones. In Chumphon province, GAP-certified farmers, 4C farmers, traders, biggest company managers, and agricultural cooperatives officers were included as respondents. Meanwhile, the respondents in Chanthaburi province were GAP-certified farmers, traders, and exporters. GAP extension officers in DOA and DOAE were interviewed as key informants. Pre-test questionnaires were been applied to 20 farmers of both provinces before the actual interview.

The survey in Chumphon province was aimed to assess the current situation of farmers' GAP implementation and extension services, with focus on farmers' GAP understanding, attitudes, and opinions towards its implementation. It was also focused on the dual standard

development which is common code for coffee community (4C) promoted by the private sector. Meanwhile, major concerns of the survey in Chanthaburi province focused on incentives from GAP implementation and the current market situation. The questionnaires consisted of farmers' practices on 8 GAP-components (water source, cultivation site, use of agricultural hazardous substance, pre-harvesting management, harvesting management, product storage and on-site transportation, worker health and welfare, and data recording), in order to evaluate the level of farmers' understanding on GAP. The example situations of GAP implementation were presented, then the farmers appropriately answered following their practical farming methods.

3.4 Data collection

3.4.1 Primary data

Interviews were conducted basically using in-depth and face-to-face interviews by using structured questionnaires. Group discussions were also designed and implemented to explore the current situation, and problems between farmers and GAP stakeholders. Random sampling method was adopted. In Chumphon province, the total sample was 184 from coffee farmers; 56 respondents from GAP farmers and 128 for 4C farmers. In Chanthaburi province, the sample was collected from 112 mangosteen farmers.

3.4.2 Secondary data

At the central government level, secondary data were collected mainly from the Ministry of Agriculture and Cooperatives (MOAC), Department of Agriculture (DOA), Department of Agriculture Extension (DOAE), and National Bureau of Agricultural and Food Safety Standard (ACFS). Statistical data, published books, scientific journals, and other resources were also collected.

3.5 Data analysis tools

3.5.1 Descriptive analysis

Descriptive analysis includes frequency distribution, mean, and standard of deviation. Mean is a number equal to the sum of the data value, divided by the number of the data values that were assumed. Descriptive analysis will emphasize on socio economic conditions of respondents, research location, and current situation of GAP and 4C extension procedure. Descriptive statistics is the branch of statistics that focuses on collecting, summarizing, and presenting a set of data (Levine and Stephan, 2005) Descriptive statistics essentially aimed to provide a better understanding of how frequent the data of values, and of how much variability there is around a typical value in the data (Fernandes, 2009). The results obtained from field observation, key informants' opinions, and un-official investigations were used to support the analysis.

3.5.2 Inferential analysis

Inferential statistical analysis infers properties about a population: this includes testing hypotheses and deriving estimates. The population is assumed to be larger than the observed data set; in other words, the observed data are assumed to be sampled from a larger population. Inferential statistics can be contrasted with descriptive statistics. Descriptive statistics is solely concerned with properties of the observed data, and does not assume that the data came from a larger population.

Inferential statistics deal with drawing conclusions and, in some cases, making predictions about the properties of a population based on information obtained from a sample. While descriptive statistics provide information about central tendency, dispersion, skew, and kurtosis of data, inferential statistics allow to make broader statements about the relationships between data. Inferential statistics in this study included ANOVA and regression analysis. The farmers' standard understanding was determined by ANOVA to

check their standard understanding differentiation in each focus areas. Regression analysis was performed for the prediction of the GAP knowledge impacts on the farmers' practical farm management.

Chapter 4 Factors Affecting the Implementation of Good Agricultural Practices (GAP) among Coffee Farmers in Chumphon province, Thailand

This chapter will analyze the factors influenced the farmers GAP understanding by using the case study of coffee farmers in Chumphon province. By approaching two specific objectives, we estimated the supporting conditions that are appropriate for farmers to introduce and implement GAP in a proper way.

4.1 Introduction

Coffee is one of the sensitive agricultural products for the export market (Ministry of Agriculture and Cooperatives, 2009). Therefore, GAP was chosen as an important public standard to increase coffee farmers' competitiveness and guarantee food safety for both domestic consumption and the export markets. It needed a globally acceptable standard as the minimum requirement for export and guarantees the food safety for exported agricultural commodities (Amekawa, 2010). However, Thai coffee farmers still encountered problems such as lack of technical knowledge and experience on GAP practical implementation.

The inefficiency of GAP implementation is caused by a low level of farmers' understanding of GAP (Buckley and Caple, 2007). Thai farmers' adherence to conventional farming methods was the challenge for GAP extension institutions in promoting the standard procedure for the farmers, which could improve the farmers' perception of the GAP standards. However, the GAP inspection procedures and limitations of extension services also caused farmers' low understanding of GAP, thereby leading to poor implementation in the past (Amekawa, 2010). Therefore, the current problems might be caused by the inefficiency of extension services provided by the Ministry of Agriculture and Cooperative (MOAC) authorities (Amekawa, 2013).

In Thailand, the coffee market condition did not give a direct incentive to the farmers to participate in the GAP theme. Not only was there a public standard for coffee commodities, there appeared to be a private standard provided by the biggest local private coffee processing company. This private standard provided higher coffee price than general coffee. To become the member of this private standard, the farmers were required GAP certification as their membership qualification. Even with the GAP certificate, coffee products could be sold at the same price as the ordinary coffee. This means only nominal GAP certification was demanded from the local coffee farmers. Minimum requirements from GAP certification might reduce the farmers' understanding of the GAP standard in the long term (David et al., 1996). It can influence the production of unstandardized products even under the GAP theme.

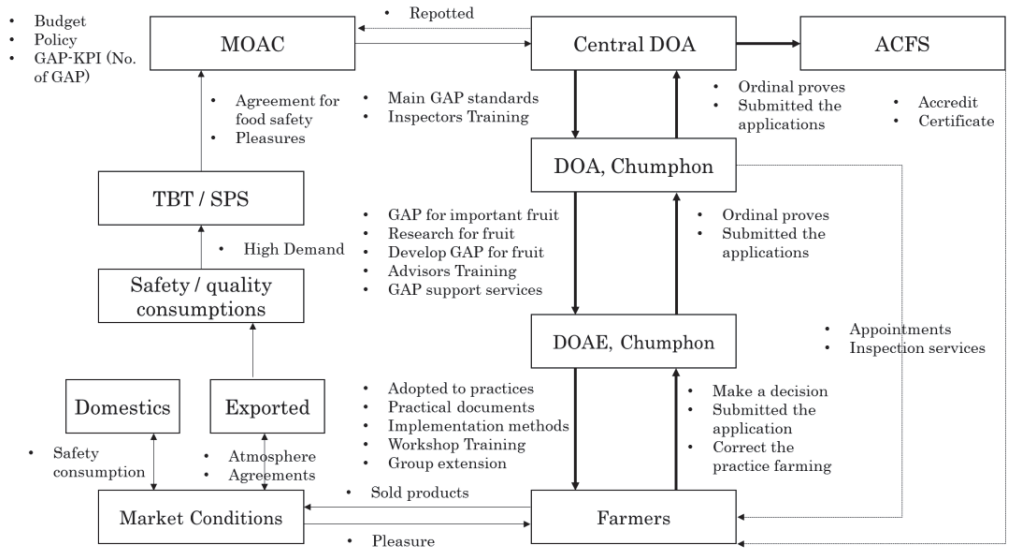
The limitations of GAP extension services and ineffective market conditions did not encourage the farmers to participate in the GAP theme. Therefore, the farmers did not completely adopt GAP standards into practical implementation, which might result to inferior Thai quality standards (Amekawa, 2010; 2013). Furthermore, very few studies focused on the Thai national GAP in coffee communities. The link between the coffee farmers' GAP perception and GAP implementation is unknown. The purpose of this study was to find out the factors affecting the GAP perception among GAP coffee farmers (GCFs), and identifying the implementation constraints of GAP extension services and its market conditions. This study also recommended some appropriate ways for the development of GAP extension methods.

4.2 Thai National GAP Scenario

GAP-established practical manuals have been promoted by governments especially in ASEAN countries including Thailand (Amekawa, 2013). The Ministry of Agriculture and Cooperatives (MOAC) first instituted GAP under its Agricultural Commodity Standard on Good Agricultural Practice for Food Crops in 2003 (Wannamolee, 2008). Since then, the Agricultural Standards Committee has revised some standards for better acceptance in

terms of both quality and safety of Thai agricultural products (Salakpetch, 2007). This is to keep up with rapidly changing global standards and to improve product competitiveness in the world market (Amekawa, 2013). Thai food safety regulation is based on Quality Management System (QMS). Within the QMS, three important bodies under the supervision of the MOAC have been established with specific advisory, certification and accreditation roles (Salakpetch, 2007). The Department of Agriculture (DOA) is mainly charged with an advisory function in encouraging and training farmers for the adoption of GAP. The Department of Agriculture Extension (DOAE) is tasked with the initial certification process after compliance. The National Bureau of Agricultural Commodities and Food Standards (ACFS) has the responsibility to assist GAP-certified farmers and their products to ensure products rigidly maintain GAP standards and are certified safe for domestic consumption and accredited for export.

Figure 4-1 : Thai National GAP institutions' functions and their practical implantation



Farmers who would like to acquire GAP certification have to submit the application to the local DOA or DOAE. The farmers were trained and instructed about GAP standard by the extension officers through the many kinds of extension activities (Fig. 4-1) without any

registration fee. Later, the local DOAE staff inspect the farmers' orchards and submit the kits of approved farmers to the local DOA. Then, DOA officers who were qualified as GAP inspectors would directly make an appointment with each farmers for inspection. The farmers should be checked for their GAP implementation on their farm site based on the 84 control points, and 22 critical control points of the GAP standards. These control points consisted of 8 GAP elements which are water resource (10.7%), cultivation site (10.7%), use of agricultural substance (11.9%), product storage and on-site transportation (14.3%), disease and pest-free production (13.1%), management of quality production (25.0%), harvesting and post-harvesting handling (10.7%), and data recording (5.9%). The farmers who accepted and practiced at least 51% of these control points were qualified as GAP farmers.

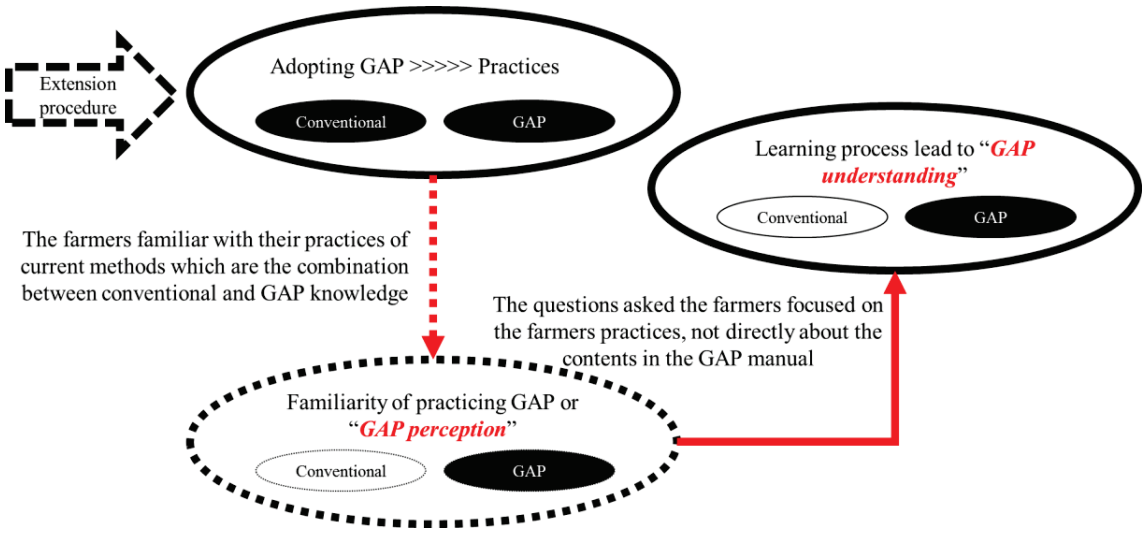
4.3 Methodology

The pre-survey was conducted on 10 coffee farmers in Chumphon province (Sawee, Tasae and Pato districts) which are among the biggest coffee cultivation areas in Thailand. There was not much difference as regards to coffee cultivation, socio-economics perceptions and opinions on GAP standards among the farmers interviewed. Due to the homogeneous distribution of the respondents, structured questionnaires were administered on 56 farmers, accounting for 13.6% of 411 GAP-practicing farmers in seven villages in the province. These farmers had expressed their willingness to renew their GAP certificates in 2013. This means the chosen respondents still remembered and were familiar with the GAP instructions which were extended by the government officers. Extension officers were also interviewed about the local extension methods used during the same period.

The structured questionnaires attempted to investigate the socio-economic characteristics of the farmers, and to categorize their current practical farming, perceptions, constraints, and opinions towards GAP regulations for Robusta coffee, including their market access and extension services. The questionnaires used the 3 Likert scales (2 = agree, 1 = Not sure, and 0 = disagree) as the measure for the GCFs' perception on GAP of each element while 5

Likert scales (5 = strongly confident, 4 = confident, 3 = not sure, 2 = not confident, and 1 = strongly not confident) for their GAP self-confidence evaluation. GCFs have complied with the GAP minimum requirements for the certification. Therefore, the farmers' GAP perception in this study was calculated by the summation of mean score of perception among GCFs on their GAP understanding of 84 control points (minimum 51.0% was required for certification) from the GAP manuals which were distributed to GCFs in the study area by DOA and DOAE. Farmers' GAP perception of their understanding is the farmers' ability to perceive the GAP knowledge and adopt it to their farming practices. After farmers perceived the GAP knowledge from the extension officers, farmers adopted this knowledge to their conventional farming methods. The farmers' practical methods mixed between both methods, therefore, it was difficult for them to distinguish between GAP and conventional techniques. The distributed questionnaires gave the example of the farmers' implementation which was referred to their GAP practices to observe their GAP perception. Consequently, this study can evaluate their current GAP understanding. The outflow of relationship between farmers' perception of GAP understanding and their GAP understanding are shown in below figure 4-2.

Figure 4-2 : The relationship between farmers' perception of GAP understanding and their GAP understanding



The data were arranged and described by statistical tools, and were analyzed to identify the factors affecting the GAP perception among GCFs by using simple linear regression analysis for 34 farmers (60.7%) whose perception missing value must be lower than 10.0%. In consequence, the socio-economic profiles in this study included farmers' age, years of education, cultivation area, and income per rai as the independent variables, as well as experiences denoting their years of practical coffee and GAP cultivation. In addition, farmers' self-confidence was measured by farmers' self-evaluation on GAP-base farming in each element. The extension services and market condition were also analyzed by using qualitative methods.

4.4 Results of the study

4.4.1 Socio-economic profile of respondents

The respondents of this study were almost equally divided by gender with 48% female and 52% male. Their ages ranged from 31 to 60; 30.4% of the respondents were in the 31-40 age group, followed by those in the 51-60 age group. Three-fourths of them worked on their farms by employing family labor because coffee cultivation and post-harvest do not heavily demand labor and skills. Only during the short harvest season were extra workers employed with wages fixed at THB 1.0-3.5/kg of harvested coffee. Forty-four point six percent (44.6%) of the respondents owned lands of up to 20 rai (1 rai = 0.16 ha) per family, while only 21.0% had land smaller than 10 rai. The farmers' coffee experiences ranged from 4 to 37 years: 41.1% of the respondents were in 11-20 years experiences group, followed by those in the 21-30 years experiences (26.8%). However, the difference of the farmers' coffee experiences has not made any variance on their income. The majority of farmers (44.6%) got incomes of between 10,000 – 15,000 THB/rai, 19.6% had 11-20 years coffee experiences and 16.0% had 21-30 years' experience. A majority of 17 farmers (30.3%) graduated from primary school or have lower educational level, and 8 farmers (14.3%) reached higher levels.

Table 4-1 : Respondents socio-economic background

Content		Number of farmers (n = 56)	percentage
Gender			
	Male	27	48.2
	Female	29	51.8
Age	*(year)*		
	21-30	7	12.5
	31-40	17	30.4
	41-50	11	19.6
	51-60	15	26.8
	> 60	6	10.7
Education			
	Less than primary school	12	21.4
	Primary school	28	50.0
	High school	12	21.4
	Vocational school	1	1.8
	Bachelor	3	5.4
Coffee cultivation area	*(rai)*		
	< 20	27	48.2
	20 - 50	27	48.2
	> 50	2	3.6
Coffee cultivation experience			
	1-10	14	25.0
	11-20	23	41.0
	> 20	19	34.0
Income from coffee	*(THB/rai)*		
	< 10,000	20	35.7
	10,000 – 15,000	25	44.6
	> 15,000	11	19.6

4.4.2 GAP perception among GCFs and factors affecting such perception

The farmers primarily received GAP information from the MOAC; therefore they made the decision to conduct GAP practical farming and qualify for the certificate according to the market situation. This was because of the farmers' expectation on the greater market access by conducting GAP. In general the GAP certificate was usually used as a marketing tool from the buyer side. The farmers' GAP familiarity on practices could be estimated by the GAP understanding. The mean scores of perception of the GCFs' GAP understanding on the control points in each elements perception are shown in Table 4-2.

Table 4-2 : Mean score of farmers' understanding and perception of GAP elements

No	GAP elements	Mean	S.D.
1	Water source	0.85	0.23
2	Cultivation site	0.77	0.33
3	Use of agricultural hazardous substance	0.85	0.22
4	Product storage and on-site transportation	0.97	0.11
5	Disease and pest-free production	0.94	0.16
6	Management of quality production	0.98	0.08
7	Harvesting and post-harvesting handling	0.80	0.27
8	Data recording	0.75	0.30
GAP perception among GCFs (Y): mean = 6.90, S.D. = 0.987			

The farmers had the lowest GAP understanding (0.75) on the "data recording" element even if the local GAP extension officers provided the data recording forms to every GCFs in the area. However, GCFs who were familiar and comfortable with their conventional farming methods did not bother to record their GAP farming procedures. Furthermore, the documents had unsuitable format for them. On the other hand, the farmers fully understood (0.98) the "management of quality agricultural production" element which was strictly checked by the GAP inspectors. Simple linear regression analysis was performed to examine the factors affecting perception of GCFs' GAP understanding among 34 GCFs of each independent variable (socio-economic profiles, coffee experiences and self-confidence). The results are shown in Table 4-3. Farmers' years of school (X_2), cultivation area (X_3), and self-confidence (X_7) had positive and significant impact on the perception of GAP understanding (Y). However, farmers' GAP cultivation experiences (X_6) had negative and significant impact on Y (X_2: $\beta = 0.452$, $t = 2.459$; X_3: $\beta = 0.326$, $t = 2.307$, X_7: $\beta = 0.450$, $t = 2.560$, and X_6: $\beta = -0.317$, $t = -2.063$ respectively, $p < 0.05$). Thus, the coefficient of determination revealed 41.3% variation in GAP understanding among GCFs as explained by the years of education, cultivation area, GAP cultivation experience and self-confidence.

Table 4-3 : Summary results, regression coefficients and descriptive statistics (n = 34) of selected predictors

Predictors (unit)	Mean	S.D.	t-value	GCFs' GAP understanding (Y)
				B
X_1 Age *(years)*	43.52	12.34	1.25	0.21
X_2 Years of education *(years)*	8.11	3.78	2.46	0.45*
X_3 Cultivation area *(rai)*	23.64	13.52	2.30	0.33*
X_4 Income per rai *(Thousand THB)*	12.07	5.53	-0.57	-0.08
X_5 Coffee cultivation experiences *(years)*	18.73	7.41	0.20	0.03
X_6 GAP cultivation experiences *(years)*	1.47	0.50	-2.06	-0.32*
X_7 GAP self-confidences *(NA.)*	3.50	1.11	2.56	0.45*
F change = 4.32, R^2 = 0.54, Adjust R^2 = 0.41**				

*p < 0.05, **p < 0.01

4.4.3 Constraints of GAP implementation among GCFs

1) Coffee farmer's GAP farming practices: GAP certification became less attractive for farmers because of the market conditions that were not directly supporting the farmers to encourage GAP-based production. It was found that 96.4% of the respondents did not have any system for data recording. However, most of them (90.0%) were more concerned with implementation of quality agricultural production methods because the Department of Agriculture Extension (DOAE) inspectors paid much attention on GAP compliance. The farmers still expressed confusion about the practical GAP processes and often made mistakes. For example, 89.3% of the respondents did not separate the storage for harvested products far enough from the chemical storage. All respondents did not use concrete surfaces in the solar drying of coffee fruits following the guidelines of the GAP manual. Only 35.7% of them achieved their initial financial goals by following GAP guidelines and applying its provisions to the other private standards.

2) Practical extension services for GAP: Extension officers were overworked and had many responsibilities with limited budget and time limitations. At present, only 12 extension officers of the DOAE are responsible for servicing more than 5,000 farmers in Chumphon and Surat Thani provinces. They provided technical information not only on

coffee and other crops, but also agricultural standards such as organic farming. The extension services provided information on technical farming and implemented the standard with documents, soil check sampling, standard practical consulting and certificate for standard farming, including inspection services. The inspectors randomly checked GCFs who followed the GAP checklists only once a year. GCFs only qualified for 84 total control points, with 51.0% of compliance required for certification. GAP documents distributed to GCFs with low educational background contained too many difficulties and complexities for their understanding.

3) Market conditions of GAP coffee: The local coffee market price had not influenced the farmers to make a decision to cultivate coffee following the GAP standards. GAP coffee was usually sold at the same price as the coffee conventionally produced without GAP certification. The farmers made their decision to sell their coffee under the most convenient situation for them even with a slight price difference between 3-5%. However, buyers mixed both coffee types together without paying attention on production procedures. Therefore, the economic incentive from GAP coffee production was diminished. The coffee price did not encourage the farmers to adopt GAP procedures.

The Thai government has set up a policy for protecting local farmers from disadvantageous and unfair competition in the world coffee market. The situation forced the processing company to responsibly purchase local coffee at first. Then they could import coffee with lower price according to the volume of domestic coffee purchased. However, the private company did not directly use the GAP certification as marketing tools. Thus, the company provided their own private standards which were not so much different from the GAP standards, and persuaded GCFs with GAP certification to sell their coffee to the company. According to the surveys, 51 (91.1%) farmers firstly sold their products to processing companies because of easier sustainable standards which brought up to 20.0% more income to the farmers. However, the coffee bean checking processes were so strict; consequently the farmers could only get an average additional income of 5% more than the general market channel.

4.5 Discussions

The results of this study were generally consistent with those of Amekawa (2010; 2013) that educational background of the farmers affected their choice of appropriate pesticide use methods. Farmers' years of school positively affected GCFs' GAP perception. Three-fourths of the respondents graduated from primary school or have lower level of educational background. They could not follow the content of the GAP manuals which did not explain procedures and methods simply; nonetheless they still qualified for GAP certification. GCFs' GAP perception increased in relation to their available cultivation area (X_3); however it would be decreased when the farmers got higher GAP experiences (X_6). GCFs were professional coffee farmers with average 18.7 years' experiences. Their farming methods did not make much difference on their income from coffee. GCFs possibly practiced and learned GAP by themselves after getting standard information from the extension offices which affected the level of their perception positively.

The market condition has not encouraged the farmers to continuously produce GAP-based coffee. Only certification on paper was needed for them. They were more familiar with conventional farming methods (18.7 years) than GAP approaches (1.4 years). They adopted GAP approach only for getting the certificates by complying only with the criteria strictly inspected by the inspectors. Previously they adopted their conventional methods for their practical farming which often conflicted with GAP approach (such as chemical use method).

The results of farmers' GAP experiences negatively affected the GCFs' GAP understanding indicating the inefficiency and strictness of inspection services that contributed to the situation. Although the GAP extension and promotion procedures were important factors for the development of farmers' GAP understanding, the lack of GAP extension discouraged practical implementation. Therefore, GCFs' perception declined whenever they acquired more experiences on GAP. This means there were options for the farmers to adapt their conventional farming methods with the GAP approaches, which was

discouraged by the limitation of inspection services. However, farmers' self-confidence positively affected their GAP understanding which was supported by the social learning theory of Bandura (1982). Both theory and practicality of GAP knowledge was promoted by DOAE officers enhancing farmers' self-confidence. If the farmers had better understanding of GAP content, they might increase their efforts for implementing GAP. GCFs had an advantage in increasing GAP understanding through their practices in their respective area. GCFs become disinterested with GAP after they were certified because GAP certification cannot be directly used as marketing tools from the buyer side.

Subsequently, GAP can be effectively implemented on the GCFs by conducting specific workshop or group training program. Continuous training programs should be provided to certified-GCFs to remind them about GAP. It will also maintain their GAP self-confidence which supports their intention to implement GAP. Extension officers only strongly encouraged and provided many services supporting farmers at the GAP start period. The certified local coffee farmers got 2 years certificates. However, the poor status of GAP inspection was the main constraint due to its limitation on budget and human resources, which resulted in the lack of continuous inspection services. The GAP manual should also be simplified to cater to the GCFs low educational background. It was clear that local coffee market conditions did not support the farmers to conduct GAP production. Similarly, farmers were only looking for tangible benefits from the standards which GAP could not provide for them. MOAC might have the responsibility to provide specific markets for coffee produced following the public standard. Otherwise, more intensive cooperation between government and private sector, which has an advantage on the market purchasing, is needed to further develop public standards scheme in Thailand.

4.6 Conclusions

The difficulty of GAP production methods and marketing influenced the change of farmers' perception of their GAP understanding in the study area. It showed that GAP extension in Thailand still has many issues to address to improve its implementation. MOAC has to

rethink developing a continuous policy (training program and simplify GAP manual) to support the farmers dependent on standard procedures. Regional market conditions also did not directly support the farmers engaged in GAP production. However, the private sector which has the advantages in the topical market systems should be persuaded to participate much more in the GAP scheme. The collaboration between government and private sectors, such as adoption of GAP as a part of the private sector standard, might reduce the difficulty and confusion of GCFs to adapt to too many standards. The success of collaboration on stakeholders might encourage the farmers to be aware of the standard which encourages comprehensive implementation.

The results of this study showed that, market condition is the important factor that influenced the farmers' GAP perception. However, GAP could not provide the direct market for GAP product itself. This is the weakness of public agricultural standard development, which is different from the private standard. In the next chapter, the agricultural private standard development and market conditions will be explored.

Chapter 5 Coffee farmers' attitudes toward the 4C process in Chumphon province, southern Thailand

GAP as a public standard could not maintain the farmers' satisfaction because there was no direct market for GAP product. This influenced the farmers' awareness to conduct GAP on their farm. They adopted only essential contents from GAP with their conventional farming techniques which could downgrade Thai agriculture product's reliability. In this chapter, the farmers' private standard "Common Code for Coffee Community: 4C" implementation was explored. 4C is not much different from GAP, as long as it focuses on the farmers' sustainability at the farm level. This standard has been promoted together with GAP in Chumphon coffee community. However, a particular market channel is preserved for 4C-certified coffee. Therefore, coffee farmers are motivated to adopt this standard for their farming practices, and may obtain a premium price of the coffee.

5.1 Introduction

Lately, Thailand has started producing coffee in increasing amounts to become a significant player in the world market. Coffee in Thailand has become one of the sensitive agricultural products under the ASEAN Free Trade Agreement (AFTA) (Pongvinyoo et al., 2013). To remain competitive in the global market, certain quality and marketing standards have been introduced and encouraged by the government. The first such standard is the Good Agricultural Practices (GAP or QGAP) which was introduced mainly by the government in 2007 with its accompanying constraints and benefits (Amekawa, 2010: 2013; Wannamolee, 2008). Another standard is the Common Code for Coffee Community (4C) as encouraged mainly by the private sector (Kolk, 2005; Muradian and Pelupessy, 2005; Neilson and Pritchard, 2007), which was introduced in 2010. Thai Coffee Strategy (2009 - 2014) was established to protect Thai coffee from the global coffee price fluctuation. The biggest private processing company in Thailand promoted 4C for coffee farmers. The price incentive and quality control process were provided through 4C standard. Consequently, the private company could increase the amount of domestic coffee purchase together with

coffee quality control. Both of these standards were aimed towards harmonizing social, environmental and economic sustainability in the practices associated with the farming, harvesting, processing and quality control of coffee. The application of GAP in the Thai coffee industry is beset with many practical implementation problems and challenges for the farmers as observed in an earlier study (Amekawa, 2010). Conventional farming activities often come in conflict with GAP resulting in confusion and frustrations among farmers (Van der Vossen, 2005).

4C was proposed to solve unstandardized coffee production, income distribution, and cultivation sustainability methods problems coming from the global coffee crisis (Charveriat, 2001; Gresser and Tickel, 2002). It was the result of close cooperation among agencies in Germany with a mission to bring together producers, trade unions, NGOs and other coffee industry stakeholders to accept a universal coffee farming practices agreement (Nelson and Pritchard, 2007). 4C was conducted for enhancing the quality of products by implementing sustainable cultivation methods, among oversupply condition of coffee products during the coffee crisis in the 1980s. By separating 4C coffee from the ordinary coffee, the 4C members could get a higher coffee price from the 4C unit. One of the goals of 4C is to provide a small premium price and specific market channel access to reward environmentally sustainable coffee farming and processing which will eventually result to a redistribution of income obtained from coffee production. Large international coffee processors have adopted 4C as part of their corporate social responsibility in their effort to solve the problems that they have created (Kolk, 2005).

Previous studies about 4C have investigated its implementation and incentives, but few studies have been conducted in Thailand. It is clear that the income of farmers complying with specific certifications tends to be higher than those using conventional methods (Neilson and Pritchard, 2007). Under these programs for sustainable production, stable market outlets are also available (Ruben and Fort, 2011). Higher coffee prices become attractive economic incentives and therefore certification is viewed favorably by farmers

(Fischer et al., 2007). Certification requires strict implementation of standards, but this is also affected by farmers' satisfaction of the program benefits.

The purpose of this chapter was to investigate Thai 4C farmers' socio-economic background, and also to compare the coffee farmers' attitudes toward QGAP and 4C standards. In addition, this survey was conducted to assess the 4C farmers' attitudes towards their practical implementation. Therefore the main objective of this study was to indicate the opportunities for private sector standard development in Thailand.

5.2 Thai common code of conduct (4C) scenario and its implementation in Chumphon province

During 2001-2002, smallholder farmers around the world dealt with the lowest world coffee prices in 100 years because of the "Coffee Crisis" (Aksoy and Beghin, 2005). Coffee growers had to deal with problems like unfair wages for women, the use of child labor, difficulties with farmers' unions, and the existence of living and work conditions that often violated international law. The 4C standard was founded in 2006 after a three-year development period. Its broad vision was to ensure the sustainability of the coffee sector by improving the economic, social and environmental conditions of coffee production and processing (4C Association, 2013). The 4C standard lists some unacceptable practices as well as sustainable practices. Some of them and general 4C implementation were investigated in the study area and are discussed below.

1) Workers' conditions: The hiring of extra workers during the harvesting season often creates an acute shortage as hiring was usually done simultaneously (Bacon, 2005; Neilson and Pritchard, 2007). This resulted to the demand for workers being higher than the laborer supply. Two main sources of occasional labor came from the northeastern region of Thailand as well as migrant laborers mainly from Myanmar. Domestic laborers from within the country were paid THB 2.0-3.5/kg of coffee harvested while migrant laborers were paid less at THB 1.5-2.5/kg. This was because most if not all migrant

workers were illegal or undocumented. However, seasonal workers were highly needed during the harvesting period. Farm owners naturally preferred to hire these lower paid laborers. Young children usually accompany their parents to work in the farms which could augment family income by 5-10% but not formally hired by the farm owner. Farm owners provided food, water and housing for these seasonal workers. Farm owners do so in order to maintain good relations with these workers who usually make their services available for the next harvest season.

2) Use of banned pesticides: Glyphosate is among the pesticides banned by the 4C standard but some farmers still used this on their farms despite the warnings issued by the extension service. Costs of the pesticides were not the main concerns but farmers continued to use them because of their positive personal experiences as well as friends' suggestions. However, 4C extension procedures and agreement between 4C units and farmers influenced the local coffee farm owners to stop the use of such pesticides. Some of them followed the suggestion of extension officers who came to randomly check their farms every 2-4 months because they need to continually maintain their 4C member status.

3) Cutting of protected forests: Thai 4C extension officers allowed farmers who had violated forestry laws more than 10 years before to become 4C members as a sort of compromise. Since the educational and information campaign launched by the 4C extension officers about forest decline, farmers have paid more attention towards this concern.

Farmers under the 4C standard had to follow 28 principles set out by 4C which covered three dimensions of sustainability: social, environmental and economic. The 4C code presents, evaluates and ranks these following the traffic light system in which practices labeled as 'red' must be stopped, 'green' ones are desirable, and 'yellow' ones will need improvement within a certain period of time (see Kolk, 2005). The general conditions in each dimensions are explained below:

A. Social dimension

The greatest strength of the 4C standard compared with other systems is its social criteria (Lentijo and Hostetler, 2011). Almost half of 4C standard focused on this issue. In the present study, farmers or land owners provided many services for their workers in order to maintain their good relationship that will extend to the next harvest season. Farm owners usually hired some extensive labors during the harvesting season. The owners should provide 'on the job training' for these newly hired but unskilled workers. More experienced workers would train them for 2-3 hours but many owners are hesitant to hire these unskilled laborers since they might damage coffee plants and coffee beans.

Most seasonal workers were hired based on verbal agreements, and fixed their work hours after mutual agreement because of the limited harvest season. Coffee beans need to be harvested within 45-60 days before beans are gone. The owners had to provide harvest equipment like hats, gloves, boots, bags, and harvest nets in case these were not available. One reason for providing these is to cut preparation time and to send the workers to the farms immediately. Frequently, seasonal workers worked in more than one farm in the area.

Worker's safety is an important issue. Workers' rights and skill improvements as prescribed by the 4C code of conduct were however not of great concern to owners. Skills of workers usually conformed to those prescribed in the 4C manual. Workers' conditions were generally good because owners need to cultivate friendship and loyalty due to the shortage of labor supply.

B. Environmental dimension

The 4C code provides measures to ensure environmental friendly production that reduces impacts on biodiversity and the environment. The majority of the 4C members admitted to illegally expanding their farm land to include land protected by the Forestry

Department. However, the 4C certification database would record only the cultivated land and hide the excess land area actually included in cultivation. Lately, owners have understood this issue and have since avoided cutting trees and expanding their farms illegally.

Two main natural resources specified to maintain 4C certification were soil and water resources. The farmers needed to check the soil nutrients and appropriately apply fertilizers. This part is really useful because the extension services provided free soil check sampling service to the farmers who sold coffee of at least ten bags (100 – 115 kg/bag, as of 2014) to the company. This service encouraged coffee farmers to become associate members of the 4C and follow its instructions. The farmer could increase their coffee production by appropriate soil nutrients fertilizing which also reduced their production cost per unit.

Some kinds of services and steps beneficial to the environment influenced the farmers' decision to adapt the standard (Muradian and Pelupessy, 2005; Neilson and Pritchard, 2007). This means their farming process became much more environmentally conscious. The low level of education among farmers caused the misunderstanding of health safety issue. Nevertheless, the 4C requested the farmers to follow at least the helpful minimum requirement of using chemical spread suits. 4C farmers' pesticide misuse not only depended on the 4C extension officers' suggestions, but also depended on their friends' suggestions.

C. Economics dimension

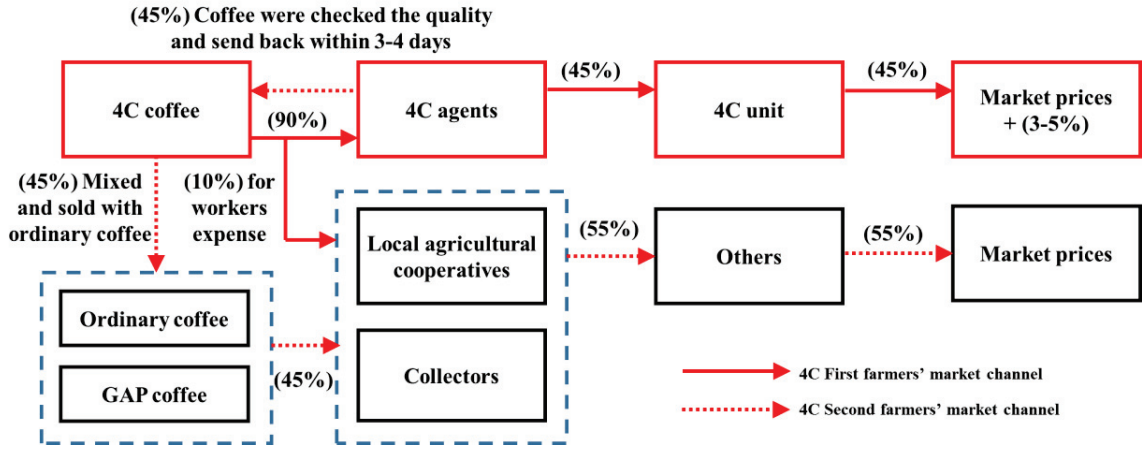
The last aspect of 4C code of conduct relates to the economic dimension. This depended on the private sector roles on standard development. This dimension was divided into three main issues (4C Association, 2013), namely, marketing conditions (information, accessibility, and commerce), data recording and coffee quality and traceability.

The 4C unit distributed particular notebooks to every farmer to make recordings of farming process. Seventy percent (70.0%) of them hinted that they had their own notebook. However, very few faithfully recorded their farming procedures in those notebook forms. The farmers, who mostly had lower education level, did not pay attention to the data recording (Muradian and Pelupessy, 2005; Neilson and Pritchard, 2007). This condition often led to the lack of farm management system on the field.

The 4C units set at least one station in every district. The coffee would be checked by the inspectors at the buying station to calculate coffee prices. The farmers had their own member ID to deal with the company. Its inspectors tested the coffee quality, weight, moisture and taste at the stations. This process took 3 - 4 days after farmers contacted a buying station. Then the 4C unit quoted the price for each bag; 4C coffee was priced 3-5% higher than ordinary coffee by the 4C unit. Traceability system was controlled by the 4C unit (Kolk, 2005). The farmers had to register and get the member's ID given from the company. The quality testing process took a long time for checking those coffee qualities.

There were three main buyers of coffee in the study site: (1) coffee farmer's cooperatives, (2) private companies and (3) mobile traders or collectors. In general, 4C farmers firstly chose to deal with 4C agents, because of easier standards which brought up to 20% (at least 3-5%) total more profit or income to the farmers. However, half of the coffee was possibly sold to the 4C unit. The quality of the coffee cultivated under the other standard and ordinary coffee were the same in the buyers' point of view. They mixed coffee together without any attention on production procedures. The economic incentive from the production of standard coffee was declining. Those farmers who lack financial liquidity for paying the seasonal workers' wage would choose to sell their products to other buyers such as local cooperatives. The general market channel for the coffee product in Chumphon is shown in Figure 5-1.

Figure 5-1 : 4C coffee beans' market channels in Chumphon province



5.3 Methodology

Due to the homogeneous distribution of the respondents, 128 farmers were interviewed by using structured questionnaires, accounting for 31.1% of the population, who were randomly chosen from 411 both GAP and 4C farmers in seven villages in the province. The respondents were interviewed in-depth by the research team at their farms and village education center. The structured questionnaires were used to collect the information on farmer's socio-economic background, 4C farming practices, current market situation, practical extension services methods and their attitudes towards QGAP and 4C satisfaction. In addition, 10 coffee farmers were selected for focused group discussion (FGD) that focused on constraints and development of coffee standards. The data were arranged and described by statistical tools, and analyzed by descriptive statistical analysis.

5.4 Results and Discussions

5.4.1 Socio-economic profile of respondents

A total of 128 respondents was selected for this study, 48.4% came from Tha Sae district and 51.6% came from Sawee district in Chumphon province. Tha Sae district registered the highest coffee production in the province, while the more famous coffee came from Sawee district. Nearly half of the total of respondents were female and 53.9% were male (Table 5-1). The coffee farm responsibilities were not specifically assigned by gender within their own families because coffee cultivation process does not need any sophisticated skill. Their ages ranged from 31 to 60 with 29.7% of them in the 51-60 age groups, followed by those in the 31-40 age groups. Nearly 40% of the respondents had more than 20 years of coffee cultivation, 34.4% with 11-20 years of experience, and 28.1% had 1-10 years of experience. About 75% attended primary school and did not enter a higher level school. Most of the respondents were smallholders with 42.2% owning less than 10 *rai* per family (1 *rai* = 0.16 ha), while about 30% having 11-15 *rai*. The same situation could be observed in most coffee producing countries (Kolk, 2005). The profiles of coffee farmers both using GAP and 4C standards were not much different, as 4C farmers should embrace the GAP standard before being qualified as 4C farmers.

Table 5-1 : Socio-economic profile of the respondents (n = 128)

Contents		Frequency	Percentage
Districts			
	Tar Sae	62	48.4
	Sawee	66	51.6
Gender			
	Male	59	46.1
	Female	69	53.9
Age	*(year)*		
	21-30	12	9.4
	31-40	33	25.8
	41-50	21	16.4
	51-60	38	29.7
	> 60	24	18.8

Civil Status			
	Single	12	9.4
	Married	113	88.3
	Divorce	3	2.3
Education	*(level)*		
	Less than primary school	41	32.0
	Primary school	57	44.5
	High school	18	14.1
	More than high school	12	9.3
Experience with coffee	*(year)*		
	1-10	36	28.1
	11-20	44	34.4
	21-30	39	30.5
	31-40	9	7.0
Cultivation area	*(rai)*		
	Less than 10	54	42.2
	11-15	36	28.1
	16-20	12	9.4
	> 20	26	20.3

Family labor or labor intensive farming is an important component of most coffee farmers. During the short harvest season, extra workers may be hired with wages fixed at THB 1.0-3.5/kg of harvested coffee. About 60% of respondents cultivated single crops. In cases where more than one crop was planted, about half of the farm area was devoted to Robusta coffee and the rest was planted to other cash crops such as oil palm. Respondents who planted multiple crops expressed their concerns about declining annual income from single coffee cultivation.

There were subtle differences between farmers in the two districts surveyed. About 80% of Tha Sae farmers were conventional farmers who cultivated coffee for more than 10 years with average incomes of 13,603.40 THB/*rai*, while Sawee farmers received an average income 11,827.90THB/*rai.* However, the coffee cultivation income (per rai) was lower than the other popular crops' income such as Para rubber and oil palm cultivations. The farmers in this province cultivated coffee as a source of annual income and regarded other crops as a source of monthly income. As a result, coffee cultivation under mono cropping system was prevalent in Sawee while much more Tha Sae farmers cultivated more than two crops (inter-cropping system). With the flat geographic conditions of farms in Tha Sae, farmers

could easily cultivate and harvest coffee. Respondents were familiar with the GAP scheme as promoted by the government as well as the 4C as promoted by the private sector.

5.4.2 Coffee farmers' attitudes towards Thai National GAP (QGAP) and Common Code for Coffee Community (4C)

GAP and 4C were implemented at the same time in the coffee community of Chumphon province. GAP was extended by the local DOAE to increase the coffee farmers' competitiveness and standardize coffee for domestic and overseas coffee demand. It also provided an opportunity for the coffee farmers to confront with non-tariff barrier from many trade agreements. 4C standard was extended by private sector to improve coffee quality, in terms of standardized and income distribution. GAP has been extended since 2005, and 4C was launched since 2010. The different farmers' experiences under both standards affected their satisfaction of both standards. The farmers' satisfaction attitude towards GAP and 4C standards were investigated and shown on Table 5-2.

Table 5-2 : Farmers' attitude towards GAP and 4C satisfaction

Farmers' attitudes	Disagree (0)	Agree (1)	Mean	Justified*
QGAP satisfaction				
1. Do you prefer QGAP rather than 4C	88	40	0.31	Low
2. GAP standards much more easier rather than 4C on practical implementation	71	57	0.44	Low
3. GAP could improve your social sustainability rather than 4C	84	44	0.34	Low
4. GAP could improve your environmental sustainability rather than 4C	71	57	0.44	Low
5. GAP could improve your economic sustainability rather than 4C	108	20	0.15	Low
Farmers' attitude towards QGAP satisfaction			**1.70**	**Low**
4C satisfaction				
1. Do you prefer 4C rather than GAP	62	66	0.52	High
2. 4C standards much more easier rather than GAP on practical implementation	68	60	0.47	Low
3. 4C could improve your social sustainability rather than GAP	58	70	0.54	High
4. 4C could improve your environmental sustainability rather than GAP	67	61	0.47	Low
5. 4C could improve your economic sustainability rather than GAP	20	108	0.84	High
Farmers' attitude towards 4C satisfaction			**2.85**	**High**

*The average of the farmers' attitudes towards GAP and 4C satisfaction were justified into two categorized (0.0 – 0.5: Low, and 0.51 – 1.0: High). While, its total average were also justified into two categorized (0.0 – 2.5: Low, and 2.51 – 5.0: High).

The study revealed that coffee farmers' were more satisfied with 4C than with GAP (Table 5-2). Although GAP had been earlier introduced farmers preferred 4C standard mainly because of economic sustainability. However, the number of agree (51.5%) and disagree

(48.4%) on GAP and 4C standard satisfaction were not much different. This is because the 4C qualification basically needed prior GAP certification. Therefore, half of the farmers still remembered on the importance of GAP certification. In addition, up to 84% of the respondents trusted that 4C standard was better than GAP in terms of improving their economic sustainability.

5.4.3 Opportunities of private sector on the coffee standards development

Although the economic incentive from the 4C certificate was low (Ponte, 2002; Muradian and Pelupessy, 2005), the coffee farmers were attracted to it. All farmers mentioned that they had followed and joined the 4C members because of a 3 – 5 % higher price. The question *"What is 4C in your point of view?"* was interpreted by all farmers as a kind of additional profit from coffee cultivation. Thus, economic incentive was the most important factor to encourage the farmers' to participate in 4C membership.

The farmers possibly wanted to approach specific coffee markets which brought up a high price. It was not difficult for the farmers to adapt 4C standard (Ponte, 2002). Almost all (93.8%) mentioned that it was easy to sell their coffee with the certificate to the domestic markets. In addition, 71.9% of farmers could increase their cultivation efficiency using 4C extension services provided for 4C farmers without any cost.

The most important concern was economic dimension (Table 5-3) which was directly related with their income. The problem was on the environmental dimension, especially on the *Use and Handling of Chemical* issues. Some prohibited and banned chemicals were widely used without any data records. The coffee bean might have been roasted and contaminants were eliminated by the roasting processes, but the ecological system still received the effects of misused pesticides. Schreinemachers et al. (2012) stated that the public standards reduced the misuse of pesticides of fruit and vegetable produces in northern Thailand. Therefore, 4C standards provided both economic incentives and useful services.

Table 5-3: Coffee farmers' attitudes towards 4C practical implementation (n = 128)

Contents	Disagree (0)	na. (1)	Agree (2)	Mean	S.D.
A. Social aspects					
1. Have your workers ever participated on the decision making for their salary?	60 (46.9)	14 (10.9)	54 (42.2)	0.95	0.94
2. Have you ever hired child workers in your farm?	87 (68.0)	6 (4.7)	35 (27.3)	0.59	0.89
3. Have you ever hired inexperienced seasonal workers for your harvesting?	54 (42.2)	20 (15.6)	54 (42.2)	1.00	0.92
4. Do you prefer to hire highly experienced workers?	113 (88.3)	6 (4.7)	9 (7.0)	0.18	0.54
5. Did you always provide appropriate services for seasonal workers on your side on hiring every year?	6 (4.7)	8 (6.3)	114 (89.1)	1.84	0.47
6. Did you provide the harvest equipment for seasonal workers?	3 (2.3)	8 (6.3)	117 (91.4)	1.89	0.38
7. Did you ever make verbal contracts between you and seasonal workers?	0 (0.0)	6 (4.7)	122 (95.3)	1.95	0.21
Average farmers' attitudes toward 4C social dimension = 1.2031 : Level of 4C practices mean score = Moderate*					
B. Environmental aspects					
1. If you want to expand your coffee production would you expand your cultivated land without any permission?	96 (75.0)	17 (13.3)	15 (11.7)	0.36	0.68
2. Have you ever checked the soil nutrients before cultivating your coffee plant?	8 (6.3)	6 (4.7)	114 (89.1)	1.82	0.51
3. Did you prefer the 4C services on the "soil check sampling services"?	15 (11.7)	9 (7.0)	104 (81.3)	1.69	0.67
4. Have you ever expanded your cultivation area illegally (last 10 years)?	17 (13.3)	9 (7.0)	102 (79.7)	1.66	0.70
5. Did you check the "banned chemical lists" from the 4C code of conduct?	105 (82.0)	5 (3.9)	18 (14.1)	0.32	0.70
6. Have you ever used your "Full chemical uniform" when you used agrochemicals?	78 (60.9)	6 (4.7)	44 (34.4)	0.73	0.94
7. Have you ever planned to seek other sources of water in case shortage in the cultivation period?	14 (10.9)	9 (7.0)	105 (82.0)	1.71	0.65
Average farmers' attitudes toward 4C environmental dimension = 1.1886 : Level of 4C practices mean score = Moderate*					
C. Economic aspects					
1. Did you check the 4C coffee prices and compared with other purchasing companies?	6 (4.7)	0 (0.0)	122 (95.3)	1.90	0.42
2. Were you forced to sell coffee only to 4C unit?	15 (11.7)	0 (0.0)	113 (88.3)	1.76	0.64
3. Your farming methods were improved by the 4C extensions and services?	9 (7.0)	2 (1.6)	117 (91.4)	1.84	0.52
4. Do you have the "notebook" to record your farming process and cost?	35 (27.3)	0 (0.0)	93 (72.7)	1.45	0.89
5. 4C unit had never violated the accord prices	18 (14.1)	0 (0.0)	110 (85.9)	1.71	0.69
6. You checked your own coffee bag after selling to the 4C unit	6 (4.7)	3 (2.3)	119 (93.0)	1.88	0.44
Average farmers' attitudes toward 4C economic dimension = 1.7617 : Level of 4C practices mean score = High*					

*The total averages were justified into three categorized (0.0 - 0.6: Low, 0.7 – 1.3: Moderate, and 1.4 – 2.0: High).

This study categorized the opportunities of 4C standards on the coffee standards development into three issues (available specific market, free and useful services, and easy adoption for conventional farmers).

1. *Available specific market:* 4C farmers in this province possibly approached specific markets to obtain a higher coffee price more than ordinary and GAP-certified ones. This led many farmers to participate in 4C membership. Better market channel was an important key of success, by which the farmers would conduct new farming methods such as organic farming (Chouichom et al., 2010). The incentives affected the farmers' behaviors to conform their farming to the standards (Fischer et al., 2007). 4C farmers adopted some appropriate farming practices following the 4C extensions' services' suggestions. This was the advantage given by private standards to improve the small-scale farmers' poverty condition in many countries (Bacon, 2005). Subsequently available market access was the preliminary standards' incentive for the farmers. Standards and certifications were not the only neutral market tools in coffee markets; they were also strategic tools for supply-chain governance. They could be either empowering or constrictive for the producers (Neilson and Pritchard, 2007). Once the farmers trusted and followed the standards, it was easy for the 4C extension officers to extend other issues to the farmers.

2. *Free, flexible and useful services:* The GAP provided many services to support the farmers in their GAP cultivation program without any cost similar to 4C services. According to the FGD, all coffee farmers (10 farmers) mentioned that QGAP soil nutrients checking service took time of more than 10 -12 months for checking results. On the other hand, they stated that 4C soil nutrients checking services took only 2 – 3 months. As a result, farmers could improve soil nutrients for their next cultivation. Also the 4C extension officers regularly visited (every 2-4 months) compared to the QGAP officers who visited the farmers only once a year. The close relationship between farmers and 4C extension services contributed to the 4C standard by increasing the number of 4C members to more than 5,000 members

within two years. Also, 92 farmers (71.9%) stated that they could increase their cultivation efficiency using 4C extension services which are provided for 4C farmers without any cost. In addition, all of them preferred the 4C services rather than QGAP services.

3. *Easy adoption for the conventional farmers:* 4C supported the farmers in term of economic empowerment. More coffee farmers were willing to conduct coffee cultivation following the 4C procedure. On the other hand, the 4C farmers had moderate up to high level attitudes towards 4C cultivation in every dimension. The results showed that 4C farmers had greater willingness to participate in 4C standards procedures. This was because 4C standards contents were not much different from their conventional farming methods. They did not pay much attention to conduct 4C cultivation.

5.5 Conclusion

The coffee private sectors were the important contributors in the coffee standards' development, because they had lots of experiences in the coffee business around the world. A specific market was provided for high quality coffee. Useful services were also delivered for the farmers. Those incentives encouraged the farmers to adopt the provided standard on their farming procedure. They slowly changed their conventional farming behaviors into acceptable standardized farming methods. Although some conventional farming processes were not accepted, the 4C was flexible and nevertheless accepted those farmers as 4C members. However, they had to change those unacceptable farming processes following the agreement between them and the 4C unit to keep their selling contract for the next year. The private sector had an advantage because of the small difference between conventional farming and its standard methods. Therefore, the farmers can easily adopt the 4C standard. According to the effectiveness and flexibility of private sector in extension services and market professional, coffee farmers will be able to produce high quality products which can bring higher income for them. Therefore, 4C standard was preferred by the local coffee

farmers over than GAP which provided and extended by the government sector. However, GAP certification became an important issue for the farmers who wanted to participate in 4C standard. This was because the farmers were required to have the GAP certification for 4C membership qualification.

This study illustrated the opportunity of private standard development in Thailand. 4C provided a *win-win situation* for the private company and the coffee farmers. In addition, it also encouraged the farmers to participate in the public standard. 4C provided a suitable procedure that will allow all players in the coffee industry in Thailand to benefit from the results of a robust production and processing system. This will help to establish the position of Thailand in the global coffee market.

According to the results, the market was not the only motivation for the farmers to implement agricultural standards on their farming. The availability of standard services and difficulties of standards contents were also needed for consideration towards the development of agricultural standard in Thailand. However, those conditions were still under development under GAP processes which needed time for its improvement. The next chapter would analyze advantages of GAP incentive from the farmers' practical farming.

Chapter 6 Cost efficiency of Thai National GAP (QGAP) and mangosteen farmers' understanding in Chanthaburi province

The previous chapters observed the farmers' motivation to adopt the agricultural standards with their conventional farming techniques. This study found the main constraints for GAP development in Thailand that in the absence of direct market for GAP products. Therefore this chapter investigated the benefits for the farmers from practical GAP implementation in a case study of mangosteen production which is targeted as an export commodity.

6.1 Introduction

Thai GAP-certified farmers paid a lot of attention for conducting GAP-based production by following the DOA and DOAE GAP instructions (Amekawa, 2010; Mankeb et al., 2012). However, GAP-based products are not very popular in the local markets. The farmers showed reluctance to fully comply with the GAP instructions because they could not reach their expected economic targets by following the GAP standard (Pongvinyoo et al., 2014). GAP was prepared mainly for export commodities. While some of the commodities were exported, the majority were sold in domestic markets.

Hobbs (2003) classified GAP economic incentives for the farmers into two main categories. The first incentive was reducing the farmers' production costs such as efficient use of labors, input selection, and sustainable farm management methods. In a case study in Kenya (Jaffee, 2003), GAP significantly improved the producers' cost effectiveness in a competitive fresh vegetable market. The producers could also improve farming methods in terms of social, environmental, and economic aspects. GAP instructions led the farmers to control their production costs by implementing appropriate farming techniques. The second incentive was the premium price for GAP products. GAP-based product quality might be more acceptable than the ordinary product (Hobbs, 2003). It was expected that farmers could easily fetch a premium market price. This is part of GAP economic incentives. Such expectation is presented at the beginning of GAP extension, but when it extended widely,

the prospects for premium price may be diminished as part of economic and competitive principle in markets.

Hosono (2007) explained the characteristic practices of the fruit producing area in Chanthaburi province, Thailand. He found that the farmers always mixed several selected plants in their orchards (inter-cropping system) which made it hard for them to manage under the standard cultivation system. They mainly managed their orchards according to their conventional experiences, thus creating some conflicts with GAP procedure (such as fertilizing, watering, and input control).

There have been many studies on GAP in the past that showed the importance of cost effective implementation including its impact of food safety (Hobbs, 2003; Mankeb et al., 2012; and Rejesus, 2009). However, very few studies focused on GAP farming conditions of important inter crops, such as mangosteen. Farm structure was usually not considered in depth. Therefore, one purpose of this study was to evaluate the practical farmers' benefits from GAP implementation. In addition, the GAP understanding of farmers on the important agricultural commodities for QGAP development was also evaluated. Finally, the economic incentives from GAP production were analyzed to examine the GAP production cost and income effectiveness as the result of adoption of GAP standards.

6.2 Methodology

Chanthaburi was chosen as the study area because of a large number of active mangosteen growers certified by the DOA which consisted of 1,968 farmers (Department of Agriculture, 2014). The sample size of 112 growers was calculated by using the formula of Yamane (1973). The respondents were randomly selected by simple sampling methods in Tha Mai (33), Khlung (46) and Makham (33) districts which are the biggest mangosteen cultivation areas in Chanthaburi. The proportional sampling depended on the size of the GAP-certified farmers in each district. These three districts are located on the borders between Chanthaburi and Trat provinces, where a large number of traders/exporters opened

buying stations of mangosteen. A number of exporters also opened buying stations in Khlung district, while Tha Mai district attracted retailers including national chain super markets. In Makham district, the provincial agricultural cooperative established a business link with one of the three biggest exporters who collected high-quality mangosteen. QGAP-certification was a requirement for those farmers who would sell high-quality products to export-traders.

The data were collected from farmers in the crop year 2013/2014 by structured questionnaires. The questions covered the socio-economic profiles of the farmers interviewed, their fruit production revenues, costs, GAP understanding and attitude towards GAP, its implementation and so on.

The questionnaires included 8 GAP-components (water source, cultivation site, use of agricultural hazardous substance, pre-harvesting management, harvesting management, product storage and on-site transportation, worker health and welfare, and data recording), in order to evaluate the level of GAP farmers' understanding. The example situations of GAP implementation were presented, then the farmers answered accordingly following their practical farming methods. According to the complexity of GAP content, farmers' understanding was scored into two categories (1= disagree, and 2 = agree).

Mangosteen are perennial plants, so the three main variable costs of production are insecticide, wage, and fertilizer costs (Agricultural Statistics of Thailand, 2013). Generally speaking, mangosteen price fluctuates according to its quality as determined by local traders in Chanthaburi. Considering the changeable price[1], the farmers' income was calculated by the following formula:

[1] Mangosteen were priced differently according to the product qualifications, such as size (3 grades: 100 g., 90 – 99 g. less than 90 g.), skin (smooth and not-smooth), perfection (round and not-round), etc. Low-quality (LQ) mangosteen were going for 30 – 50 THB per Kg. (each weigh 70 – 90 g means 10 – 11 mangosteen for 1 Kg), while high-quality (HQ) mangosteen were priced between 80 – 130 THB. The HQ mangosteen were exported to high-end markets, such as Japan, Korea, and EU. While LQ mangosteen was exported to China, and borders markets.

$$Farmers' income = (Price_L \times Quantity_L) + (Price_H \times Quantity_H)$$

Price $_L$: average farmers' selling price for the low quality (THB)

Quantity $_L$: quantity of farmers' low quality products (Kg.)

Price $_H$: average farmers' selling price for the high-quality (THB)

Quantity $_H$: quantity of farmers' high-quality products (Kg.)

The respondents were interviewed in-depth by the research team at their farm sites, district agricultural cooperatives, and purchasing stations with the assistance of DOAE officers during April 2014. The data were analyzed by descriptive and inferential statistics. Frequencies, percentages, arithmetic means, and standard deviations were used to describe profiles of the respondents, farm characteristics, income, cost effectiveness, and GAP implementation, while ANOVA was performed to determine the differentiation of their GAP understanding, production cost and income, and cost effectiveness. In this study, cost effectiveness means the proportion of farmers' income from mangosteen commodity and annual investment in its production. Finally, regression analysis was employed to determine the practical additional economic incentives for the farmers considering their GAP understanding in each element.

6.3 Profile background of respondents

One hundred twelve (112) respondents were selected in this study; 29.5% came from Makham district, 41.0% came from Khlung district, and 29.5% came from Tha Mai district as shown in Table 6-1. Mangosteen cultivation was not specifically assigned by gender within their families because it is not labor-intensive needing high skills. Their ages ranged from 22 to 72 with the 32 – 51 age group being 53.3% of the total, following by those in the 52 – 61 age group. Although about three-fourths of the respondents graduated from primary school, they had considerable long experiences in mangosteen cultivation at 23.1 years on average (Makham 17.2, Khlung 27.1 and Tha Mai 23.4 years). They were familiar with GAP procedures, too. The majority of them participated in GAP scheme for 8 years (68.7%), followed by 2 years (12.5%).

It is noteworthy that all respondents cultivated fruit using the inter-cropping system. However, 28.5% of them separated their mangosteen orchard from other fruits and crops. Income from mangosteen ranged between 14,000 to 28,600 THB/rai, while production cost was estimated to be between 8,900 to 17,000 THB/rai. Production costs varied according to farm structure and farm management, including inputs such as labor and productive materials, land utilization, and so on. The farm structure and management influenced the quality of mangosteen. The income from mangosteen fluctuated according to local market prices and quality of products. Adoption of GAP might affect the farmers' farm structure, costs and earnings.

Table 6-1 : Respondents socio-economic background

Contents	Frequencies			Total (percent)
	District			
	Makham (33)	*Khlung (46)*	*Tha Mai (33)*	
Gender				
Male	19	20	14	53 (47.3)
Female	14	26	19	59 (52.7)
Age (years)				
22 – 31	12	3	-	15 (13.4)
32 – 41	14	8	8	30 (26.8)
42 – 51	3	14	13	30 (26.8)
52 – 61	2	15	12	29 (25.9)
> 61	2	6	-	8 (7.1)
Mean	*36.5*	*49.1*	*47.7*	*45.0*
S.D.	*11.6*	*10.8*	*7.6*	*11.5*
Education				
Pre-primary school	9	18	12	39 (34.8)
Primary school	7	19	14	40 (35.7)
Junior high school	5	7	7	19 (17.0)
High school	10	2	-	12 (10.7)
Vocational school	2	-	-	2 (1.8)
Number of family members				
2 – 3	10	8	5	23 (20.5)
4 – 5	20	29	25	74 (66.1)
6 – 7	3	7	3	13 (11.6)
> 7	-	2	-	2 (1.8)
Mean	*4.2*	*4.7*	*4.3*	*4.4*
S.D.	*1.1*	*1.4*	*0.9*	*1.2*
Fruit cultivation experiences (years)				
1 – 10	13	4	6	23 (20.5)
11 – 20	8	10	7	25 (22.3)
21 – 30	8	16	14	38 (33.9)
31 – 40	3	11	6	20 (17.9)
41 – 50	1	5	0	6 (5.4)
Mean	*17.2*	*27.1*	*23.4*	*23.1*
S.D.	*12.1*	*11.5*	*10.3*	*12.0*

Experience on GAP (years)				
1 – 2	7	4	4	15 (13.4)
3 – 4	3	1	1	5 (4.4)
5 – 6	8	4	2	14 (12.5)
7 – 8	15	37	26	78 (69.6)
Mean	*5.7*	*7.1*	*7.0*	*6.7*
S.D.	*2.4*	*1.8*	*2.0*	*2.1*
Mangosteen cultivated area (rai)				
5 – 10	1	8	5	14 (12.5)
11 – 20	19	31	25	75 (66.9)
21 – 30	9	7	3	19 (16.9)
31 – 40	4	-	-	4 (3.6)
Mean	*21.3*	*15.4*	*14.5*	*16.9*
S.D.	*7.8*	*5.1*	*4.4*	*6.5*
Mangosteen income / rai (THB)				
< 15,000	0	8	0	8 (7.1)
15,000 – 20,000	7	18	25	50 (44.6)
20,001 – 25,000	17	20	8	45 (40.1)
25,000 – 30,000	9	0	0	9 (8.0)
Mean	*23,415.9*	*19,124.0*	*18,251.1*	*20,131.4*
S.D.	*3,102.9*	*3,463.3*	*2,624.5*	*3,781.9*
Total	**33**	**46**	**33**	**112 (100.0)**

6.4 Results of the study

6.4.1 Current GAP understanding among mangosteen farmers

This study revealed that mangosteen farmers moderately understood (mean = 1.6) the overall GAP contents (Table 6-2). GAP standard is promoted to increase the reliability of agricultural products in the overseas markets. Nonetheless, GAP presented difficulty and complexity for practical farming. Consequently, GAP inspection services often had to compromise to give a better opportunity for the farmers to apply for the GAP certificate. However, they still needed to keep their food safety production practices, such as input selection, as the minimum requirement for certificate qualifications.

GAP farmers could not automatically get higher prices for their produce even with their GAP certificates. However, higher prices can be expected from higher fruit quality whether they have GAP certificate or not. Because GAP certification usually result to better fruit quality, the cooperatives actively campaign for GAP system. The local cooperatives tried to promote GAP system in collaboration with the government institutions and export company through campaigns, such as "*the farmers who showed their GAP certificate can get free electric fan*". After the farmers implemented GAP on their orchards, they realized that GAP

can improve their farm management to increase the proportion of high-quality mangosteen production. Therefore, the farmers who wanted to obtain more income needed to learn and understand GAP contents for their eventual GAP certification.

The agricultural cooperatives had an important role to encourage the farmers to produce GAP-based mangosteen. Without any support from extension officers and the cooperative's staff, mangosteen farmers could hardly prepare for necessary data and figures required by the GAP system. Therefore, each agricultural cooperative prepared un-official GAP procedures for its member-farmers which would be tested by the GAP inspectors. Although these roles were not normally expected from cooperatives, they were continuously implemented by them rather than by government sectors.

After the farmers learned the GAP procedures and contents, their GAP practices affected the level of understanding about pre-harvest management methods, especially on the aspects related to improve the product quality more than the others contents (mean = 1.9). Only 31 farmers (27.6%) kept their cultivation records at least for 2 years. This was because these respondents participated in the program provided by the local cooperatives.

Table 6-2 : Current GAP understanding of mangosteen farmers categorized by GAP elements

Content	Yes (2)	No (1)	Mean	S.D.	Level*
Water source			**1.7**	**0.2**	**High**
Farm used water that was not contaminated by substances	103	9	1.9	0.2	High
Treatment was needed before using water on farm	96	16	1.8	0.3	High
Post harvested used water was same quality as drinking water	65	47	1.5	0.4	Moderate
Cultivation site			**1.5**	**0.3**	**Moderate**
Cultivation site should not be polluted by the substances	74	38	1.6	0.4	High
High risk site should treated to reduce risks	60	52	1.5	0.5	Moderate
Cultivation should be legal	55	57	1.4	0.5	Moderate
Use of agricultural hazardous substance			**1.6**	**0.3**	**High**
Agro-chemical must be used under DOA instruction	74	38	1.6	0.4	High
DOA prohibited agro-chemicals were not used	66	46	1.5	0.4	Moderate
Agro-chemical equipment must be clean after use every time	86	26	1.7	0.4	High
Pre-harvesting management			**1.6**	**0.2**	**High**
Keeping on record of the cultivation input methods	65	47	1.5	0.4	Moderate
Solid waste from humans must not be used on the farm	64	48	1.5	0.4	Moderate
Cultivation plan must follow the traders' requirement	100	12	1.8	0.3	High

Harvesting management			**1.6**	**0.2**	**High**
Cultivation methods must follow the traders' requirement	106	6	1.9	0.2	High
Cultivation methods must be done for food security	58	54	1.5	0.5	Moderate
Cultivation equipment indirect contact with the products must be clean	59	53	1.5	0.5	Moderate
Product storage and on-site transportation			**1.5**	**0.2**	**Moderate**
Product harvesting must be done for the food security	58	54	1.5	0.5	Moderate
Product storage should be provided without hazardous substance	71	41	1.6	0.4	Moderate
Truck/cart must be clean and provided without contamination	57	55	1.5	0.5	Moderate
Workers Health			**1.6**	**0.2**	**High**
Workers who directly handle the product must be cleared	69	43	1.6	0.4	Moderate
Workers must be trained/educated on food safety production method	71	41	1.6	0.4	Moderate
Workers must check their health every year	89	23	1.7	0.4	High
Data recording			**1.4**	**0.4**	**Moderate**
Recording on cultivation methods, input, and management is needed	65	47	1.5	0.4	Moderate
Do you have any note books?	47	65	1.4	0.4	Moderate
Do you keep record for at least 2 years?	31	81	1.2	0.4	Low
Total mangosteen farmers' GAP understanding			**1.6**	**0.1**	**Moderate**

*level of farmers understanding were justified into 3 levels (Low = 1 – 1.33; Moderate = 1.34 - 1.66; High = 1.67 – 2.00)

The farmers' GAP understanding varied with their background, practices, market environment, and extension efficiency, and so on. There is a difference as regards to level of farmers' understanding among the three districts, being significant at 1% level of confidence (table 6-3). The farmers in Makham district had the highest GAP understanding (mean = 1.8) among the three districts. Farmers in Makham district had superior competition in the export market. GAP certified-farmers always searched for lucrative market channels that activated the movements of the local farmers' organization to connect between producers and satisfied market. Makham agricultural cooperative had a contract with a large exporter who provided small purchasing stations to support its members. However, to produce high-quality mangosteen, farmers needed to conduct specific methods rather than conventional ones, such as regulating the use of chemicals and harvesting only after rainfall. These methods are defined under the GAP system. Of course, the majority of mangosteen farmers familiar with conventional methods can produce only a small proportion of high quality mangosteen. Local purchasers exporting high-quality mangosteen preferred to have a business link with GAP-certified farmers, rather than with non-certified farmers since GAP certificate was a requirement in the export market. The farmers in Makham district had more chances to access the valuable market because they followed GAP methods.

Table 6-3 : Difference of farmers GAP understanding in three districts

GAP elements	Average farmers' GAP understanding (level)			t-value	p-value
	Makham	*Khlung*	*Tha Mai*		
Water source	1.8 (H)	1.7 (H)	1.7 (H)	4.2	0.1
Cultivation site	1.8 (H)	1.4 (M)	1.3 (L)	30.2	0.0**
Use of agricultural hazardous substance	1.8 (H)	1.5 (M)	1.5 (M)	15.2	0.0**
Pre-harvesting management	1.8 (H)	1.6 (M)	1.5 (M)	24.3	0.0**
Harvesting management	1.7 (H)	1.6 (M)	1.6 (M)	0.7	0.4
Product storage and on-site transportation	1.5 (M)	1.5 (M)	1.5 (M)	0.0	0.9
Worker health	1.7 (H)	1.6 (M)	1.6 (M)	3.6	0.0**
Data recording	1.8 (H)	1.3 (L)	1.1 (L)	42.7	0.0**
Total farmers' GAP understanding	1.8 (H)	1.5 (M)	1.5 (M)	76.5	0.0**

**significant at 1% level of confidence

6.4.2 Farmers' GAP economic incentives (cost effectiveness)

GAP certified farmers were satisfied with income from their investment more than the ordinary farmers (cost efficiency = 1.74 and 1.27, respectively). However, the production cost per rai was 11,554.7 THB/rai, higher than the ordinary farmers' cost (7,007.9 THB/rai) (table 6-4). The production methods required the farmers to manage their farms, but extensive labor needed to be factored into the production cost.

Meanwhile, mangosteen market prices depended on quality. For example, peel of the mangosteen is one of the pricing criterion. The mangosteen with smooth skin which is highly appreciated in the market, was sold at 30 – 40 THB/Kg, while that with irregular skin was less than 20 THB/Kg. GAP farmers could sell their mangosteen at 38 THB/Kg on average, whereas the ordinary farmers realized only 15 THB/kg. There was not much difference as regards volume of production between GAP certified and ordinary farmers (-10.7%). As a result, the GAP farmers' income was more than the average farmer (124.4%).

Table 6-4 : Economic incentive comparison between Chanthaburi GAP-based and ordinary farmers

Contents	Chanthaburi farmers*	Chanthaburi GAP-based farmers	Practical GAP economic incentive advantages (%)
Average production cost / rai (THB)	7,007.9	11,554.7	- 4546.8 (64.8)
Average cost / rai / Kg. (THB)	14.1	15.6	- 1.5 (10.6)
Average production / rai (Kg.)	585	522	- 63 (10.7)
Average income / rai / Kg. (THB)**	8,968.0	20,131.4	+ 11,163.4 (124.4)
Average income / rai / Kg. (THB)	15.3	38.5	+23.2 (151.6)
Average cost efficiency / rai	1.27	1.74	+ 0.47 (37.0)

*_Source_ Chanthaburi provincial Department of Agriculture Extension survey, 2014
**Mangosteen prices for the farmers were fluctuated due to the product quality, and period of purchasing

The density of mangosteen trees in an orchard was a good example affecting production outcome. In general, ordinary farmers believed that 30 – 40 trees / rai would bring more production and more income (Department of Agriculture, 2009). In sun-lit areas of their farms, the quality of mangosteen got better. GAP instructions guided farmers to reduce mangosteen density to 20 – 25 trees per rai. Farmers slowly adopted GAP on their farm by reducing the density of mangosteen trees per rai. The farmers who reduced the density of mangosteen to 20 – 25 trees per rai obtained the highest economic benefit (cost efficiency ratio = 1.79) (table 6-5). The most cost efficient density was 24 trees per rai, which was the same number as the DOA's GAP instruction concerning planting density.

Table 6-5 : Comparative cost efficiency of different mangosteen planting density

Number of mangosteen per rai (trees)	Number of respondents	Average cost efficiency per rai	S.D.
20 – 25	34 (30.3%)	1.79	0.28
26 – 30	22 (19.6%)	1.57	0.22
31 – 35	14 (12.5%)	1.42	0.18
36 – 40	42 (37.5%)	1.60	0.23
Total	**112 (100.0%)**	**1.63**	**0.02**

ANOVA: F-change = 8.793, p-value = 0.00

In Makham district, where farmers had the greatest understanding of GAP than those in other districts, they showed the highest cost efficiency ratio (table 6-6). Since their production cost was the highest, they could also obtain the highest income among the three

districts. Understanding of GAP might positively impact on the farmers' economic structure.

In Makham district, where the export mangosteen market has seen stiff competition, mangosteen farmers deeply understood the importance of GAP. GAP certificates were also highly coveted among the farmers in this district. At the start of the GAP extension period, it was difficult for the farmers to adopt new knowledge to their conventional farming. However, the minimum requirement for accessing satisfactory market price needed the GAP certificates to be shown to the local export trader. Normally, farmers tend to adopt GAP requirements step by step with their conventional farming, such as sorting out the chemical storage and data recording. However, these issues were not enough to improve the quality of mangosteen for the export market. If the farmers needed to improve their product quality, they had to change their farm management according to the instruction of GAP.

Table 6-6 : Practical GAP-based mangosteen production cost, income, and profitability

Content	District			F change	p-value
	Makham	*Khlung*	*Tha Mai*		
Average cost of mangosteen production/ rai (THB)	13,264.2	12,314.7	11,674.2	5.902	0.004
Average income from mangosteen producing/rai (THB)	23,415.9	19,124.0	18,251.1	26.496	0.000
Average cost efficiency ratio of mangosteen/rai	1.779	1.572	1.583	7.246	0.001

Comparing the proportion of cost investment, farmers in Makham district disbursed the largest amount of wage cost (Table 6-7). This was probably because GAP processes needed complex cultivation techniques. In general, the farmers hired both permanent and seasonal workers for daily operations, such as tree clipping and watering. Careful pre-harvesting process could reduce costs of pesticides and fertilizing. Tree clipping reduced the branches density for farm chemical spraying, so the farmers might spend lesser costs of fertilizers and chemicals. Makham farmers spent the highest cost on wage during pre-harvesting period. On the other hand, those farmers in Khlung and Tha Mai did not pay much attention on wage cost. They disbursed other costs like insecticide during harvesting and post-harvesting periods. Farmers in Makham invested in the pre-harvesting management such as

soil and plant preparation. These processes could add up to the overall cost; however, they might enable reduction of other costs for the farmers in order to produce high quality mangosteen.

Table 6-7 : Practical GAP-based mangosteen investment categorized by main production costs

GAP-based farmers cost management	Cost investment in each area			Mean	S.D.
	Makham	*Khlung*	*Tha Mai*		
Three main cost of mangosteen production (THB)					
1. Insecticide	3,975.7	5,084.1	4,802.2	4,674.5*	917.6
2. Wage	4,689.1	4,993.7	4,109.7	4,643.5*	895.7
3. Fertilizer	3,907.5	1,476.9	2,002.2	2,347.8*	1,180.2
Cultivation process cost management (THB)					
4. Pre-harvest cost management	4,952.1	2,206.8	990.2	2,657.2*	161.4
5. Harvesting cost management	3,617.0	4,506.1	5,541.9	4,549.3*	1,119.2
6. Post-harvest cost management	3,935.0	4,841.7	4,381.9	4,439.1*	109.3
Total cost of GAP-based production	**12,504.2**	**11,554.7**	**10,914.2**	**11,645.8***	**1,976.2**

**p-value < 0.05*

6.4.3 Farmers' understanding of and cost effectiveness from GAP adoption

Simple linear regression analysis was performed to examine the modification of production cost (Y_1) and income (Y_2) among 112 farmers as a reflection of their understanding of each GAP element. As shown in Tables 6-8 and 6-9, farmers' understanding on data recording procedure (X_8) had a positive and significant impact on their production cost (Y_1) (X_8: β = 1,356.76, t = 2.63, $p < 0.05$). The coefficient of determination revealed 15.6% variation in GAP production cost.

Table 6-8 : Relationship between farmers' GAP understanding and their production cost

Predictors (Farmers' GAP understanding)	Mean	S.D.	t-value	GAP-based cost of production (Y) Beta
X_1 Water source	1.78	0.24	0.22	180.63
X_2 Cultivation site	1.56	0.34	0.65	394.45
X_3 Use of agricultural hazardous substance	1.67	0.30	0.16	109.92
X_4 Pre-harvesting management	1.68	0.25	-0.00	-2.65
X_5 Harvesting management	1.66	0.24	-0.89	-672.32
X_6 Production storage and on-site transportation	1.55	0.27	-0.02	-15.59
X_7 Workers' welfare	1.68	0.28	1.94	1,369.36

X_8 Data recording	1.42	0.41	2.63	1,356.76*
F change = 2.387*, R^2 = 0.156, Adjust R^2 = 0.091				

$p < 0.05$

GAP farmers' income (Y_2) was also affected by their understanding (F-change = 7.838, $p < 0.01$) (table 9). This result proved that pre-harvest management methods (X_4) (X_4: β = 2,745.81, t = 1.98, $p < 0.05$), worker welfare management (X_7) (X_7: β = 3,215.97, t = 2.77, $p < 0.01$), and data recording methods (X_8) (X_8: β = 2,387.08, t = 2.82, $p < 0.01$) positively influenced their income. Thus, the coefficient of determination revealed 37.8% variation in production cost among the farmers.

Table 6-9 : Relationship between farmers' GAP understanding and farmers' income

Predictors (Farmers' GAP understanding)	Mean	S.D.	t-value	GAP-based farmers' income/rai (Y) Beta
X_1 Water source	1.78	0.24	-0.02	-26.72
X_2 Cultivation site	1.56	0.34	1.84	1,816.34
X_3 Use of agricultural hazardous substance	1.67	0.30	1.53	1,646.73
X_4 Pre-harvesting management	1.68	0.25	1.98	2,745.81*
X_5 Harvesting management	1.66	0.24	-0.25	-310.83
X_6 Production storage and on-site transportation	1.55	0.27	-0.78	-856.30
X_7 Workers' welfare	1.68	0.28	2.77	3,215.97**
X_8 Data recording	1.42	0.41	2.82	2,387.08**
F change = 7.838**, R^2 = 0.378, Adjust R^2 = 0.330				

*$p < 0.05$, **$p < 0.01$*

Even if farmers' understanding of GAP elements was relatively sufficient, their production costs were not reduced. On the other hand, they could obtain more income through adapting GAP production methods. This is because GAP products are lucratively marketed and farmers can increase their income from sales. If the farmers had a higher level of GAP understanding, their GAP-based production cost possibly be increased to 1,356.7 THB/rai or 11.6%, and their income could also be increased to 8,348.7 THB/rai or 41.4% from their farmer total income. The explanation of 3 GAP elements that influenced the economic structure of farmers are shown below:

1. *Data recording methods*: Recording data allows the farmers to manage their decision of input selection. This will improve planning of farming and post-

harvest. However, a systematic farm arrangement can possibly increase cost of production but improving their product quality.

2. *Pre-harvest management*: The farmers' income increased due to the improvement of their understanding of this issue. Crop preparation following the GAP instruction enhanced the farmers' cultivation processes. For example, diversification of crop control improved product quality. Although the GAP-based production was lower than those from conventional farming methods, the product quality might be better than the conventional production. Thus, the GAP farmers could receive more income than the ordinary farmers.

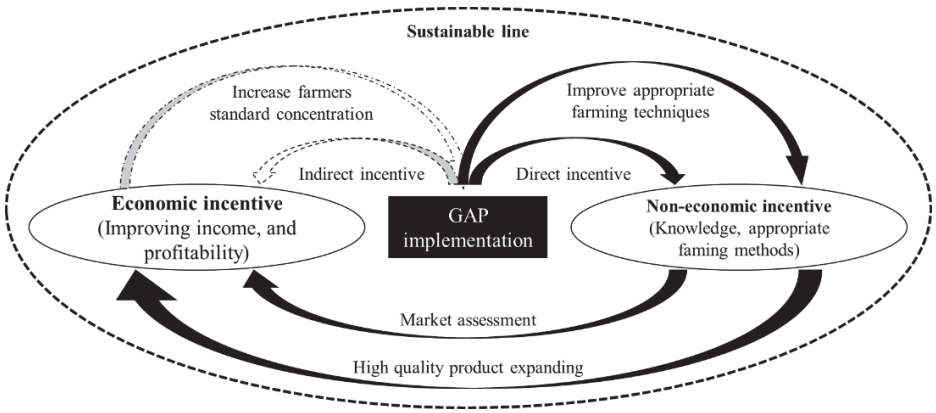
3. *Workers' welfare management*: During harvesting season, extensive labor is much needed and desired but the shortage of laborers is always an impediment. Farmers needed to maintain relationship with their workers to assure sufficient number of laborers for the next harvesting season. An increasing demand for seasonal workers during harvest season raised the wage levels. For the example, temporarily hired seasonal workers' wage was 7 THB/kg., but farmers spent only 200 THB/day for their permanent workers. A days' harvest of mangosteen can yield as much as 100 Kgs per worker. This is advantageous to seasonal workers who work hard but are not guaranteed permanent employment. For permanent workers receiving fixed daily wage regardless of harvest quantity, the only benefit would be job security. These permanent farm workers perform other tasks aside from fruit harvesting especially during the off-season such as watering, chemical spraying and tree clipping. GAP social aspects which focused on the improvement of workers' welfare indirectly influenced the farm owners to contribute towards better conditions for their workers. Therefore, the farmers' understanding of this aspect helped maintain product quality through the efficient supply of farm workers.

6.5 Conclusion

GAP has been chosen as a sustainable cultivation standard by most Thai fruit exporters. The farmers adopt GAP together with their conventional farming techniques to improve their product quality. It is a reliable standard for producing high-quality fruit for the overseas markets. The MOAC has encouraged those farmers cultivating export-oriented commodities to follow the instruction of GAP since 2004. However, in the study areas, farmers were still confused and encountered many constraints for implementing it. However, farmers engaged with GAP practical implementation, such as data recording methods can expect influences for their farm improvement. In collaboration with local cooperatives and exporters in Makham district, the farmers can access export markets. They practiced GAP with their conventional farming methods for greater market access. This situation further brought up their GAP understanding. Moreover, market incentives positively enhanced the farmers' GAP understanding.

Adopting GAP production methods can increase farmers' income more than the conventional farming methods. The farmers produced high-quality mangosteen which are sold at a higher price. However, those farmers adopting GAP methods cannot bring down production cost, and they have to deal with higher costs. The farmers' GAP understanding positively affected both their production cost and income. Therefore, GAP standards can provide sustainable farming techniques which are regarded as non-economic incentives. This non-economic incentive brings satisfactory market price to the farmers which is a form of economic incentive. Conversely, the market price motivates the farmers' willingness to embrace the new GAP knowledge. It is a relational development cycle between non-economic and economic incentives for sustainable development of GAP in the long term (Figure 6-1).

Figure 6-1 : Farmers' practical incentive and linkage for farmers' sustainability



The GAP standard itself provides direct incentive through its knowledge and appropriate farming techniques which are classified as non-economic incentives. The proportion of high-quality mangosteen can be increased if the farmers effectively practice GAP on their farms. This situation is essential for the farmers to adopt additional GAP criteria on their farming practices. The relationship between direct and indirect incentives motivates and expands the cycles into the expected goal of sustainable development arising from GAP implementation. QGAP certificates were less attractive for farmers in practice because there was no direct market for them after implementing GAP.

Chapter 7 Marketing of Thai National GAP (QGAP) mangosteen in Chanthaburi province, eastern Thailand

The farmers' practical incentives from GAP adoption were already explained in the previous chapter. In Thailand, GAP products were distributed through the same market channels as were the ordinary products. As a result, farmers' could not always get any additional price from their standard implementation even if they spent more in production costs. In this chapter, the current market situation of GAP-certified mangosteen was analyzed in-depth.

7.1 Introduction

GAP standard is an official national food safety guarantee certificate. It was proposed to encourage the farmers to improve their product quality. In addition, it increased the farmers' competitiveness and pushed the market towards safe agricultural production for both domestic and overseas markets (Hobbs, 2003). GAP products were distributed to the markets which are classified into two types. The first is the market that provides direct price-premium for GAP-based product, while the other does not provide any price premium (Amekawa, 2010:2013; Hobbs, 2003). The market environment influenced farmers' willingness to implement GAP standards on their farms through its available incentives (Pongvinyoo et al., 2014). Therefore, these market accesses helped encourage GAP development.

A case study in Tanzania (Mushobozi, 2010) showed market enforcement positively influenced GAP development which was motivated by the farmers' GAP implementation. GAP provided sustainable cultivation methods for the farmers. Hence, farmers repeatedly adopted appropriate cultivation methods to ensure safe food consumption in the markets. This situation presented an obstacle for farmers to fulfill the distributors and consumers' increasing concern about food safety, but it is a win-win situation for the farmers and stakeholders in the safety food chain. Therefore, market situation can encourage the farmers

to implement GAP system on their farms. Gazi (2012) studied exported tomatoes and GAP development in Malaysia wherein high-quality products for export were mainly produced by GAP-based market. Consequently, market demands encouraged the farmers to participate in the GAP scheme. Naturally, the market was the important factor for GAP development in many agricultural countries.

It is clear that the GAP standard is driven by market mechanisms in many countries. Pongvinyoo et al. (2014) evaluated the market environment of GAP coffee in Thailand and identified external factors that influenced its development. Farmers' market accesses encouraged/ discouraged the farmers to cultivate on their farm guided by GAP. However, as regards Thai coffee, there was no specific market or price premium for GAP-based products. All products were mixed together in collection and processing processes. Similar to the results of Mankeb et al. (2009), the durian market did not distinguish the GAP durian from the ordinary product. This shown that, Thai market had not yet developed the GAP specific market to encourage the farmers to certify as GAP farmers, because they could not realize any additional price for their standard cultivation products. It could be concluded that the visible economic incentives for the farmers' standard implementation were reduced or cut from Thai agricultural standard development system. Of course, this situation negatively influenced the farmer motivation to implement GAP on their farming practices.

The Committee on Agriculture 2004 summarized that Thailand was one of the pioneer for GAP development and that Thai GAP development was the original model for ASEAN countries. GAP products needed the farmers' investment and attentions to adopt this standard. Therefore, farmers expected the lucrative market as an incentive for their standard implementation. However, the current market situation could not satisfy the farmers' expectation, especially for the exported products.

Some studies have focused on export-oriented agricultural products with GAP certificates. There were several market conditions which influenced the farmers' motivation to implement any standards on their farm. A previous study indicated the GAP certification at

one time seem less attractive. The purpose of this chapter was to identify the current situation of GAP market from farmers' viewpoints.

7.2 Methodology

This chapter focused on 2 groups. The first group was farmers. The sample size was 112 calculated by using the formula (Yamane, 1973). They were randomly selected by simple sampling methods in Tha Mai (33), Khlung (46) and Makham (33) districts which are the biggest mangosteen producing areas in Chanthaburi. The proportional sampling depended on the size of the GAP-certified farmers in each district. The second group was the main mangosteen buyers. This group consisted of exporter, packaging factory managers, and mobile merchants. Here, an agricultural cooperative was classified as a packaging factory because its business activity in the mangosteen market was the same as a private packaging company. On the other hand, retailers were excluded from these targeted groups because they did not participate in the market along the harvesting season. The retailers participated in the market when the mangosteen production was saturated and its price was at the lowest level. Retailers fixed the mangosteen price and bought amount of mangosteen in the market without any consideration for on the GAP certificates. Finally, one exporter, five packaging factory, and six mobile merchants were selected for in-depth interviewing in this study.

The data were collected in the seasonal crop year 2013/2014 by structured questionnaires. The questions for the mangosteen farmers covered their socio-economic profiles, market environments, and their marketing attitudes. The farmers were investigated in term of their market accesses and decision making to sell their GAP-based product. The buyers were questioned on their profiles, market environment, and market attitudes towards GAP-based product by the structure questionnaires. Their attitudes were classified according to the 4Ps market components (product, price, place, and promotion). Descriptive statistics was employed to explain the current market channel, farmers' decision making to sell their GAP product, and the buyers' attitudes of GAP product. Inferential statistics (ANOVA) was performed to evaluate the market factors that influenced the buyers' decision making to

purchase GAP-based products. The discussion of this study consisted of three parts which covered early market, late market, and whole market situations.

7.3 Outline of the respondents

7.3.1 Farmers group

A total of 112 respondents were selected in this study; 29.5% came from Makham district, 41.0% came from Khlung district, and 29.5% came from Tha Mai district, as shown in Table 6-1. Workers for mangosteen cultivation were not specifically assigned by gender within their families because mangosteen cultivation is not labor-intensive but required high skill. Their ages ranged from 22 to 72 with the 32 – 51 age group being 53.3% of the total, followed by those in the 52 – 61 age group. Although about three-fourths of the respondents graduated from primary school only, but they had considerable experiences in mangosteen cultivation for 23.1 years on average (Makham 17.2, Khlung 27.1 and Tha Mai 23.4). These farmers were familiar with GAP procedure. The majority of them participated in GAP scheme for 8 years (68.7%), followed by 2 years (12.5%). It is noteworthy that all respondents cultivated fruit using inter-cropping system. However, 28.5% of the farmers separated their mangosteen orchard from other fruits and crops. Their farm structure might affect their mangosteen quality. Income from mangosteen ranged between 14,000 to 28,600 THB/rai/year.

7.3.2 Buyer group

The majority of buyers were undertaking family businesses which were started by first generation owners. They had higher formal education than farmers with 20 – 30 years on fruit business experiences. They dealt with fruits in more than 2 regions every year. The buyers required farmers to show GAP certificate, and to prepare a “moving document (MV)” which guaranteed the product came from Chanthaburi. This MV was requested for the international trades. The profile of the buyers’ respondent shown on Table 7-1.

The first group of buyers purchased products from the local markets in order to export. Representing the new generation. He is university educated, with the 20 years experiences in mangosteen trade. He has additional marketing experiences transferred from the previous generation, and he marketed fruit for export all year round. The second group was the packaging factory including agricultural cooperatives acting as packaging companies. The company managers had 20 – 30 years experiences in the fruit business. Approximately 6 – 8 months/year, they operated their fruit marketing business. The last group consisted of mobile merchants, migrating from other regions (mainly from northeast region). This type of distributors operated fruit business as a part time job outside of the rice harvesting season in their hometowns. The mobile merchants had superior experiences on fruit marketing compared to the other purchasers.

Table 7-1 : Buyers' respondent profile in Chanthaburi

Contents	Frequency			Total (percent)
	Exporter	*Packaging factory*	*Mobile merchant*	
Type of business				
Individual	1	3	5	9 (75.0%)
Limited partnership	0	3	0	3 (25.0%)
Gender				
Male	0	1	5	6 (50.0%)
Female	1	5	0	6 (50.0%)
Age				
Less than 50	1	2	1	4 (33.3%)
50 – 60	0	3	3	6 (50.0%)
More than 60	0	1	1	2 (16.7%)
Generation				
First	0	5	4	9 (75.0%)
Second	1	1	1	3 (25.0%)
Education				
Primary school	0	0	2	2 (16.6%)
Junior high school	0	0	2	2 (16.6%)
High school	0	2	1	3 (25.0%)
Bachelor	1	4	0	5 (41.6%)
Experiences				
Less than 20	1	1	0	2 (16.7%)
20 – 30	0	4	2	6 (50.0%)
31 – 40	0	1	2	3 (25.0%)

More than 40	0	0	1	1 (8.3%)
Hometown				
Chanthaburi	1	5	1	7 (58.3%)
Migrated	0	1	4	5 (41.7%)
Targeted areas				
Eastern	0	3	1	4 (33.3%)
Eastern and Southern	0	3	4	7 (58.3%)
Eastern, Southern, and Northern	1	0	0	1 (8.3%)
Total	**1**	**6**	**5**	**12 (100.0)**

7.4 Overview of mangosteen market in Chanthaburi province

The estimated mangosteen production and price correlation are shown on Table 7-2 (Department of Agriculture, 2009). Mangosteen market was influenced by the market mechanisms (demand and supply). GAP standard was differently targeted in each period, in term of product price, products qualifications, and paper certificates. Roughly speaking, transactions of mangosteens were grouped into two periods, like early and late harvesting seasons. During the period from March to April, the production of mangosteen was very low while demand for high quality one for export started to increase from January. The price of mangosteen during the early harvest was much higher than that during other periods. On the other hand, from April onwards, the volume of mangosteen increased. During this period, domestic distributors such as retailers participated in transactions. The mangosteen price sharply dropped due to increasing supply.

Table 7-2 : General mangosteen farm activities during cultivated season

	Month	Season	Production	Price	Main market
	January	Preparing	-	-	-
	February	Preparing	-	-	-
Early market	March	Preparing	Very few	MAX	Overseas
	April	Harvesting	Few	Highest	Overseas
	May	Harvesting	Some - Average	High – mid	Overseas and domestic
Late market	June	Harvesting	Average - Many	Mid - low	Domestic
	July	Harvesting	Highest	Lowest	Domestic
	August	Planning	-	-	-
	September	Post-Harvest	-	-	-
	October	Post-Harvest	-	-	-
	November	Preparing	-	-	-
	December	Preparing	-	-	-

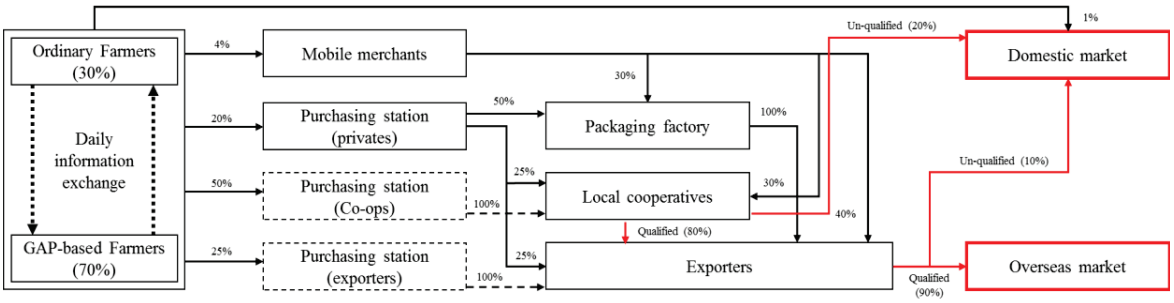
7.5 Results of the study

7.5.1 The market situation for early of harvesting season

Early market environment and farmers' marketing behaviors

During the early harvest season, farmers were satisfied with high market price due to scarcity of mangosteen. Approximately 90% of mangosteens were traded for export (Figure 7-1). GAP-certified and ordinary mangosteens were mixed together in the markets. This means there was no specific market for the GAP product. Mangosteen were priced according to the product qualifications, such as size (3 grades: 100 g., 90 – 99 g. less than 90 g.), skin (smooth and not-smooth), perfection (round and not-round), etc. Low-quality (LQ) mangosteen were 30 – 50 THB per Kg. (each weigh 70 – 90 g means 10 – 11 mangosteen for 1 Kg), while high-quality (HQ) mangosteen were priced between 80 – 130 THB. The HQ mangosteen were exported to Japan, Korea, and EU, whereas LQ mangosteen was exported to China and borders markets.

Figure 7-1 : Early of Chanthaburi harvesting season (March – April) marketing channel



Source: Adopted from interview with the head officers of Chanthaburi provincial department of agriculture
Note: during this period there was 10-20% of mangosteen production in Chanthaburi province

Main buyers were local cooperatives and exporters having two main market functions. First is grading and pricing the mangosteen for the farmers. The farmers sold mangosteen which were contained in their own baskets. The farmers and buyers negotiated the price at the

purchasing station in every district and villages. GAP-certified farmers did not obtain premium prices, but they needed to show their QGAP certificates to buyers for grading purposes. Workers hired by farmers graded mangosteen according to the specific requirements for HQ and LQ products. They transacted with buyers on cash basis. Second group of buyers have a supplementary function. They purchased packages from particular contract factories. Mangosteen container boxes were provided to complete the requirements of the importers. The HQ (or qualified) mangosteens were collected at main stations in each district. They were packed in the specific containers for export. On the other hand, LQ mangosteens were distributed to the domestic market or exported to China.

Table 7-3 : The main reason of the farmers to select their products' buyers in the early season (n = 112)

Main reason to select the buyers	Makham	Khlung	Tha Mai	Total
Price attraction (price)	25	29	25	79 (70.5%)
Keep relationship with buyers (promotion)	6	11	3	20 (17.9%)
Convenience (place)	2	6	5	13 (11.6%)

It is obvious that price is the first factor affecting the farmers' decision making to sell product to buyers (Table 7-3). Due to the scarcity of the products, HQ mangosteen's price increased due to buyers' demand. The farmers did not have workload in their orchards because it was the waiting time to harvest the majority of the remaining mangosteen. They checked price fluctuation every day by directly contacting friends, purchasing stations, exporter and agricultural cooperatives. Half of them used the social media for price information assessment.

The exporters and agricultural cooperatives offered a lower fluctuated price, while the mobile merchants and packaging companies offered a higher varied price. The mobile merchants sold the mangosteen collected from farmers to exporters. In general, the farmers priced their mangosteen which was mixed between LQ and HQ according to the experiences of mobile merchants (Evaluating price per kilogram method) without grading methods. However, this method could not satisfy the farmers' expected price because the

farmers exerted much effort to control their product quality. They selected the best market channel to satisfy their price expectation. Consequently the mobile merchants had low market share.

The second factor was the promotion components. Agricultural cooperatives could gather half of the mangosteen production. They provided main seasonal credit sources for the farmers. They guaranteed to the farmers that there would be no mangosteen flooded in the late market. The agricultural cooperatives would buy the farmers' mangosteen during the late harvesting season. They made the verbal-contract with member-farmers for selling their product. This could guarantee them to sell their mangosteen throughout the harvesting season. Consequently, the farmers set aside a certain part of mangosteens to sell to the cooperative in order to maintain a good relationship with the cooperatives for the future.

Early market buyers' attitudes towards GAP-based products' marketing components

Exporters really need GAP-certificates of mangosteens to guarantee that their products are safe for consumption. They were the main end-buyers in this early period because the majority of products were exported to overseas markets. However, they needed the assistance from the other distributors/buyers to fulfill their mangosteen demand. The distributors' attitudes toward GAP product was an important indicator to assess the buyers' GAP product satisfaction. The selected buyers' attitude towards GAP-based product are shown on Table 7-4.

Table 7-4 : Buyers attitudes towards GAP-based products (n = 12)

Contents	Exporter (1)		Packaging factory (6)		Mobile merchants (5)		Mean	S.D.
	Agree	disagree	Agree	disagree	Agree	disagree		
Product							**0.75**	**0.32**
1. Product quality from GAP-based producers are different from the ordinary farmers	1	0	5	1	2	3	0.66	0.49
2. The product which easily to sell in high price market were from GAP-based farmers	1	0	5	1	1	4	0.58	0.51
3. Proportion of HQ product from the GAP-based farmers are higher than HQ product from ordinary farmers	1	0	6	0	5	0	1.00	0.00
Price							**0.50**	**0.39**
4. Price of product from GAP-based farmers are different from the ordinary farmers' product	1	0	3	3	0	5	0.33	0.49
5. Price of product from GAP-based farmers are higher than the ordinary farmers' product	1	0	3	3	0	5	0.33	0.49
6. GAP-based farmers can sell their product with high price rather than ordinary farmers	1	0	6	0	3	2	0.83	0.38
Place							**0.94**	**0.19**
7. HQ product were easily found in GAP-based farmers	1	0	6	0	4	1	0.91	0.28
8. HQ product were easily found in this period	1	0	6	0	5	0	1.00	0.00
9. GAP-based farmers were widely sold their product in this period	1	0	6	0	4	1	0.91	0.28
Promotion							**0.55**	**0.43**
10. GAP certificate are really important for you	1	0	6	0	2	3	0.75	0.45
11. GAP-based farmers product needed lower grading labor intensive compare to the ordinary farmers used	1	0	4	2	0	5	0.41	0.51
12. GAP-based farmers are the important producers to control your supply during this period	1	0	5	1	0	5	0.50	0.52

Note: The buyers attitude were evaluated in 2 categories (agree = 1, disagree = 0)

Buyers paid the uppermost attention on product source, followed by product-market components. GAP-certified farmers could benefit in the early part of harvesting season because their products were HQ products. GAP encouraged farmers' farm management which increased their income from the outcome of HQ mangosteen. This situation supported those exporter who demanded HQ mangosteen. . Consequently, GAP-certified farmers were targeted as the good HQ mangosteen suppliers by the buyers. The farmers' product was sold to the exporter who paid the high mangosteen price. This was because of the production volume was inferior, so the farmers could pay attention to control their product quality before selling to the market. The analyzing of impacts of GAP standards on the buyers' attitudes towards marketed components are shown on Table 7-5.

Table 7-5 : Buyers attitudes towards GAP-based products' marketing components during the early market

Marketing components	Average positive attitude towards QGAP advantages			F-value	Sig.
	Exporter	*P.F.*	*M.M.*		
Product	1.00 (H)	0.88 (H)	0.53 (M)	2.56	0.13
Price	1.00 (H)	0.66 (H)	0.20 (L)	4.87	0.03**
Place	1.00 (H)	1.00 (H)	0.86 (H)	0.65	0.54
Promotion	1.00 (H)	0.83 (H)	0.13 (L)	13.37	0.00**

***Significant at 1% level of confidence*

Note: The level of attitudes categorized to 3 levels (0.00 – 0.33 = Low, 0.34 – 0.66 = Medium, 0.67 – 1.00 = High)

GAP standard had the largest impacts towards exporters during the early part of harvesting season (Table 7-5). The HQ product was demanded together with their certificate papers by exporters, and packaging companies. In general, GAP product was not separated from the ordinary product. The farmers could achieve economic incentive from the proportion of HQ mangosteen production. It was shown that GAP-certified farmers get benefits from the management changes in their farms during the low harvesting season.

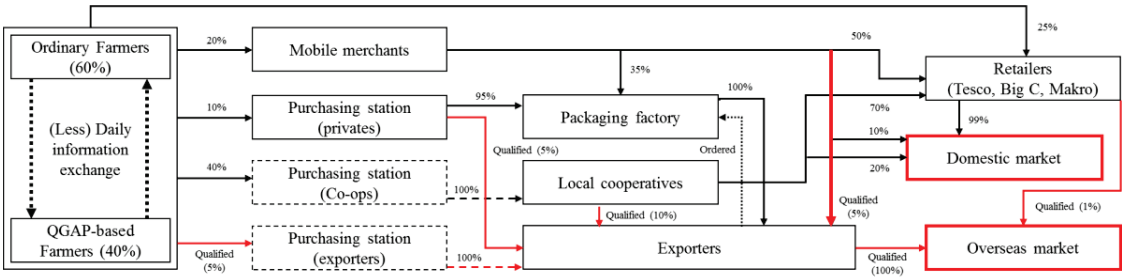
Mobile merchants were not much concerned on the GAP product and its certificate. They were concerned with price and promotion marketing components for GAP product becoming low or middle level. GAP standard has not influenced the middleman's buying methods. During the early part of harvesting season, farmers spent their time to find the best price market for themselves. Therefore, mobile merchant could not buy the HQ product (approximately 40%) during this period. This confirmed the first statement that GAP management could encourage the farmers to control their harvesting period to get the highest price in the early part of harvesting season.

7.5.2 The market situation for late harvesting season

Late market environment and farmers' marketing behaviors

Some HQ mangosteen were exported to the overseas market, while an amount of LQ were distributed to the domestic market. Approximately 80 – 90% of total mangosteen in Chanthaburi province were harvested during the late mangosteen harvesting season. An increasing mangosteen supply decreased the price becoming lower than that of the early harvesting season. At that time, mangosteen was mainly distributed to domestic markets (Figure 7-2). The GAP-based mangosteen were mixed with non-GAP mangosteen in markets. Mangosteen was priced based on its appearance just like during the early harvest session. However, grading criteria was concentrated into skin and weight conditions (7 - 25 THB for LQ and 35 – 60 for HQ/kg). Figure 7-2 showed the dynamics of mangosteen market channel during the late harvesting period.

Figure 7-2 : Late of Chanthaburi harvesting season (May - July) marketing channel



Source: Adopted from interviewing from the head officers of Chanthaburi provincial department of agriculture
Note: during this period there were 80 – 90% of mangosteen production in Chanthaburi province

Buyers did not require GAP certificates anymore in the late harvest seasons. The GAP-certified farmers who had registered in the early of harvesting season were carefully checked product by collectors at a buying station, in order to select the HQ mangosteen. During this period, mangosteen market was peak dealing a large volume. A lot of workload brought both farmers and buyers to work on site for more than 12 hours every day.

Therefore, trading method was simplified and classified into 2 types. The first is "per kilogram price evaluation". The buyers set the price of mangosteen which mixed with both LQ and HQ products. This process could reduce transaction costs of buyers. Of course, farmers can select "grading methods" for marketing in peak seasons. This methods took more time rather than the first methods. Net price was depended on the quality of product. The farmers' decision to sell their product during this period are shown on Table 7-6.

Table 7-6 : The main reason of the farmers to select their products' buyers in the late season (n = 112)

Main reason to select the buyers	District			Total (percent)
	Makham (33)	Khlung (46)	Tha Mai (33)	
Price attraction (place)	8	17	14	39 (34.8%)
Keep relationship with buyers (promotion)	7	5	0	12 (10.7%)
Convenience (place)	18	24	19	61 (54.5%)

Market access (place component) was a main factor to choose marketing channels during the late of mangosteen harvesting season. The farmers checked the price fluctuation every day. There was not much difference as regards buyers' offered prices. The exporters and cooperatives offered a curtained price, while big buyers such as retailers offered a fix price. Due to the limited time for mangosteen harvesting and low labor intensive, the farmers did not pay much attention to control quality of product. They harvested mangosteen as much as possible. GAP-certified farmers who looked for the market price in an early season needed to harvest together with seasonal workers. Mobile merchants marketed by supporting the farmers to reduce the farmers' farm responsibility. They went to the farmers' orchards and evaluated the price with little difference from the average market price.

Late market buyers' attitudes towards GAP-based products' marketing components

There were two kinds of buyers during the late harvesting season. The first type was a retailer or its agent. The other type was exporter. GAP standard was focused to increase the farmers' potential to access overseas market. Therefore, domestic buyers who fixed the

mangosteen price with less considering any standard were excluded from this analysis. The second type of buyers marketed attitude towards GAP products are shown on Table 7-7.

Table 7-7 : Buyers attitudes towards QGAP-based products (n = 12)

Contents	Exporter (1)		Packaging factory (6)		Mobile merchants (5)		Mean	S.D.
	Agree	disagree	Agree	disagree	Agree	disagree		
Product							**0.30**	**0.26**
1. Product quality from GAP-based producers are different from the ordinary farmers	0	1	1	5	1	4	0.16	0.38
2. The product which easily to sell in high price market were from GAP-based farmers	1	0	3	3	3	2	0.58	0.51
3. Proportion of HQ product from the GAP-based farmers are higher than HQ product from ordinary farmers	0	1	1	5	1	4	0.16	0.38
Price							**0.58**	**0.28**
4. Price of product from GAP-based farmers are different from the ordinary farmers' product	0	1	4	2	4	1	0.66	0.49
5. Price of product from GAP-based farmers are higher than the ordinary farmers' product	0	1	2	4	2	3	0.33	0.49
6. GAP-based farmers can sell their product with high price rather than ordinary farmers	1	0	5	1	3	2	0.75	0.45
Place							**0.61**	**0.34**
7. HQ product were easily found in GAP-based farmers	1	0	1	5	4	1	0.50	0.52
8. HQ product were easily found in this period	1	0	2	4	4	1	0.58	0.51
9. GAP-based farmers were widely sold their product in this period	0	1	4	2	5	0	0.75	0.45
Promotion							**0.25**	**0.20**
10. GAP certificate are really important for you	0	1	0	6	0	5	0.00	0.00
11. GAP-based farmers product needed lower grading labor intensive compare to the ordinary farmers used	0	1	1	5	3	2	0.33	0.49
12. GAP-based farmers are the important producers to control your supply during this period	1	0	2	4	2	3	0.41	0.51

Place and price were given a priority in trading. Although farmers' behaviors on selling changed, buyers focused to collect HQ product from GAP-certified farmers. Buyers believed that there was no different between GAP and ordinary farmers' product during the late market. However, GAP-certified farmers could sell their product at a higher price than the ordinary farmers. The easiness on HQ products assessment was the first advantages of GAP-certified farmers in markets. This was because of the high demand for HQ mangosteen for overseas market still demanded during this time. Consequently, the GAP-certified farmers could supply HQ product with the high proportion compare to the ordinary farmers.

GAP certificate was not paid much attention during peak seasons. The buyers had already register the farmers' certificate (copy and keep recording) during an early stage of harvesting, while mangosteen demand during the late market had adjusted into equilibrium

which its price was in the lowest level. Buyers' exported volume have already predicted by the GAP-certified farmers during the early stage. Therefore, GAP certificate was not requested from the farmers at this time.

GAP-certified farmers had the most significant effects towards the mobile merchants trading (Table 7-8). An average mangosteen price was low and farm grading workers were increasingly demanded for harvesting work. The farmers preferred to sell their product with mobile merchants to reduce the farmers' farm responsibility. The merchants usually buy the product from the farmers with the per kilogram price evaluation method. It showed that mobile merchants would much prefer to purchase the products from GAP-certified farmers, in order to get benefit from HQ product through graded by them.

Table 7-8 : Buyers attitudes towards GAP-based products' marketing components during the late market

Marketing components	**Average positive attitude towards QGAP advantages**			**F-value**	**Sig.**
	Exporter	*P.F.*	*M.M.*		
Product	0.33 (L)	0.24 (L)	0.33 (L)	0.55	0.94
Price	0.33 (L)	0.61 (M)	0.60 (M)	0.36	0.70
Place	0.66 (H)	0.38 (M)	0.86 (H)	4.20	0.51
Promotion	0.33 (L)	0.16 (L)	0.33 (L)	0.96	0.41

Exporter reduced attentions on the GAP-based product and certificates rather than in the early market. Their product, price and promotion marketing components attitudes for GAP product were in a low level which different from the early market. During the late market, the mangosteen had already flooded in the market. This means, the exporters' GAP standard concentration was reduced from the buyers' perspective. The proportion of production in market negatively influenced the QGAP certificate and standard purchasers' concentration.

7.6 Discussion

7.6.1 Early market situation for GAP-based mangosteen

1) GAP-certified farmers were main targets suppliers for buyers: The main market of mangosteen is overseas market. The certificates, standards, and product quality were highly concerned by the purchasers. They needed the safe products with certificates to guarantee their own supply chain toward export. The main market was China. It took at least 3 days for transportation (by truck containers), so the product quality from the purchasing station were strictly controlled. In addition, GAP-certified farmers were major suppliers during the early harvesting season.

2) "Price" is the main factor influenced the farmers' decision making to marketing behaviors: This was because the production during this period was low while there were sufficient workers (permanent and household). The farmers could paid much attention to control the quality of product, and they could search the most valuable price market by themselves. Farmers investigated market price every day. Due to exceed demand for HQ product, price competition was tough. Market information was rapidly spread among the farmers in the early harvesting season, through various kinds of social media.

3) Buyers used the psychological competition strategy to persuade the farmers to sell their product: Farmers had to separate some of their product to sell to the agricultural cooperatives to keep the relationship with them. This is because the farmers needed to remain their market in the peak seasons. This contract was the bargaining power between farmers and agricultural cooperatives. The buyers could full fill their demand and market the mangosteen during its high price season in the early market, while farmers could achieve their satisfied prices and prepared for the peak season's market access in the late market. The market price was still priced by the buyers' side, although the HQ product was limited.

4) GAP-certified farmers can make the high buyers' confidence on their HQ-supplied product: During a low season, end-buyers could estimate the proportion of HQ-product by targeted on the GAP-certified farmers. Therefore, the place marketing components were the highest attentions by the buyers.

7.6.2 Late market situation for GAP-based mangosteen

During the late harvesting season, mangosteen production was flood, and some of HQ mangosteen from both ordinary and GAP farmers were selected by purchasers for overseas market.

1) GAP-certified farmers are not the main targeted by buyers: The main product were sold in the domestic market. The mangosteen market were supplied by both GAP and ordinary farmers. The purchasers could select the best quality product for export. However, the low – normal quality product could be sold in the domestic market. Therefore, buyers' reduced concentration on the GAP farmers during the late market of harvesting season.

2) GAP-certified farmers pay less concern on market price: The farm work was loaded because of lacking workers intensive. Normally, owners would investigate price in the morning during the early harvesting season; however, in reality, they just selected the most convenience market channel to sell product during the late harvesting season. The farmers investigated price approximately once a day (3 – 4 times during the early harvesting season).

3) Purchasers have the full rights for pricing the mangosteen product market during the late market of harvesting season: Both exporter and retailers were separated into two markets. They purchased different kinds of product quality during this period (exporter focused on the HQ, while retailers focused on low – medium quality). The farmers bargaining power were less because of an increasing of product quantity brought the price

reduction. However, the market price was driven by the market mechanism under the guideline of purchasers (less purchasers in the market).

4) Purchasers can take the benefits from the HQ product availability from the GAP-certified farmers' production: The traders would transfer the proportion of LQ product from GAP-certified farmers into HQ product availability in the market. Because the overseas market required only for the HQ product and be qualified under the GAP standard. So the exporters subrogated the GAP-certified farmers to full fill the demand from overseas market during this period. Certificate became less important.

5) GAP-certified farmers can still make buyers' confidence on their HQ-supplied product: During peak seasons, the mobile merchants could take the benefits from the available purchasing methods and like to do business with GAP-certified farmers.

7.6.3 The whole market situation for GAP-based mangosteen

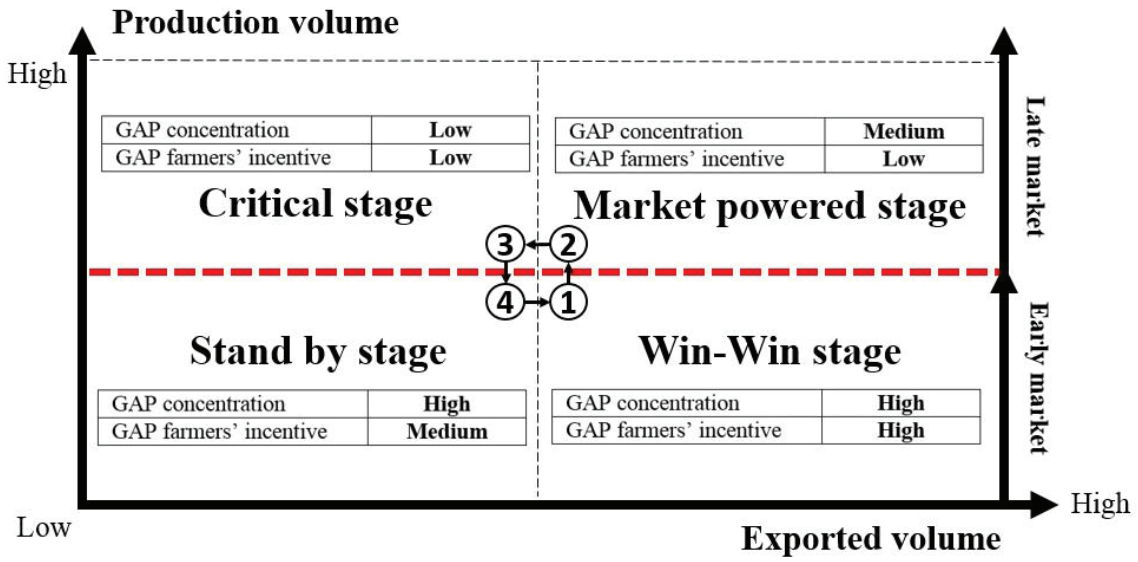
According to the results and discussion, two factors influenced the marketing of GAP product which are GAP concentration and GAP farmers' incentive.

1. GAP concentration: It is the total of standards attention/interesting between producers and purchaser, in production and certificates aspects for the period of time. GAP concentration inversely related to the production volume, and directly related to demand from export. GAP concentration highly concerned with exported demand rather than production volume. Mangosteen is usually sold in fresh product, which limits farmers' time to sell. Therefore, market price is likely to be fixed by purchasers, even if there is a small amount of production.

2. GAP farmers' incentives: It can identify into economic (cost reduction, income improvement) and non-economic (knowledge, farming techniques, and market information) incentives. It can be found that the intensives were also inversely related to the production

volume, and directly related to exported demand. The incentives were also highly related with exported demand rather than production volume, because of purchasers fixed the market price, while mangosteen were highly produced. Purchasers had many choices to collect the HQ product from farmers in the market even without any certificate for their export. As a result, GAP farmers did not expect GAP-marketing for mangosteen. The export GAP commodities' marketing were evaluated and shown in Figure 7-3.

Figure 7-3 : GAP-marketing cycle for high competitive commodities



The relations between production and export which differently influenced the GAP concentration and farmers' practical incentive motivated the market into 4 stages in a period of time as are shown on the figure 7-3. The GAP market should evaluate into 4 stages as follow:

1. Win – Win stage

This stage provided the maximum benefits to both GAP-certified farmers and buyers, due to scarcity of mangosteen and high demand for HQ product. GAP

concentration was targeted in the market in term of certificates paper requirement from the farmers and product quality. It is noteworthy that mangosteen chains were shorten by the farmers' function (market access). The demand for mangosteen has already started from the China, Japan, and EU markets which severely required for food safety certificate in early market. Such market conditions raised HQ mangosteen price for exporting. Because of the limitation of HQ product and price fluctuation in a local market, farmers can look for more lucrative channels by themselves without any relying on a particular middleman. They take benefits from the GAP-based HQ product.

2. Market powered stage

Mangosteen was in oversupply in market during late harvesting season. The market in the second stage was driven by a buyers' side. Harvest season of mangosteen was very short, so small capacity of storage and shortage of labors were major constraints. Buyers could fix the mangosteen price and took benefits from usefulness of the GAP certificate without paying any price premium. The strong connection between buyers inspired them to control market. GAP certificate was still used by the exporter. Therefore, GAP concentration appeared in this stage from the buyers' side (using certificate for exporting). HQ product can be produced by both GAP and ordinary farmers in the late harvesting season. That means the buyers could collect the HQ mangosteen in the market from both GAP and ordinary farmers. They purchased the mangosteen at the market price without paying any premium price for GAP farmers. The GAP farmers lost bargaining power in market. It was cleared that building network among the stakeholders (farmers' or buyers' sides) becomes important process to control the market in this stage.

3. Critical stage

Buyers can move and explore new production centers in any parts of Thailand. GAP standard were reduced the importance in term of certificate and positioning (HQ product supply) from this area in this stage. The incentives for the GAP farmers and GAP

concentration were completely disappeared in this stage. GAP concentration fully appeared in Chanthaburi province in an early stage of its development, because it was the first area that mangosteen was harvested. Markets in Trat and Chumphon provinces were secondly harvested.

4. Stand by stage

In this stage, GAP standard is widely motivated by many sectors. It directly influenced the farmers' farm structure. The government is the main actor to promote GAP standard. But private sectors demanded and marketed HQ product, including GAP certificate. The government extension officers, private sectors, and farmers' organization (such as a cooperative) contact farmers to prepare their farm to produce the HQ mangosteen. GAP was selected as a standard to improve the farmers' capacity to produce the HQ mangosteen. In this stage, farmers were extended many knowledge from many sources, even if their products were not ready to harvest. These provided knowledge (normally related with GAP) was a direct incentive for the farmers. Therefore, GAP incentive appeared in this stage.

Market mechanisms supports the GAP-farmers to cultivate high quality products. The GAP product marketing currently existing is divided into 4 stages which depend on the production and exported demand. The farmers do not realize GAP standard can provide some incentives for them. However, in reality, farmers' incentives appear in stage 4 and 1 which are both income and farming techniques. The market prices were fixed by the buyers, especially the exporters who have the demand for HQ product. GAP-certified farmers are targeted as good HQ product suppliers. Distributers can took some additional benefit from a market by collecting the HQ products from GAP-certified farmers without providing any additional price for the farmers. Therefore, farmers are taken their benefit during the high production with the high exported demand. Consequently, the farmers believe that, GAP could not contribute any incentive for them.

7.7 Conclusion

GAP-based product are targeted for exported along the harvesting season. Although market analysis in this study are divided into two parts, but the HQ and LQ product from GAP-certified farmers are highly targeted for export along the season. It confirms that, GAP-certified farmers are the main suppliers for exporters which is one of the benefits of GAP-certified farmers in the market supply chain. GAP-certified farmers are targeted as the main HQ product suppliers for the purchasers. Due to the demand for HQ product during the less production period, GAP farmers were specified as the main HQ product suppliers. This situation is not different from the high production period, however, the incentive for the farmers' standard producing are reduced by the market mechanism during the late season because the HQ product supply impacts from the ordinary farmers.

Price incentive is a farmers' practical factor influenced their decision making to sell their product. GAP-certified farmers have a high bargaining power during early harvesting season. Price is fixed between farmers' expected price and exporter offered price. Later in late harvesting season, farmers who worked load changed their selling strategy to sell their produce. In another way, they want to reduce their farm work responsibility. So, the roles of mobile merchants become high during this period.

The marketing for the GAP product are not stable along the harvesting season. The GAP marketing is driven by two factors which are GAP concentration and GAP incentives for the farmers. The changes of GAP concentration are relied on the production and export volume. The market can provide both direct and indirect incentives for the farmers. These incentives positively influenced the farmers' HQ product ability. Therefore, GAP-certified farmers can improve their farm cultivation techniques to produce HQ product. As well as, they can increase their income from the current market situations through their GAP implementation, even if there is no specific market for GAP product.

Chapter 8 Conclusion and recommendation

Conclusion and recommendation will provide answers to research questions in this dissertation and describe results of analysis and discussion to four specifics objectives. The contents of conclusion consist of clarifying the current situation of GAP development in Thailand, and to answering "Is Thai national GAP development success?"

8.1 Conclusion

8.1.1 The factors influenced the farmers' perception on their GAP understanding

Farmers' perception is one of their learning process which can indicate their current understanding on the focused issues. **Chapter 4** reviewed that there were internal and external factors influenced the farmers' GAP perception of GAP. Farmers' conditions to perceive the GAP knowledge depended on their farm responsibility, market purpose, and alternative choices of standards. The factors influenced the farmers' perception were classified into two categories which were farmers' background and externalities such as market environment which brought up the farmers motivation. One of the important factors is the farmers' GAP self-confidence which is directly affected by the efficiency of extension procedure.

Thai farmers' adherence to conventional farming methods was an obstacle of GAP extension. It is difficult to promote GAP standard which includes new cultivation methods. Even if it can improve the farmers' perception of the GAP standards. The limitations of extension services were a main cause of farmers' low GAP understanding and poor practical implementation in the past (Amekawa 2010; Amekawa 2013b; Mankeb et al. 2009). Ineffective market conditions did not encourage the farmers to participate in the GAP system. Therefore, the farmers hesitated to completely adopt GAP standards into their farming operations.

Internal factors are the farmers' capabilities to perceive the GAP knowledge. These factors are difficult to change in practices, showing inefficiency of Thai extension procedure, which still needs to be improved. This is because farmers can increase GAP perception through the improvement of their self-confidences. GAP market GAP supports are additional functions to encourage the changes of farmers' farm management and behaviors. Therefore, the externalities (market environment and extension procedures) are necessary factors to develop the farmers' behaviors and their GAP perception.

8.1.2 The role of private sector on Dual-GAP standard development

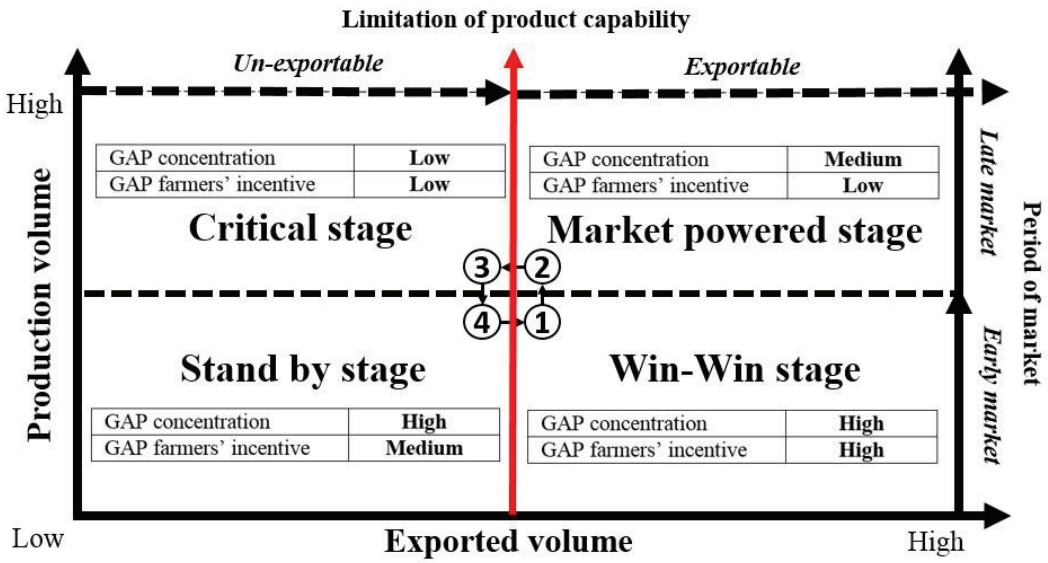
The 4C was proposed to solve unstandardized coffee production. It provided a particular market for 4C-based coffee with premium price for its farmer-members. 4C contents were developed in order to improve sustainable cultivation techniques. It was cleared that, 4C and GAP have the same ultimate goals at farm-level implementation. 4C was promoted in Thailand together with GAP standard by a private company. **Chapter 5** identified that coffee farmers were enough satisfied with 4C rather than GAP, although goals of both are not so different. A specific market was provided for the 4C certified coffee. Useful services such as quality soil checking and farm extension service were delivered for the 4C certified farmers. Additional market prices encouraged the farmers to adopt 4C standards on their conventional farming. They slowly changed conventional farming methods into 4C standard ones. Although some conventional methods were not accepted, the 4C flexibly compromise those farmers as 4C members by giving suggestions to improve their missing contents. There are two reasons why 4C have successfully developed.

Firstly, 4C is dual-GAP extending on coffee production. The developing of private agricultural standard in Thailand was not completely separated from a government-sponsored system like GAP. 4C standard was developed together with the GAP and targeted the GAP-certified farmers as pioneer farmers. They had opportunities to develop their farming methods to access a premium/higher price market.

Secondly, 4C developed the GAP procedure into practical standard implementation with market access for the 4C coffee. GAP and 4C contents are not much different as regards implementation. However, farmers preferred a dual-GAP private standard (4C) because it could easily adopt with their conventional farming methods. 4C provided a particular market channel with HQ product. Therefore, the farmers could achieve their expected economic incentive from adopting this dual-GAP standard.

According to Chapter 7 (see also Figure 7-3), market can be classified into 4 stages. Mangosteen market is different from the low competitive commodities (such as coffee, coconut, flower, etc.) which farmers lack awareness to improve their product quality, because the farmers' cannot access to the lucrative price markets. These commodities cannot be smoothly promoted GAP standard. Therefore, the market situation of these commodities move between standby and critical stages (Figure 8-1).

Figure 8-1 : Model of Dual-GAP standard development for low competitive commodity



The private sector can shift into this system to break down the limitation of these products for export by promoting their own standard as a dual-GAP standard. This situation can

motivate the market cycle to complete within the 4 stages cycle. The company can market HQ product with GAP certificate, and the low competitive commodity can assess export markets. Therefore, the farmers can increase their income and willingness to improve their farm management under the standard guidelines.

According to the "Model of Dual-GAP standard development for low competitive commodity", GAP standard will be automatically increased attentions (concentration and farmers' incentives) from stakeholders. This is because requirement of dual-GAP standard member only required the GAP-certified farmers who has already be the GAP-certified ones. Therefore, the market position of this commodity can move from 3rd and 4th stage into 1st and 2nd stage. Thai product can improve its competitive ability in global market much more than before, with the labelling of dual-GAP standard. GAP standard is a fundamental one for the success of export development.

8.1.3 The practical benefits from GAP implementation

In general, farmers expect economic incentive through adopting a new farming techniques. Naturally, farmers are likely to regard implementation of GAP as a direct incentive. The previous studies classified GAP economic incentives for the farmers into two main categories. The first category was to reduce farmers' production costs such as efficient use of labors, input selection, and sustainable farm management methods. The second one was to gain premium price of GAP products. **Chapter 6** reviewed that, in Thailand, GAP-based product could not gain any direct price premium from the market. Adopting GAP production methods can increase farmers' income from their improvement of their product quality. Of course, GAP adopting also increased the farmers' operation costs.

GAP standards can provide sustainable farming techniques which are regarded as non-economic incentives. This non-economic incentive brings satisfactory market price to farmers. Conversely, the market price motivates the farmers' willingness to embrace new GAP knowledge. It is a relational development cycle (see also Figure 6-1) between non-

economic and economic incentives for sustainable development of GAP in a long term. Therefore, the actual incentive from farmers' GAP adopting in practices are classified into two categories.

First is direct incentive: GAP could increase farmers' capability or knowledge for their farm management in practical way. The GAP standard itself provides direct incentive through knowledge and appropriate farming techniques. These knowledge included the appropriate farming techniques which improve GAP-certified farmers' capacity to conduct safe agricultural food. These direct incentive (knowledge for safe food producing methods and high quality production techniques) was farmers' fundamental components for their GAP standard qualifications.

Second is indirect incentive: GAP was promoted to support the farmers' valuable price market access with safe food qualification. For export markets especially EU, products must be certified GAP. GAP is a standard-requirement for food safety. In EU market, additional price could not be expected as long as GAP is a minimum required certificate. In the rest of world markets, GAP-certified farmers may be able to access a lucrative market with their HQ product.

8.1.4 The current supported market situation for GAP-based product

GAP standard is driven by market mechanisms with focusing on food safety and food control, especially in lucrative price markets for HQ products. From the farmers' experiences on GAP implementation, they believed that GAP could not provide any incentive with them. **Chapter 7** proofed that, the agricultural marketing is divided into 2 periods (early and late markets of harvesting season). The HQ product which is mainly produced by GAP certified farmers can be easily sold in the early markets of harvesting season.

GAP strongly provided an opportunity with its certified-farmers in an early harvesting season which product can be sold at a high price. As well as in the late harvesting season, the farmers believe that the GAP cannot provide them incentive. This believe is half correct because little price premium was given the GAP-based products during this period. But the farmers can improve their product quality through adoption of GAP in conventional farms. The farmers can increase their HQ product and supply them to the lucrative market even in a peak season of mangosteen.

8.1.5 The success of Thai national GAP development

The general objective of this dissertation is to evaluate the current situation of GAP development in Thailand. Domestic market has not yet developed for GAP products. The success of GAP development was clearly found in export markets but its need private sector intervention on non-exported commodity, which the products have low competitiveness in the global market.

GAP was mainly motivated by mainly HQ market system with increasing concern on food safety and food control. Extension procedure fully successes in order for farmers to produce standardized product in case of export commodity. These standardized and HQ products are targeted especially toward export markets or lucrative price markets. However, not all Thai products can be exported to overseas market (such as coffee commodity). GAP can only deliver the appropriate farming techniques to increase GAP production. The private sectors focused on the GAP-based farmers as the HQ product suppliers. Moreover, they provide their own dual-GAP standard with the practical and useful services for the GAP farmers. Therefore, that commodity can develop its competitiveness with the other and export under this dual-GAP standard labelling (see also Figure 8-1). On the other hand, the other dual-GAP developed standard can achieve the farmers' expected incentive (knowledge and income) because of their supported condition which is market access.

After FAO introduced GAP for a period of time, it become one of the minimum requirements for the agricultural trades in global market to secure food safety and sustainable issues at the farm-level production. Many countries have adopted the FAO GAP guidelines and established food security framework, including Thailand. There were many obstacles on policy, extension services, research, and farmers' implementation levels during GAP developing process. The success of GAP is depended on the effectiveness of farmers' implementing GAP procedures. The farmers will increase their GAP standard attention when they can get premium price from selling their GAP-based product. In general, consumers markets have not yet developed enough mature to deal in GAP labelled products in some countries. Farmers might ignore this standard. Food safety issues including GAP are not cared at a farm-level. As a result, like Thailand, food safety of agricultural product is not reliable in the global trades.

Actually GAP gave both direct and indirect incentives to farmers, but they tend to believe that GAP can secure little incentive for them, in cases where a direct market for GAP-based product has not yet become mature in economic terms. Therefore, private sector need to generate a dual-GAP standard which will secure food safety and keep a certain level of product quality. Some dual-GAP standards labelling (such as 4C, GlobalGAP, etc.) have already be accepted widely in the global markets. Farmers can gain visible benefits (normally is premium price) from implementing such standards, and learn how to improve their food safety production on their farms.

However, it is also difficult to promote new dual-GAP standards. Private company have expanded the fundamental GAP knowledge among farmers through dual-GAP standard. This knowledge expanding becomes the best way how private company explore their new standard. Any dual-GAP standard needs the development of GAP as an essential requirement. GAP standard also needs the dual-GAP standard for the market access. Each standard cannot stand alone in market. This mutual-relationship positively motivates the development of both GAP and dual-GAP standards. This relationship inspires the farmers

to improve their sustainable cultivation which positively affects the Thai agricultural food safety reliability in the global trades.

According to these conclusions, this dissertation will give some suggestions for the future GAP development as three recommendations in the next section.

8.2 Recommendation

8.2.1 Developed Thai National GAP into more practicable standard for the farmers

This study reviewed that extension services could increase the farmers' willingness to conduct GAP. The farmers faced many constraints from adopting GAP with their conventional farming methods. MOAC has to rethink a continuous GAP promoting procedures (training program, and simplify GAP manual). The capacity of extension services (human and budget resources) should be improved, too. Although the cluster extension are widely discussed and implemented in many commodities, the current GAP extension procedures still targets on the area. MOAC should target a farmers' group (such as experiences, farmers' scale) rather than specific area. MOAC has to develop GAP extension procedure as follow:

1) Rearrange the contents of GAP manual to be more appropriate with the farmers' practices
2) Improving the GAP extension in term of human and budget resources are needed
3) Cluster extension for important export commodity should be implement in practice

8.2.2 Appropriate information is needed to inform the farmers

This dissertation analyzed the practical investment and additional benefits that GAP system brought. The output of this analyzing was contradict with the farmers' believes. The farmers trust that they can access valuable price markets by conducting GAP cultivation

methods. However, the GAP standard is just appropriate farming techniques or knowledge for food safety under a certain framework of food control. It may successfully satisfied with increasing demand for high quality and safe products. After farmers adapt GAP, they can apply for other standards that will provide a new market access. This is the farmers' actual benefit from GAP adaptation in Thailand.

Although it is not clearly assess the effects of social media on the farmers' market information. The farmers started use this channel to communicate each other on the practices. This study strongly recommend MOAC to increase the effectiveness of GAP promotion as follows:

1) MOAC should consider about the "unofficial" methods to close the gap between government officers and local farmers.
2) The provided actual information in this dissertation are closely the realistic situation of the farmers on implementing GAP are appropriate information for the MOAC to develop and inform to the farmers

8.2.3 Cooperation between public and private sectors for dual-GAP private standard

It seems impossible for government to establish a direct market of GAP products. However, cooperation between government and private sectors is needed to encourage the farmers to participate in GAP theme to create a new market access. Private companies are the real GAP certificate users who stand in every exported commodity.

GAP standard established to support the farmers to access lucrative price market but not every Thai products can be exported (as the case study of coffee commodity in Chumphon province). This is because some Thai products do not have enough competitiveness other countries. These product can improve their quality through standardization in order to increase competitiveness. This process needs an intervention of the private sector that can

provide their own specific qualification for exported commodity. However, the private sector does not need to develop a new standard by itself. They can develop their own standard with the specific qualification as dual-GAP private standard. This can reduce a company's costs to develop a new standard.

According to the Model of Dual-GAP standard development for low competitive community, this study proposes the steps of GAP standard development in practices for the MOAC as follow:

1) Review the limitation of product which cannot seek the market for GAP production
2) Review the qualification of those product which needed for export
3) MOAC should research for the marketers on the low competitive commodities
4) Collaborate between public and private in term of services to provide the most useful services for the farmers
5) Market information should update and inform to the farmers

These recommendation strongly targeted for Thai MOAC, especially the DOA because they are they has the main responsible organization for the GAP development in Thailand. It seems that these recommendations do not focus to suggest the ways to develop only GAP standard because GAP cannot stand alone without specific market in practices. The collaboration between all stakeholders (government sector, private sector, and farmers) are needed. The researchers hope there will be positively changed in the development of Thai National GAP in the near future.

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Appendix

Appendix 1: Coffee survey (Chumphon province 2012)

Appendix 1.1 : Pre- coffee survey

Appendix 1.2 : GAP farmer survey

Appendix 1.3 : GAP officer survey

Appendix 1.4 : 4C farmer survey

Appendix 1.5 : 4C officer survey

Appendix 2: Mangosteen survey (Chanthaburi province 2013 - 2014)

Appendix 2.1 : Pre- mangosteen survey

Appendix 2.2 : GAP farmer survey

Appendix 1: Coffee survey (Chumphon province 2012)

Appendix 1.1: Pre- coffee survey

Content summary

1. Personal Information

2. GAPs information aspects

3. Attitude of farmers toward GAPs training

4. GAPs knowledge practice (Pre – Post participated in training program)

5. The most important constrain for adopting GAPs knowledge to coffee farming

6. The effect after adopting GAPs knowledge

7. Suggestions

Interview schedule – for pre survey of coffee community

Research Title: Level of Cooperatives' members GAPs perception in Chumphon: A Case Study on Coffee Farmers' Opinions Attitudes and Practices

By: Pongthong Pongvinyoo
Graduate School of Biosphere Science, Hiroshima University, Japan

Name/Surname .....
Date of interview .....
Village .....
Sub-District. .....
District .....
Province .....

A. Personal Information

1. Gender
   ☐ Male ☐ Female
2. Age ..... Years old
3. Marital Status
   ☐ Single ☐ Married ☐ Widowed ☐ Divorce
4. Education
   ☐ Primary School ☐ Secondary School
   ☐ High School ☐ Diploma
   ☐ Bachelor ☐ Higher than Bachelor
5. Member of Chumphon Coffee Farmer Agricultural Cooperatives for .....Years
6. Resident in Household Persons
7. Family laborers in Coffee Farming Persons
8. Coffee Farming size Rai
9. Total Coffee Production Kg/Rai
10. Total Agriculture Income THB/Year
11. Total Coffee Income THB/Rai
12. Total Extra Income THB/Month
13. Saving Money THB/Month
14. Debt burden THB (2012)
15. Total Cost of Agricultural THB (2012)
16. Total Cost of Coffee THB (2012)
17. Experience of Coffee Farming Years
18. Hired farm labors Person
    Wage THB/Month

B. GAPs information aspects (Pre Question: Have you ever heard about GAP?

PRE QUESTION!! ☐ Yes ☐ No

19. Do you have the opportunity in obtain academic suggestion about GAPs?

☐ Yes ☐ No

How many times?

.....

From ☐ Department of Agriculture Extension ☐ Department of Agriculture

☐ Cooperatives ☐ Others .....

20. Have you ever participated in GAPs academic program?

☐ Yes ☐ No

How many times?

.....

From ☐ Department of Agriculture Extension ☐ Department of Agriculture

☐ Cooperatives ☐ Others .....

21. In your opinion, Good Agricultural Practice will give benefit to your coffee farming the most in which part?

☐ Economics

: I can get more money benefit from adopting GAPs knowledge to my farming.

☐ Better Selling Price

☐ Cheaper Cost

☐ More market access

☐ Social

: My community is developed because of GAPs knowledge.

We exchange some ideas to improve our farm

☐ Environmental

: Our water resources become cleaner. We reduce our using dangerous chemical for our farming

☐ Health

: My health is better since last year I tried to adopting GAPs.

C. Attitude of farmers toward GAPs training (5 4 3 2 1)

Issue	Level of Attitude toward GAPs training				
	5	4	3	2	1
1. Water Resource					
2. Cultivation Area					
3. Chemical Using					
4. Pre-Cultivation management					
5. Post-Cultivation management					

6. Storage and Transportation					
7. Health					
8. Data Recording					
9. Others ……					

D. GAPs knowledge practice (Pre – Post participated in training program)

Issue	Before participate		After participate	
	Yes	No	Yes	No
1. Water Resource : without toxic				
2. Cultivation Area : without toxic				
3. Chemical use follow the instruction by DoAE or follow the label				
4. Did not use the chemicals which were banned in the list of the trading partner countries				
5. Use the hazardous material which appear in the banned list				
6. Keep the chemicals in the safety area without sun light, rain and separate group of them				
7. Area for keeping the chemical far from the house and kitchen				
8. Have the banned chemical in the store				
9. Always checking the plant pesticide				
10. Control the pesticide in proper way				
11. Follow and Practice the control plan for good production				
12. Cultivate the product in the proper time				
13. Still using the chemical in the time which near the cultivation period				
14. Using the clean material and don't danger for the health of the farmers				
15. Separate the low quality product				
16. Vehicles and baskets are clean and safety				
17. Storage the product in the safety area				
18. Always record the data : pesticide and how to cut it				
19. Always record the data : Chemical usage				
20. Always record the data : management for good quality product				

E. What is the most important constrain for adopting GAPs knowledge to your coffee farming

☐ Not enough knowledge for practice
☐ Complicate in practical
☐ High cost
☐ Long time to apply
☐ lack of material
☐ waiting for the next season
☐ not proper cultivation area
☐ other ……

F. The effect after adopting GAPs knowledge

issue	yes	no
1. Using chemical in proper ways		
2. Decreasing the chemical usage		
3. Production lower toxic		
4. reduce cost		
5. higher selling price		

G. Suggestion

Appendix 1.2: GAP farmer survey

Content summary

1. Personal Information

2. GAPs information aspects

3. Attitude of farmers toward GAPs training

4. GAPs knowledge practice (Pre – Post participated in training program)

5. The most important constrain for adopting GAPs knowledge to coffee farming

6. The effect after adopting GAPs knowledge

7. Suggestions

Practical questionnaire for GAP coffee farmers	เกษตรกร	

แบบสอบถาม

แนวทางการพัฒนาระบบการปฏิบัติทางการเกษตรที่ดีของกลุ่มเกษตรกรผู้ปลูกกาแฟในจังหวัดชุมพร

แบบสอบถามนี้เป็นส่วนหนึ่งของวิทยานิพนธ์ของนักศึกษาปริญญาเอก บัณฑิตวิทยาลัยสิ่งแวดล้อมศาสตร์ มหาวิทยาลัยฮิโรชิม่า ประเทศญี่ปุ่นจึงใคร่ขอความร่วมมือจากท่านในการตอบแบบสอบถามให้ครบทุกข้อตามความเป็นจริงทั้งนี้ข้อมูลในแบบสอบถามทั้งหมดจะถือเป็นความลับ และจะนำเสนอผลการวิจัยในลักษณะโดยภาพรวมเท่านั้น ขอขอบคุณทุกท่านที่สละเวลาอันมีค่าให้ความร่วมมือในการตอบแบบสอบถามครั้งนี้

นายพงศ์ทอง พงศ์วิญญู

ส่วนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

คำชี้แจง: โปรดทำเครื่องหมาย ✓ ลงในช่อง ☐ ที่ตรงกับความเป็นจริงของท่านมากที่สุด หรือเติมคำตอบลงในช่องว่างที่กำหนดให้

1. เพศ

☐ ชาย ☐ หญิง

2. อายุ

☐ น้อยกว่า20 ปี ☐ 21– 30 ปี ☐ 31– 40 ปี

☐ 41– 50 ปี ☐ 51– 60 ปี ☐ 61 ปีขึ้นไป

3. สถานภาพสมรส

☐ โสด ☐ สมรส / อยู่ด้วยกัน ☐ หม้าย / หย่าร้าง / แยกกันอยู่

4. ระดับการศึกษาขั้นสูงสุด

☐ ต่ำกว่าประถมศึกษา ☐ ประถมศึกษา ☐ มัธยมศึกษา ☐ ปวช.

☐ ปวส. ☐ อนุปริญญา ☐ ปริญญาตรี ☐ สูงกว่าปริญญาตรี

5. พื้นที่รวมในการทำเกษตรกรรม

☐ น้อยกว่า 10 ไร่ ☐ 11 – 20 ไร่ ☐ 21 – 30 ไร่

☐ 31 – 40 ไร่ ☐ 41 ไร่ขึ้นไป

6. ท่านมีประสบการณ์ในการทำสวนกาแฟมาแล้วทั้งสิ้น …… ปี โดยทำมาตั้งแต่รุ่น..... ระยะเวลา .....ปี

7. การถือครองที่ดินเพื่อการเพาะปลูกของท่าน เป็นลักษณะใด

☐ เป็นของตนเอง .....ไร่ [ ] มีเอกสารสิทธิถูกต้องตามกฎหมาย ..... ไร่

[ ] ไม่มีเอกสารสิทธิถูกต้องตามกฎหมาย ..... ไร่

☐ เช่า .....ไร่ [ ] ทั้งหมด

8. รายได้รวมโดยประมาณต่อปีของท่านที่ได้รับจากการทำเกษตรกรรม ..... บาท

9. รายได้ต่อปีที่ได้รับจากการปลูกกาแฟของท่าน ประมาณ ..... บาท

10. พืชชนิดใดบ้างที่ทำรายได้ให้แก่ครอบครัวของท่าน และโปรดระบุจำนวนเนื้อที่ในการเพาะปลูกพืชแต่ละชนิด

☐ กาแฟ จำนวน .....ไร่ ☐ ยางพารา จำนวน .....ไร่

☐ ปาล์มน้ำมัน จำนวน .....ไร่ ☐ ทุเรียน จำนวน .....ไร่

☐ ลองกอง จำนวน .....ไร่

☐ อื่นๆ โปรดระบุ ..... จำนวน .....ไร่

11. ท่านมีประสบการณ์ในการปฏิบัติทางการเกษตรที่ดี หรือ จีเอพี มาแล้วประมาณกี่ปี

☐ น้อยกว่า 1 ปี ☐ 1 – 3 ปี ☐ 4 – 5 ปี ☐ 5 ปีขึ้นไป

12. ณ เวลาเริ่มต้น ทำไมท่านจึงเลือกที่จะเข้าร่วมทำการปฏิบัติทางการเกษตรที่ดี (สามารถตอบได้มากกว่า 1 ข้อ)

☐ ช่วยลดต้นทุน ☐ ช่วยให้ขายได้ในราคาที่สูงขึ้น

☐ ช่วยเพิ่มจำนวนผลผลิตต่อรวมให้สูงขึ้น ☐ อยากพัฒนาวิธีการเพาะปลูกจากรุ่นพ่อให้ดีขึ้น

☐ เพื่อนแนะนำ ☐ เจ้าหน้าที่ภาครัฐมาช่วยให้คำแนะนำ

☐ ผลผลิตมีคุณภาพดีขึ้น ☐ ช่วยให้พึ่งพาตัวเองได้มากขึ้น

☐ ช่วยให้สามารถขายผลผลิตให้แก่เนสท์เล่ได้ง่ายขึ้น (ผ่านระบบ 4C)

☐ อื่นๆ โปรดระบุ .....

13. หลังจากที่ท่านเข้าร่วมระบบการทำการเกษตรที่ดีมาระยะหนึ่ง ท่านพบว่า ระบบจีเอพี มีประโยชน์อะไรกับท่านบ้าง

a. .....

b. .....

c. .....

d. .....

14. ท่านคิดว่าท่านมีความเข้าใจในเรื่องการปฏิบัติทางการเกษตรที่ดีมากน้อยเพียงใด

☐ น้อยที่สุด ☐ น้อย ☐ ปานกลาง ☐ มาก ☐ มากที่สุด

15. ท่านสามารถเข้าถึง “วิธีการปฏิบัติทางการเกษตรที่ดี” ผ่านทางช่องทางใดบ้าง

☐ เจ้าหน้าที่ภาครัฐมาช่วยให้คำแนะนำ ☐ เจ้าหน้าที่ภาคเอกชนมาช่วยให้คำแนะนำ

☐ เจ้าหน้าที่สหกรณ์ ☐ แผ่นพับ / ใบปลิว

☐ หนังสือพิมพ์ ☐ วิทยุท้องถิ่น

☐ ศึกษาด้วยตนเอง ☐ เพื่อนแนะนำ

☐ อื่นๆ โปรดระบุ .....

16. ท่านเคยได้รับการเข้าร่วมการอบรมเรื่องการปฏิบัติทางการเกษตรที่ดีหรือไม่

☐ไม่เคย ☐ เคย

☐ กรมส่งเสริมการเกษตร ..... ด้วยตนเอง ..... เจ้าหน้าที่เข้ามาให้คำแนะนำ จำนวน ..... ครั้ง ปี .....

☐ กรมวิชาการเกษตร ..... ด้วยตนเอง ..... เจ้าหน้าที่เข้ามาให้คำแนะนำ จำนวน ..... ครั้ง ปี .....

☐ กรมพัฒนาที่ดิน ..... ด้วยตนเอง ..... เจ้าหน้าที่เข้ามาให้คำแนะนำ จำนวน ..... ครั้ง ปี .....

☐ สหกรณ์ ..... ด้วยตนเอง ..... เจ้าหน้าที่เข้ามาให้คำแนะนำ จำนวน ..... ครั้ง ปี .....

☐ หน่วยงานเอกชน ..... ด้วยตนเอง ..... เจ้าหน้าที่เข้ามาให้คำแนะนำ จำนวน ..... ครั้ง ปี .....

17. รายละเอียดเพิ่มเติมจากข้อ 16

- จำนวนกี่ครั้ง .....ครั้ง
- ระยะเวลาการเข้าร่วมอบรมต่อครั้งกี่วัน .....วัน
- ท่านมีค่าใช้จ่ายในการเข้าร่วมอบรม หรือไม่ อย่างไร

☐ มีค่าใช้จ่าย และต้นทุนในการเข้าร่วมอบรม ได้แก่

○ ในรูปของตัวเงิน .....

○ อื่นๆ.....

☐ ไม่มี/ ได้รับเงินสนับสนุน (โปรดระบุจำนวนเงินต่อครั้ง ..... บาท)

<u>ส่วนที่ 2 ทัศนคติและความคาดหวังของเกษตรกรต่อระบบการปฏิบัติทางการเกษตรที่ดี</u>

<u>คำชี้แจง:</u> โปรดทำเครื่องหมาย✓ ลงในช่อง ☐ที่ตรงกับความเป็นจริงของท่านมากที่สุด หรือเติมคำตอบลงในช่องว่างที่กำหนดให้

1. ท่านทราบหรือไม่ว่าการปฏิบัติทางการเกษตรที่ดีเป็นอย่างไร และในทัศนคติของท่าน "จีเอพี" มีความหมายว่าอย่างไร

☐ ไม่ทราบ ☐ ทราบ โปรดระบุ .....

2. เหตุผลที่ท่านยังคงทำการปฏิบัติทางการเกษตรที่ดีคือ (ตอบได้มากกว่า 1 ข้อ)

☐ ช่วยลดต้นทุน ☐ ช่วยให้ขายได้ในราคาที่สูงขึ้น

☐ ช่วยเพิ่มจำนวนผลผลิตต่อรวมให้สูงขึ้น ☐ อยากพัฒนาวิธีการเพาะปลูกจากรุ่นพ่อให้ดีขึ้น

☐ เพื่อนแนะนำ ☐ เจ้าหน้าที่ภาครัฐมาช่วยให้คำแนะนำ

☐ ช่วยให้สามารถขายผลผลิตให้แก่เนสท์เล่ได้ง่ายขึ้น (ผ่านระบบ 4C)

☐ ผลผลิตมีคุณภาพดีขึ้น ☐ ช่วยให้พึ่งพาตัวเองได้มากขึ้น

☐ อื่นๆ โปรดระบุ.....

3. ท่านคาดหวังว่าจะได้รับประโยชน์อะไรบ้างจากการปฏิบัติทางการเกษตรที่ดี ในมุมมองต่อไปนี้ (ตอบได้มากกว่า 1 ข้อ)

☐ เศรษฐกิจ เช่น ลดต้นทุน เพิ่มผลผลิต เพิ่มรายได้

☐ สังคม เช่น ทำให้เกิดการแลกเปลี่ยนความรู้ทางการเพาะปลูก มีการพึ่งพาอาศัยซึ่งกันและกันมากขึ้น

☐ สิ่งแวดล้อม เช่น ช่วยรักษาสิ่งแวดล้อม / ลดการใช้สารเคมี

☐ สุขภาพดีขึ้น

☐ อื่นๆ โปรดระบุ.....

4. ท่านมีความคิดเห็นต่อกระบวนการ การปฏิบัติทางการเกษตรที่ดี ต่อไปนี้อย่างไร
<u>คำชี้แจง:</u> โปรดใส่เครื่องหมาย ✔ ลงในช่อง ☐ ที่ตรงกับความคิดเห็นของท่านมากที่สุด

ความคิดเห็นต่อกระบวนการ	ระดับความคิดเห็น		
ด้านแหล่งน้ำ	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. หากท่านใช้น้ำที่มาจากแหล่งน้ำที่ไม่มีสารปนเปื้อนหรือสิ่งที่เป็นอันตราย ผลผลิตของท่านจะมีมาตรฐานเป็นที่ต้องการของตลาดมากยิ่งขึ้น			
2. หากอยู่ในช่วงฤดูแล้งที่ต้นกาแฟที่ท่านปลูกต้องการน้ำ ท่านเลือกที่จะใช้น้ำที่ต้นน้ำมาจากโรงงานอุตสาหกรรมโดยไม่ปรึกษาเจ้าหน้าที่ส่งเสริมการเกษตร			
ด้านพื้นที่การเพาะปลูก	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. หากท่านใช้พื้นที่เพาะปลูกที่ดินไม่มีวัตถุหรือสิ่งที่เป็นอันตราย ผลผลิตของท่านจะมีมาตรฐานเป็นที่ต้องการของตลาดมากยิ่งขึ้น			
2. ท่านจะทำการเพาะปลูกพืชในพื้นดินของท่านเป็นระยะเวลานานกว่า 5 – 10 ปี โดยไม่มีการนำดินนั้นมาทำการวิเคราะห์เลย			
การใช้วัตถุอันตรายทางการเกษตร	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. หากท่านศึกษาความรู้เบื้องต้นเกี่ยวกับศัตรูพืชของกาแฟและการใช้วัตถุอันตรายที่ถูกต้อง ผลผลิตของท่านจะมีมาตรฐานเป็นที่ต้องการของตลาดมากยิ่งขึ้น			
2. ท่านไม่ต้องอ่านคู่มือระบบการจัดการคุณภาพกาแฟก่อนทำการเพาะปลูกก็ได้			
3. ท่านมีสถานที่เก็บแยกสารเคมีที่ห่างจากที่พักอาศัย และมีการจัดเก็บสารเคมีออกเป็นหมวดหมู่อย่างชัดเจน			
การจัดการคุณภาพในการผลิตก่อนการเก็บเกี่ยว	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. ท่านมักจะมีการเตรียมแผน เพื่อจัดหาแรงงานในการเก็บเกี่ยวให้เพียงพอต่อผลผลิตกาแฟของท่านล่วงหน้า เพื่อสามารถจัดการกับต้นทุนได้ดีขึ้น			
2. ท่านดูแลเรื่องศัตรูพืชของกาแฟเป็นประจำ ทำให้ผลผลิตกาแฟในแปลงของท่านไม่พบปัญหาแมลงศัตรูพืชมากนัก			
การเก็บเกี่ยวและการปฏิบัติหลังการเก็บเกี่ยว	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. ท่านจะเก็บเกี่ยวเมล็ดกาแฟที่มี “สีเขียว” ปะปนไปบ้าง เพื่อให้ได้น้ำหนักที่ดีขึ้น			
2. ท่านเลือกที่จะตากผลสดกาแฟให้แห้งสนิท เพื่อจะได้เมล็ดกาแฟที่มีคุณภาพที่ดีขึ้น			
3. ท่านสามารถตากเมล็ดกาแฟบนลานดิน โดยไม่จำเป็นต้องมีผ้าใบมารองเมล็ดกาแฟที่ตากก็ได้			
4. หากเกิดฝนตกระหว่างที่ท่านทำการตากกาแฟไว้ ท่านจะใช้พลาสติกคลุมผลการแฟที่ตากไว้ หรือ เคลื่อนย้ายผลผลิตของท่านไปยังสถานที่ที่ปลอดภัย เพื่อป้องกันผลผลิตของท่านเสื่อมคุณภาพลง			

ความคิดเห็นต่อกระบวนการ	ระดับความคิดเห็น		
การเก็บรักษาและการขนย้าย	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. ท่านเก็บเมล็ดกาแฟสาร เมล็ดกาแฟ และกาแฟกาลา ในที่ที่ถูกสุขลักษณะ อากาศถ่ายเทได้สะดวก และป้องกันความชื้นจากภายนอก เพื่อไม่ให้ผลผลิตของท่านมีคุณภาพที่ลดลง หรือเสียคุณภาพไป			
2. ท่านมักใช้ผ้าใบคลุมหลังรถกระบะตอนขนย้ายกาแฟกะลาไปยังจุดรับซื้อ			
สุขลักษณะส่วนบุคคล	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. ท่านใส่หน้ากาก หรืออุปกรณ์ระหว่างการที่ฉีดพ่นยากำจัดศัตรูพืชทุกครั้ง เพื่อป้องกันตนเองจากสารพิษที่อาจจะทำอันตรายต่อตัวท่าน			
2. ท่านถนัดที่จะใช้มือจับเครื่องฉีดพ่นยากำจัดศัตรูพืชโดยตรงมากกว่าที่จะใช้ถุงมือ			
การบันทึกข้อมูล	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. ท่านจดบันทึกข้อมูลทุกครั้งที่มีการซื้อปุ๋ย และยาฆ่าแมลง*			
2. หากท่านหาสมุดบันทึกไม่เจอท่านก็จะไม่จด			

** ขอดูบันทึกข้อมูลที่ท่านจดไว้*

5. ความถี่ในการเข้าดูแลแปลงกาแฟที่ท่านเพาะปลูกโดยประมาณ .....

6. ท่านนำเมล็ดกาแฟไปสีเป็นกาแฟสาร ณ ที่ใดบ้าง

   a. ..... เพราะ .....

   b. ..... เพราะ .....

7. โดยปกติ ท่านจะเลือกขายกาแฟของท่าน ณ ที่ใดบ้าง

   a. ..... เพราะ .....

   b. ..... เพราะ .....

8. โดยปกติ ท่านคำนึงถึงปัจจัยใด ในการเลือกขายกาแฟ เป็นอันดับแรก

   a. การเก็บเกี่ยวผลผลิตครั้งแรก

   ☐ ราคาขายต่อกิโลกรัม ☐ ความสะดวกสบาย ☐ อื่นๆ .....

   b. การเก็บเกี่ยวผลผลิตครั้งต่อๆไป

   ☐ ราคาขายต่อกิโลกรัม ☐ ความสะดวกสบาย ☐ อื่นๆ .....

9. ถ้าให้ท่านเลือกทำ "Good Agricultural Practice (GAP)" กับ "The Common Code for Coffee Community (4C)" ท่านจะเลือก ?

   ☐ GAP อย่างเดียว ☐ 4C อย่างเดียว ☐ ทำทั้งสองอย่างพร้อมกัน

   เพราะ .....

10. ในความคิดของท่านอะไรคืออุปสรรคสำคัญที่สุดในการทำการปฏิบัติทางการเกษตรที่ดี

    .....

    .....

"ขอขอบพระคุณทุกท่านที่กรุณาให้ความร่วมมือในการตอบแบบสอบถามในครั้งนี้"

Appendix 1.3: GAP officer survey

Content summary

1. Personal Information

2. GAPs information aspects

3. Attitude of farmers toward GAPs training

4. GAPs knowledge practice (Pre – Post participated in training program)

5. The most important constrain for adopting GAPs knowledge to coffee farming

6. The effect after adopting GAPs knowledge

7. Suggestions

แบบสอบถาม

แนวทางการพัฒนาระบบการปฏิบัติทางการเกษตรที่ดีของกลุ่มเกษตรกรผู้ปลูกกาแฟในจังหวัดชุมพร

แบบสอบถามนี้เป็นส่วนหนึ่งของวิทยานิพนธ์ของนักศึกษาปริญญาเอก บัณฑิตวิทยาลัยสิ่งแวดล้อมศาสตร์ มหาวิทยาลัย อิโรชิม่า ประเทศญี่ปุ่น จึงใคร่ขอความร่วมมือจากท่านในการตอบแบบสอบถามให้ครบทุกข้อตามความเป็นจริงทั้งนี้ข้อมูลในแบบสอบถามทั้งหมดจะถือเป็นความลับ และจะนำเสนอผลการวิจัยในลักษณะโดยภาพรวมเท่านั้น ขอขอบคุณทุกท่านที่สละเวลาอันมีค่าให้ความร่วมมือในการตอบแบบสอบถามครั้งนี้

นายพงศ์ทอง พงศ์วิญญู

ส่วนที่ 1ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

คำชี้แจง: โปรดทำเครื่องหมาย ✓ ลงในช่อง ☐ที่ตรงกับความเป็นจริงของท่านมากที่สุด หรือเติมคำตอบลงในช่องว่างที่กำหนดให้

1. เพศ

☐ ชาย ☐ หญิง

2. อายุ

☐ น้อยกว่า20 ปี ☐ 21– 30 ปี ☐ 31– 40 ปี

☐ 41– 50 ปี ☐ 51– 60 ปี ☐ 61 ปีขึ้นไป

3. สถานภาพสมรส

☐ โสด ☐ สมรส / อยู่ด้วยกัน ☐ หม้าย / หย่าร้าง / แยกกันอยู่

4. ระดับการศึกษาขั้นสูงสุด

☐ ต่ำกว่าประถมศึกษา ☐ ประถมศึกษา ☐ มัธยมศึกษา ☐ ปวช.

☐ ปวส. ☐ อนุปริญญา ☐ ปริญญาตรี ☐ สูงกว่าปริญญาตรีขึ้นไป

5. ท่านมีประสบการณ์ในการส่งเสริม การปฏิบัติทางการเกษตรที่ดี หรือ จีเอพี มาแล้วประมาณกี่ปี

☐ น้อยกว่า 1 ปี ☐ 1 – 3 ปี ☐ 4 – 5 ปี ☐ 5 ปีขึ้นไป

โดยส่งเสริม “จีเอพี กาแฟ” เป็นระยะเวลา ..... ปี

ปัจจุบัน ท่านดำรงตำแหน่ง .....

สังกัดหน่วยงาน .....

หน้าที่หลักของท่าน ในการส่งเสริม “จีเอพี กาแฟ” คือ .....

6. ในความคิดเห็นของท่าน “จีเอพี กาแฟ” มีประโยชน์กับเกษตรกร ในด้านใดบ้าง (สามารถตอบได้มากกว่า 1 ข้อ)

☐ ช่วยลดต้นทุน ☐ ช่วยให้ขายได้ในราคาที่สูงขึ้น

☐ ช่วยเพิ่มจำนวนผลผลิตต่อรวมให้สูงขึ้น ☐ อยากพัฒนาวิธีการเพาะปลูกจากรุ่นพ่อให้ดีขึ้น

☐ เพื่อนแนะนำ ☐ เจ้าหน้าที่ภาครัฐมาช่วยให้คำแนะนำ

☐ ผลผลิตมีคุณภาพดีขึ้น ☐ ช่วยให้พึ่งพาตัวเองได้มากขึ้น

☐ ช่วยให้สามารถขายผลผลิตให้แก่เนสท์เล่ได้ง่ายขึ้น (ผ่านระบบ 4C)

☐ อื่นๆ โปรดระบุ .....

7. ท่านคิดว่าเกษตรกรในพื้นที่ ที่ท่านรับผิดชอบมีความเข้าใจในเรื่อง "จีเอพี กาแฟ" มากน้อยเพียงใด

☐ น้อยที่สุด ☐ น้อย ☐ ปานกลาง ☐ มาก ☐ มากที่สุด

8. จากประสบการณ์ของท่าน ท่านมักจะ ส่งเสริม "จีเอพี กาแฟ" ให้กับเกษตรกรด้วยวิธีใด

a. .....

b. .....

c. .....

d. .....

9. ท่านเคยได้รับการเข้าร่วมการอบรมเรื่องเกี่ยวกับการปฏิบัติทางการเกษตรที่ดีหรือไม่

☐ ไม่เคย ☐ เคย

☐ กรมส่งเสริมการเกษตร จำนวน ..... ครั้ง ปี ..... หัวข้อ .....

☐ กรมวิชาการเกษตร จำนวน ..... ครั้ง ปี ..... หัวข้อ .....

☐ กรมพัฒนาที่ดิน จำนวน ..... ครั้ง ปี ..... หัวข้อ .....

☐ สหกรณ์ จำนวน ..... ครั้ง ปี ..... หัวข้อ .....

☐ หน่วยงานเอกชน จำนวน ..... ครั้ง ปี ..... หัวข้อ .....

10. รายละเอียดเพิ่มเติมจากข้อ 9

- ใช้ระยะเวลาโดยเฉลี่ย ในการเข้าร่วมอบรมต่อครั้งกี่วัน .....วัน / วันละประมาณ .....ชม.
- ท่านมีค่าใช้จ่ายในการเข้าร่วมอบรม หรือไม่ อย่างไร

☐ มีค่าใช้จ่าย และต้นทุนในการเข้าร่วมอบรม ได้แก่

- ในรูปของตัวเงิน .....
- อื่นๆ.....

☐ ไม่มี/ ได้รับเงินสนับสนุน (โปรดระบุจำนวนเงินต่อครั้ง ..... บาท)

<u>ส่วนที่ 2 ทัศนคติและความคาดหวังของเกษตรกรต่อระบบการปฏิบัติทางการเกษตรที่ดี</u>

<u>คำชี้แจง:</u> โปรดทำเครื่องหมาย✓ ลงในช่อง ☐ที่ตรงกับความเป็นจริงของท่านมากที่สุด หรือเติมคำตอบลงในช่องว่างที่กำหนดให้

1. ท่านทราบหรือไม่ว่าการปฏิบัติทางการเกษตรที่ดีเป็นอย่างไร และในทัศนคติของท่าน "จีเอพี" มีความหมายว่าอย่างไร

☐ ไม่ทราบ ☐ ทราบ โปรดระบุ .....

2. เหตุผลสำคัญ ที่ท่านยังคงให้การส่งเสริมทำการปฏิบัติทางการเกษตรที่ดีแก่เกษตรกร คือ (ตอบได้มากกว่า 1 ข้อ)

☐ ช่วยลดต้นทุน ☐ ช่วยให้ขายได้ในราคาที่สูงขึ้น

☐ ช่วยเพิ่มจำนวนผลผลิตต่อรวมให้สูงขึ้น ☐ อยากพัฒนาวิธีการเพาะปลูกจากรุ่นพ่อให้ดีขึ้น

☐ ช่วยให้สามารถขายผลผลิตให้แก่เนสท์เล่ได้ง่ายขึ้น (ผ่านระบบ 4C)

☐ ผลผลิตมีคุณภาพดีขึ้น ☐ ช่วยให้พึ่งพาตัวเองได้มากขึ้น

☐ อื่นๆ โปรดระบุ.....

3. ท่านคาดหวังว่าเกษตรกร ได้รับประโยชน์อะไรบ้างจากการปฏิบัติทางการเกษตรที่ดี ในมุมมองต่อไปนี้ (ตอบได้มากกว่า 1 ข้อ)

☐ เศรษฐกิจเช่น ลดต้นทุน เพิ่มผลผลิต เพิ่มรายได้

☐ สังคม เช่น ทำให้เกิดการแลกเปลี่ยนความรู้ทางการเพาะปลูก มีการพึ่งพาอาศัยซึ่งกันและกันมากขึ้น

☐ สิ่งแวดล้อม เช่น ช่วยรักษาสิ่งแวดล้อม / ลดการใช้สารเคมี

☐ สุขภาพดีขึ้น

☐ อื่นๆ โปรดระบุ.....

4. ในความคิดเห็นของท่าน *ทำไม "จีเอพี กาแฟ" จึงจำเป็นต้องมีการส่งเสริมให้กับเกษตรกร*

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5. ในความคิดเห็นส่วนตัวของท่าน ท่านคาดหวังอะไรจาก การส่งเสริม "จีเอพี กาแฟ" ให้กับเกษตรกร

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6. ในความคิดเห็นส่วนตัวของท่าน อะไรคือดัชนีชี้วัดความสำเร็จของ การส่งเสริม "จีเอพี กาแฟ" ให้กับเกษตรกร

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5. ความถี่ต่อสัปดาห์ในการเข้าส่งเสริมแปลงกาแฟที่ท่านรับผิดชอบ .....ครั้ง / สัปดาห์

6. ถ้าให้ท่านเลือกทำ "Good Agricultural Practice (GAP)" กับ "The Common Code for Coffee Community (4C)" ท่านจะเลือก ?

☐ GAP อย่างเดียว ☐ 4C อย่างเดียว ☐ ทำทั้งสองอย่างพร้อมกัน

เพราะ .....

7. ในความคิดของท่านอะไรคืออุปสรรคสำคัญที่สุดในการทำการปฏิบัติทางการเกษตรที่ดี

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8. ข้อคิดเห็นและข้อเสนอแนะ เกี่ยวกับ "จีเอพี กาแฟ" ในมุมมองของท่าน

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"ขอขอบพระคุณทุกท่านที่กรุณาให้ความร่วมมือในการตอบแบบสอบถามในครั้งนี้"

Appendix 1.4: 4C farmer survey

Content summary

1. Personal Information

2. 4C information aspects

3. Attitude of farmers toward 4C training

4. 4C knowledge practice (Pre – Post participated in training program)

5. The most important constrain for adopting 4C knowledge to coffee farming

6. The effect after adopting 4C knowledge

7. Suggestions

Practical questionnaire for 4C coffee farmers	โฟร์ซี	เกษตรกร	

แบบสอบถาม

แนวทางการพัฒนาระบบการปฏิบัติทางการเกษตรที่ดีของกลุ่มเกษตรกรผู้ปลูกกาแฟในจังหวัดชุมพร

แบบสอบถามนี้เป็นส่วนหนึ่งของวิทยานิพนธ์ของนักศึกษาปริญญาเอก บัณฑิตวิทยาลัยสิ่งแวดล้อมศาสตร์ มหาวิทยาลัยฮิโรชิม่า ประเทศญี่ปุ่น จึงใคร่ขอความร่วมมือจากท่านในการตอบแบบสอบถามให้ครบทุกข้อตามความเป็นจริงทั้งนี้ข้อมูลในแบบสอบถามทั้งหมดจะถือเป็นความลับ และจะนำเสนอผลการวิจัยในลักษณะโดยภาพรวมเท่านั้น ขอขอบคุณทุกท่านที่สละเวลาอันมีค่าให้ความร่วมมือในการตอบแบบสอบถามครั้งนี้

นายพงศ์ทอง พงศ์วิญญู

ส่วนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

คำชี้แจง: โปรดทำเครื่องหมาย ✓ ลงในช่อง ☐ ที่ตรงกับความเป็นจริงของท่านมากที่สุด หรือเติมคำตอบลงในช่องว่างที่กำหนดให้

1. เพศ

☐ ชาย ☐ หญิง

2. อายุ

☐ น้อยกว่า20 ปี ☐ 21– 30 ปี ☐ 31– 40 ปี

☐ 41– 50 ปี ☐ 51– 60 ปี ☐ 61 ปีขึ้นไป

3. สถานภาพสมรส

☐ โสด ☐ สมรส / อยู่ด้วยกัน ☐ หม้าย / หย่าร้าง / แยกกันอยู่

4. ระดับการศึกษาขั้นสูงสุด

☐ ต่ำกว่าประถมศึกษา ☐ ประถมศึกษา ☐ มัธยมศึกษา ☐ ปวช.

☐ ปวส. ☐ อนุปริญญา ☐ ปริญญาตรี ☐ สูงกว่าปริญญาตรีขึ้นไป

5. พื้นที่รวมในการทำเกษตรกรรม

☐ น้อยกว่า 10 ไร่ ☐ 11 – 20 ไร่ ☐ 21 – 30 ไร่

☐ 31 – 40 ไร่ ☐ 41 ไร่ขึ้นไป

6. ท่านมีประสบการณ์ในการทำสวนกาแฟมาแล้วทั้งสิ้น …… ปี โดยทำมาตั้งแต่รุ่น..... ระยะเวลา .....ปี

7. การถือครองที่ดินเพื่อการเพาะปลูกของท่าน เป็นลักษณะใด

☐ เป็นของตนเอง .....ไร่ [ ] มีเอกสารสิทธิถูกต้องตามกฎหมาย ..... ไร่

[ ] ไม่มีเอกสารสิทธิถูกต้องตามกฎหมาย ..... ไร่

☐ เช่า .....ไร่ [ ] ทั้งหมด

8. รายได้รวมโดยประมาณต่อปีของท่านที่ได้รับจากการทำเกษตรกรรม ..... บาท

9. รายได้ต่อปีที่ได้รับจากการปลูกกาแฟของท่าน ประมาณ ..... บาท

10. พืชชนิดใดบ้างที่ทำรายได้ให้แก่ครอบครัวของท่าน และโปรดระบุจำนวนเนื้อที่ในการเพาะปลูกพืชแต่ละชนิด

☐ กาแฟ จำนวน .....ไร่ ☐ ยางพารา จำนวน .....ไร่

☐ ปาล์มน้ำมัน จำนวน .....ไร่ ☐ ทุเรียน จำนวน .....ไร่

☐ ลองกอง จำนวน .....ไร่

☐ อื่นๆ โปรดระบุ ..... จำนวน .....ไร่

11. ท่านมีประสบการณ์ในการเข้าร่วมโครงการ 4C มาแล้วประมาณกี่ปี

☐ น้อยกว่า 1 ปี ☐ 1 – 3 ปี ☐ 4 – 5 ปี ☐ 5 ปีขึ้นไป

12. ณ เวลาเริ่มต้น ทำไมท่านจึงเลือกที่จะเข้าร่วมโครงการ 4C (สามารถตอบได้มากกว่า 1 ข้อ)

☐ ช่วยลดต้นทุน ☐ ช่วยให้ขายได้ในราคาที่สูงขึ้น

☐ ช่วยเพิ่มจำนวนผลผลิตต่อรวมให้สูงขึ้น ☐ อยากพัฒนาวิธีการเพาะปลูกจากรุ่นพ่อให้ดีขึ้น

☐ เพื่อนแนะนำ ☐ เจ้าหน้าที่ภาครัฐมาช่วยให้คำแนะนำ

☐ ผลผลิตมีคุณภาพดีขึ้น ☐ ช่วยให้พึ่งพาตัวเองได้มากขึ้น

☐ ช่วยให้สามารถขายผลผลิตให้แก่เนสท์เล่ได้ง่ายขึ้น (ผ่านระบบ 4C)

☐ อื่นๆ โปรดระบุ .....

13. หลังจากที่ท่านเข้าร่วมในระบบ 4C มาระยะหนึ่ง ท่านพบว่า ระบบ 4C มีประโยชน์อะไรกับท่านบ้าง

a. .....

b. .....

c. .....

d. .....

14. ท่านคิดว่าท่านมีความเข้าใจในเรื่องระบบ 4C มากน้อยเพียงใด

☐ น้อยที่สุด ☐ น้อย ☐ ปานกลาง ☐ มาก ☐ มากที่สุด

15. ท่านสามารถเข้าถึง “ระบบ 4C” ผ่านทางช่องทางใดบ้าง

☐ เจ้าหน้าที่ภาครัฐมาช่วยให้คำแนะนำ ☐ เจ้าหน้าที่ภาคเอกชน(บ. เนสเล่ย์) มาช่วยให้คำแนะนำ

☐ เจ้าหน้าที่สหกรณ์ ☐ แผ่นพับ / ใบปลิว

☐ หนังสือพิมพ์ ☐ วิทยุท้องถิ่น

☐ ศึกษาด้วยตนเอง ☐ เพื่อนแนะนำ

☐ อื่นๆ โปรดระบุ .....

16. ท่านเคยได้รับการเข้าร่วมการอบรมเรื่อง “4C” หรือไม่

☐ไม่เคย ☐ เคย

☐ กรมส่งเสริมการเกษตร ..... ด้วยตนเอง ..... เจ้าหน้าที่เข้ามาให้คำแนะนำ จำนวน ..... ครั้ง ปี .....

☐ กรมวิชาการเกษตร ..... ด้วยตนเอง ..... เจ้าหน้าที่เข้ามาให้คำแนะนำ จำนวน ..... ครั้ง ปี .....

☐ กรมพัฒนาที่ดิน ..... ด้วยตนเอง ..... เจ้าหน้าที่เข้ามาให้คำแนะนำ จำนวน ..... ครั้ง ปี .....

☐ สหกรณ์ ..... ด้วยตนเอง ..... เจ้าหน้าที่เข้ามาให้คำแนะนำ จำนวน ..... ครั้ง ปี .....

☐ หน่วยงานเอกชน ..... ด้วยตนเอง ..... เจ้าหน้าที่เข้ามาให้คำแนะนำ จำนวน ..... ครั้ง ปี .....

17. ท่านมีค่าใช้จ่ายในการเข้าร่วมอบรม หรือไม่ อย่างไร

☐ มีค่าใช้จ่าย และต้นทุนในการเข้าร่วมอบรม ได้แก่

○ ในรูปของตัวเงิน .....

○ อื่นๆ.....

☐ ไม่มี/ ได้รับเงินสนับสนุน (โปรดระบุจำนวนเงินต่อครั้ง ..... บาท)

ส่วนที่ 2 ทัศนคติและความคาดหวังของเกษตรกรต่อ“4C”

คำชี้แจง: โปรดทำเครื่องหมาย✓ ลงในช่อง ☐ที่ตรงกับความเป็นจริงของท่านมากที่สุด หรือเติมคำตอบลงในช่องว่างที่กำหนดให้

1. ท่านทราบหรือไม่ว่าระบบ 4C เป็นอย่างไร และในทัศนคติของท่าน “4C” มีความหมายว่าอย่างไร

☐ ไม่ทราบ ☐ ทราบ โปรดระบุ .....

2. เหตุผลที่ท่านยังคงทำ “4C” คือ (ตอบได้มากกว่า 1 ข้อ)

☐ ช่วยลดต้นทุน ☐ ช่วยให้ขายได้ในราคาที่สูงขึ้น

☐ ช่วยเพิ่มจำนวนผลผลิตต่อไร่รวมให้สูงขึ้น ☐ อยากพัฒนาวิธีการเพาะปลูกจากรุ่นพ่อให้ดีขึ้น

☐ เพื่อนแนะนำ ☐ เจ้าหน้าที่ภาครัฐมาช่วยให้คำแนะนำ

☐ ช่วยให้สามารถขายผลผลิตให้แก่เนสท์เล่ได้ง่ายขึ้น (ผ่านระบบ 4C)

☐ ผลผลิตมีคุณภาพดีขึ้น ☐ ช่วยให้พึ่งพาตัวเองได้มากขึ้น

☐ อื่นๆ โปรดระบุ.....

3. ท่านคาดหวังว่าจะได้รับประโยชน์อะไรบ้างจาก “4C” ในมุมมองต่อไปนี้ (ตอบได้มากกว่า 1 ข้อ)

☐ เศรษฐกิจ เช่น เข้าถึงข้อมูลทางการตลาด

☐ สังคม เช่น ทำให้เกิดการแลกเปลี่ยนความรู้ทางการเพาะปลูก มีการพึ่งพาอาศัยซึ่งกันและกันมากขึ้น

☐ สิ่งแวดล้อม เช่น ช่วยรักษาสิ่งแวดล้อม / ลดการใช้สารเคมี หรือ เลือกใช้สารเคมีที่ไม่มีผลกระทบต่อสิ่งแวดล้อม

☐ พัฒนาระบบการผลิต เช่น การจดบันทึกข้อมูล การควบคุมคุณภาพกาแฟ

☐ อื่นๆ โปรดระบุ.....

4. ท่านมีความคิดเห็นต่อกระบวนการ “4C” ต่อไปนี้อย่างไร

<u>คำชี้แจง:</u> โปรดใส่เครื่องหมาย ✔ ลงในช่อง ☐ ที่ตรงกับความคิดเห็นของท่านมากที่สุด

ความคิดเห็นต่อกระบวนการ	ระดับความคิดเห็น		
พฤติกรรมที่ไม่พึงปฏิบัติ	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. หากท่านขาดแคลนแรงงานในช่วงการเก็บเกี่ยว ท่านเลือกที่จะใช้แรงงานเด็กในท้องที่มาช่วยในการเก็บเกี่ยวผลผลิตของท่าน			
2. ท่านไม่เคยบังคับฝืนใจ แรงงานที่ไม่เต็มใจ ให้มาเป็นแรงงานของท่าน			
3. ท่านมีส่วนเกี่ยวข้องกับการค้ามนุษย์ เช่น แรงงานต่างชาติเพื่อเป็นแรงงานส่วนหนึ่งของท่าน ยามขาดแคลนแรงงาน หรือค่าจ้างแรงงานในช่วงนั้นมีอัตราที่สูงขึ้น			
4. ท่านมักจะขัดขวางการรวมกลุ่มเพื่อต่อรองของแรงงานท่าน			
5. หากแรงงานของท่านไม่มีความสามารถ ท่านจะ “เลิกจ้าง” โดยไม่จ่ายค่าแรง			
6. ท่านจัดเตรียมที่พักสำหรับแรงงานอย่างเหมาะสม หากผลผลิตของท่านมากจนไม่สามารถ เก็บเกี่ยวหมดภายในหนึ่งวัน			
7. ท่านจัดเตรียมอาหารและเครื่องดื่มให้แรงงานของท่านอย่างเหมาะสม			
8. ท่านเคยขยายเนื้อที่การเพาะปลูกของท่านไปยังพื้นที่ใกล้เคียงของท่าน โดยไม่ขออนุญาติจากเจ้าของที่คนเก่า			
9. ท่านเคยแอบใช้ “ยาเบื่อปู” เพราะราคาถูกกว่ายาฆ่าแมลงชนิดอื่น			
10. ท่านไม่เคยลักลอบนำกาแฟจากพม่าเข้ามาขายเลยซักครั้งหนึ่ง			
มิติด้านสังคม	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. ท่านมักจะห้ามไม่ให้แรงงานรวมตัวกันก่อตั้งตัวเพื่อต่อค่าจ้างกับท่าน			
2. แรงงานของท่านเป็นผู้กำหนดค่าแรงเอง			
3. ท่านปฏิบัติต่อแรงงานไทย ดีกว่า แรงงานพม่า			
4. ท่านมักจะให้ลูกหลานของท่านหยุดเรียน เพื่อมาช่วยท่านทำสวนกาแฟ			
5. ท่านจัดเตรียมอุปกรณ์ให้กับแรงงานของท่านเพื่อความปลอดภัย ก่อนจะให้แรงงานของท่านทำงาน			
6. หากแรงงานของท่านไม่มีทักษะ ท่านจะทำการสอนงานด้วยวิธีใดวิธีหนึ่ง			
7. แรงงานของท่านมักจะมีความสุข และเป็นกันเองเมื่อทำงานร่วมกับท่าน			
มิติด้านสิ่งแวดล้อม	**เห็นด้วย**	**ไม่เห็นด้วย**	**เฉยๆ**
1. หากท่านต้องการเนื้อที่ในการเพาะปลูกที่มากขึ้น ท่านจะแอบขยายเนื้อที่ของท่านไปยังที่รกร้าง แม้ว่าที่นั้นจะเป็นป่าสงวนก็ตาม			
2. ท่านใส่หน้ากาก และถุงมืออย่างสม่ำเสมอก่อนทำการฉีดสารเคมีต่างๆ			
3. ในแปลงของท่าน “น่าจะ” มีการปลูกถั่วคลุมดิน เพื่อให้ดินดีเสมอๆ			
4. ท่านเคยมีการ “ตรวจดิน” หลังจากที่เข้าร่วมโครงการ			
5. หากฝนไม่ตก ท่านไม่เคยคิดเลยว่าจะใช้น้ำจากแหล่งไหน			
6. ท่านมักจะพบ “ขยะ” ในแปลงของท่านเป็นประจำ			
7. ท่านมักปิดเครื่องใช้ไฟฟ้าในการเพาะปลูกของท่าน เพื่อความประหยัด			

ความคิดเห็นต่อกระบวนการ	ระดับความคิดเห็น		
มิติด้านเศรษฐกิจ	เห็นด้วย	ไม่เห็นด้วย	เฉยๆ
1. ท่านสามารถเปรียบเทียบราคารับซื้อของที่รับซื้อต่างๆได้ ก่อนนำกาแฟของท่านไปขายในที่ที่ท่านตั้งใจไว้			
2. ท่านไม่เคยถูกบังคับให้ขายกาแฟของท่านกับทางบริษัท ท่านมีสิทธิเลือก			
3. บริษัท เคยส่งเจ้าหน้าที่เข้ามาให้ความรู้เกี่ยวกลับคุณภาพของกาแฟที่ บริษัทต้องการ ทำให้ท่านสามารถควบคุมการผลิตให้เป็นไปตามนั้น			
4. ท่านจดบันทึกข้อมูล การเพาะปลูกเป็นประจำ*			
5. บริษัทไม่เคยชำระราคากาแฟ ต่ำกว่าที่กำหนดไว้เลย ***หากสินค้าของท่านมีคุณภาพ ตรงตามความต้องการของบริษัท***			
6. หากเข้าระบบ 4C แม้ว่าจะนำกาแฟมารวมกัน แต่บริษัทก็ยังสามารถทราบได้ว่า "กระสอบไหน เป็นกาแฟจากสวนของท่าน"			

** ขอดูบันทึกข้อมูลที่ท่านจดไว้*

5. ความถี่ในการเข้าดูแลแปลงกาแฟที่ท่านเพาะปลูกโดยประมาณ .....

6. ท่านนำเมล็ดกาแฟไปสีเป็นกาแฟสาร ณ ที่ใดบ้าง

   a. ..... เพราะ .....

   b. ..... เพราะ .....

7. โดยปกติ ท่านจะเลือกขายกาแฟของท่าน ณ ที่ใดบ้าง

   a. ..... เพราะ .....

   b. ..... เพราะ .....

8. โดยปกติ ท่านคำนึงถึงปัจจัยใด ในการเลือกขายกาแฟ เป็นอันดับแรก

   a. การเก็บเกี่ยวผลผลิตครั้งแรก

   ☐ ราคาขายต่อกิโลกรัม ☐ ความสะดวกสบาย ☐ อื่นๆ .....

   b. การเก็บเกี่ยวผลผลิตครั้งต่อๆไป

   ☐ ราคาขายต่อกิโลกรัม ☐ ความสะดวกสบาย ☐ อื่นๆ .....

9. ถ้าให้ท่านเลือกทำ "Good Agricultural Practice (GAP)" กับ "The Common Code for Coffee Community (4C)" ท่านจะเลือก ?

   ☐ GAP อย่างเดียว ☐ 4C อย่างเดียว ☐ ทำทั้งสองอย่างพร้อมกัน

   เพราะ .....

10. ในความคิดของท่านอะไรคืออุปสรรคสำคัญที่สุดในการทำ "4C"

    .....

    .....

"ขอขอบพระคุณทุกท่านที่กรุณาให้ความร่วมมือในการตอบแบบสอบถามในครั้งนี้"

Appendix 1.5: 4C officer survey

Content summary

1. Personal Information

2. 4C information aspects

3. Attitude of farmers toward 4C training

4. 4C knowledge practice (Pre – Post participated in training program)

5. The most important constrain for adopting 4C knowledge to coffee farming

6. The effect after adopting 4C knowledge

7. Suggestions

โฟร์ซี	เจ้าหน้าที่	

แบบสอบถาม

แนวทางการพัฒนาระบบการปฏิบัติทางการเกษตรที่ดีของกลุ่มเกษตรกรผู้ปลูกกาแฟในจังหวัดชุมพร

แบบสอบถามนี้เป็นส่วนหนึ่งของวิทยานิพนธ์ของนักศึกษาปริญญาเอก บัณฑิตวิทยาลัยสิ่งแวดล้อมศาสตร์ มหาวิทยาลัยฮิโรชิม่า ประเทศญี่ปุ่น จึงใคร่ขอความร่วมมือจากท่านในการตอบแบบสอบถามให้ครบทุกข้อตามความเป็นจริงทั้งนี้ข้อมูลในแบบสอบถามทั้งหมดจะถือเป็นความลับ และจะนำเสนอผลการวิจัยในลักษณะโดยภาพรวมเท่านั้น ขอขอบคุณทุกท่านที่สละเวลาอันมีค่าให้ความร่วมมือในการตอบแบบสอบถามครั้งนี้

นายพงศ์ทอง พงศ์วิญญู

ส่วนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

คำชี้แจง: โปรดทำเครื่องหมาย ✓ ลงในช่อง ☐ ที่ตรงกับความเป็นจริงของท่านมากที่สุด หรือเติมคำตอบลงในช่องว่างที่กำหนดให้

1. เพศ

☐ ชาย ☐ หญิง

2. อายุ

☐ น้อยกว่า 20 ปี ☐ 21– 30 ปี ☐ 31– 40 ปี

☐ 41– 50 ปี ☐ 51– 60 ปี ☐ 61 ปีขึ้นไป

3. สถานภาพสมรส

☐ โสด ☐ สมรส / อยู่ด้วยกัน ☐ หม้าย / หย่าร้าง / แยกกันอยู่

4. ระดับการศึกษาขั้นสูงสุด

☐ ต่ำกว่าประถมศึกษา ☐ ประถมศึกษา ☐ มัธยมศึกษา ☐ ปวช.

☐ ปวส. ☐ อนุปริญญา ☐ ปริญญาตรี ☐ สูงกว่าปริญญาตรี

5. ท่านมีประสบการณ์ในการส่งเสริม “4C” มาแล้วประมาณกี่ปี

☐ น้อยกว่า 1 ปี ☐ 1 – 3 ปี ☐ 4 – 5 ปี ☐ 5 ปีขึ้นไป

ปัจจุบัน ท่านดำรงตำแหน่ง .....

สังกัดหน่วยงาน .....

หน้าที่หลักของท่าน ในการส่งเสริม “4C” คือ .....

6. ในความคิดเห็นของท่าน “4C” มีประโยชน์กับเกษตรกร ในด้านใดบ้าง (สามารถตอบได้มากกว่า 1 ข้อ)

☐ ช่วยลดต้นทุน ☐ ช่วยให้ขายได้ในราคาที่สูงขึ้น

☐ ช่วยเพิ่มจำนวนผลผลิตต่อรวมให้สูงขึ้น ☐ พัฒนาวิธีการเพาะปลูกจากรุ่นพ่อให้ดีขึ้น

☐ ผลผลิตมีคุณภาพดีขึ้น ☐ ช่วยให้พึ่งพาตัวเองได้มากขึ้น

☐ ช่วยให้สามารถขายผลผลิตให้แก่เนสท์เล่ได้ง่ายขึ้น (ผ่านระบบ 4C)

☐ อื่นๆ โปรดระบุ .....

7. ท่านคิดว่าเกษตรกรในพื้นที่ ที่ท่านรับผิดชอบมีความเข้าใจในเรื่อง “4C” มากน้อยเพียงใด

☐ น้อยที่สุด ☐ น้อย ☐ ปานกลาง ☐ มาก ☐ มากที่สุด

8. จากประสบการณ์ของท่าน ท่านมักจะ ส่งเสริม “4C” ให้กับเกษตรกรด้วยวิธีใด

a. .....

b. .....

c. .....

d. .....

9. ท่านเคยได้รับการเข้าร่วมการอบรมเรื่องเกี่ยวกับ “4C” หรือไม่

☐ ไม่เคย ☐ เคย

จาก .....

10. รายละเอียดเพิ่มเติมจากข้อ 9

- ใช้ระยะเวลาโดยเฉลี่ย ในการเข้าร่วมอบรมต่อครั้งกี่วัน .....วัน / วันละประมาณ .....ชม.
- ท่านมีค่าใช้จ่ายในการเข้าร่วมอบรม หรือไม่ อย่างไร

☐ มีค่าใช้จ่าย และต้นทุนในการเข้าร่วมอบรม ได้แก่

○ ในรูปของตัวเงิน .....

○ อื่นๆ.....

☐ ไม่มี/ ได้รับเงินสนับสนุน (โปรดระบุจำนวนเงินต่อครั้ง ..... บาท)

<u>ส่วนที่ 2 ทัศนคติและความคาดหวังของเกษตรกรต่อ “4C”</u>

<u>คำชี้แจง:</u> โปรดทำเครื่องหมาย✓ ลงในช่อง ☐ที่ตรงกับความเป็นจริงของท่านมากที่สุด หรือเติมคำตอบลงในช่องว่างที่กำหนดให้

1. ท่านทราบหรือไม่ว่า“4C” เป็นอย่างไร และในทัศนคติของท่าน “4C” มีความหมายว่าอย่างไร

☐ ไม่ทราบ ☐ ทราบ โปรดระบุ .....

2. เหตุผลสำคัญ ที่ท่านยังคงให้การส่งเสริม “4C” แก่เกษตรกร คือ (ตอบได้มากกว่า 1 ข้อ)

☐ ช่วยลดต้นทุน ☐ ช่วยให้ขายได้ในราคาที่สูงขึ้น

☐ ช่วยเพิ่มจำนวนผลผลิตต่อรวมให้สูงขึ้น ☐ อยากพัฒนาวิธีการเพาะปลูกจากรุ่นพ่อให้ดีขึ้น

☐ ช่วยให้สามารถขายผลผลิตให้แก่เนสท์เล่ได้ง่ายขึ้น (ผ่านระบบ 4C)

☐ ผลผลิตมีคุณภาพดีขึ้น ☐ ช่วยให้พึ่งพาตัวเองได้มากขึ้น

☐ อื่นๆ โปรดระบุ.....

3. ท่านคาดหวังว่าเกษตรกร ได้รับประโยชน์อะไรบ้างจาก “4C” ในมุมมองต่อไปนี้ (ตอบได้มากกว่า 1 ข้อ)

☐ เศรษฐกิจ เช่น เข้าถึงข้อมูลทางการตลาด

☐ สังคม เช่น ทำให้เกิดการแลกเปลี่ยนความรู้ทางการเพาะปลูก มีการพึ่งพาอาศัยซึ่งกันและกันมากขึ้น

☐ สิ่งแวดล้อม เช่น ช่วยรักษาสิ่งแวดล้อม / ลดการใช้สารเคมี หรือ เลือกใช้สารเคมีที่ไม่มีผลกระทบต่อสิ่งแวดล้อม

☐ พัฒนาระบบการผลิต เช่น การจดบันทึกข้อมูล การควบคุมคุณภาพกาแฟ

☐ อื่นๆ โปรดระบุ.....

4. ในความคิดเห็นของท่าน *ทำไม* “4C” *จึงจำเป็นต้องมีการส่งเสริมให้กับเกษตรกร*

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5. ในความคิดเห็นส่วนตัวของท่าน ท่านคาดหวังอะไรจาก การส่งเสริม “4C” ให้กับเกษตรกร

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6. ในความคิดเห็นส่วนตัวของท่าน อะไรคือดัชนีชี้วัดความสำเร็จของ การส่งเสริม “4C” ให้กับเกษตรกร

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5. ความถี่ต่อสัปดาห์ในการเข้าส่งเสริมแปลงกาแฟที่ท่านรับผิดชอบ .....ครั้ง / สัปดาห์

6. ถ้าให้ท่านเลือกทำ “Good Agricultural Practice (GAP)” กับ “The Common Code for Coffee Community (4C)” ท่านจะเลือก ?

☐ GAP อย่างเดียว ☐ 4C อย่างเดียว ☐ ทำทั้งสองอย่างพร้อมกัน

เพราะ .....

7. ในความคิดของท่านอะไรคืออุปสรรคสำคัญที่สุดในการทำ “4C”

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8. ข้อคิดเห็นและข้อเสนอแนะ เกี่ยวกับ “4C” ในมุมมองของท่าน

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“ขอขอบพระคุณทุกท่านที่กรุณาให้ความร่วมมือในการตอบแบบสอบถามในครั้งนี้”

Appendix 2: Mangosteen survey (Chanthaburi province 2013 - 2014)

Appendix 2.1: Pre- mangosteen survey

Content summary

1. Personal Information

2. GAP attitudes

3. How farmers take practices on farm according to GAP guideline?

4. The beneficial of the GAP

5. Extension services

6. Market conditions

Interview Form – for pre survey of Chanthaburi farmers

Questionnaire "How the farmers take practices on farm according to GAP guideline?"

Date ……

Pre-Questions: Do you have the GAP certificates for your cultivation? ☐ Yes ☐ No

I. Personal Information

Name ……..

Age …… Education ……..

Position …….. Experiences ……..

Main responsibilities ……..

How much the cultivation area you have? ……Rai

How many crops you cultivated ……

Annual income ……THB

a. …… Rai with approximately annual income ……THB

b. …… Rai with approximately annual income ……THB

c. …… Rai with approximately annual income ……THB

d. …… Rai with approximately annual income ……THB

e. …… Rai with approximately annual income ……THB

How many commodities you have the GAP certificates?

a. …… ☐ Yes ☐ No For ……...RAI

b. …… ☐ Yes ☐ No For ……...RAI

c. …… ☐ Yes ☐ No For ……...RAI

d. …… ☐ Yes ☐ No For ……...RAI

e. …… ☐ Yes ☐ No For ……...RAI

How long have you follow GAP guideline and get the certificate?……..Years

1

II. GAP perception Please choose the choice with same as your on farm practical

1. The other source of water you have used for your cultivation sometime pass through the industrial area. You still can use the water for the GAP cultivation.

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

2. Even you cultivated your commodities without any soil nutrient sampling, this year you will use your experience to choose the best fertilizer by your decision making

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

3. If your friend asked you about the pesticide which is good for his farm, you will follow him without checking the GAP manual

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

4. You have to check the pesticide by yourself at least once in a month

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

5. The manual check list is really important for you. You could approximate the best harvesting period for the best fruits quality you were cultivated

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

6. It is so complicate and take cost for the equipment on the post harvesting process. Sometimes you avoided to follow the method which introduce in the manual

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

7. I have never clean the fruit box after used for long time

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

8. It really need to memo the pesticide used and check every time in the notebook for the future farm improvement

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

9. How much the important of GAP certificate?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

10. How much the difficulties of GAP?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

11. How much you understand the GAP?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

12. What are the main reasons for your cultivation be needed to follow the GAP guideline?

……..

……..

13. What are the most of your satisfaction to follow the GAP guideline?

……..

……..

III. How farmers take practices on farm according to GAP guideline?

14. Safety of water used

14.1) how much you understand on this element of GAP guideline?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

14.2) you always plan and looking for the other source of water for the year that has dry weather

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

14.3) source of water you used for your cultivation are clean, without any adulterated thing

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

14.4) you always re-check the source of water you used for the standard quality of your product

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

14.5) ……

……..

15. Site

15.1) how much you understand on this element of GAP guideline?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

15.2) you always check your farm area to looking for the objects could made the accident

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

15.3) you have ever used the prohibited agrochemical with affected to the quality of soil

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

15.4) you know there is the soil check sampling service from the DOA

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

15.5) you have never checked the soil residue even there are the services of DOA

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

15.6) ……

……..

16. Use of agrochemical

16.1) how much you understand on this element of GAP guideline?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

16.2) you can use whatever agrochemical you want to use

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

16.3) there are only 20 prohibited agrochemicals on the GAP guideline

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

16.4) you would choose the cheapest agrochemical for your cost reduction

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

16.5) cultivation experiences are the best way to choose the agrochemical

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

16.6) ……

……..

17. Product Storage

17.1) how much you understand on this element of GAP guideline?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

17.2) you always clean your storage place whenever you something affected to products

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

17.3) you always clean your fruit box containers

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

17.4) you have never check the contaminate in storage and box containers

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

17.5) you have to strictly be careful the product moving to control your product quality

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

17.6) ……

……..

18. Data record

18.1) how much you understand on this element of GAP guideline?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

18.2) you need not to record the data of your cultivation

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

18.3) you have to record "all" the agrochemical use on your farm

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

18.4) you have to record "some" contents on the harvesting process

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

18.5) data recording is really important process to control your products quality

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

18.6) ……

……..

19. Pest-Free products

19.1) how much you understand on this element of GAP guideline?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

19.2) you always check the pesticide to protect and control your product quality

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

19.3) GAP guideline made you much more easily to check the specific pesticide

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

19.4) you have to control the pesticide to control your product quality

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

19.5) you have to strictly be carefully checked the pesticide following the GAP guideline

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

19.6) ……

……..

20. Quality management

20.1) how much you understand on this element of GAP guideline?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

20.2) you always check the productivity of your crops compare with the GAP standard

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

20.3) GAP guideline made you much more easily to evaluate your farm efficiency

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

20.4) you have to control the fertilizer used according to the GAP guideline

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

20.5) you have to strictly be carefully checked the guideline to improve your productivity

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

20.6) ……

……..

21. Harvesting and Post harvesting handling

21.1) how much you understand on this element of GAP guideline?

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

21.2) you have to harvest your products follow the GAP guideline?

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

21.3) GAP guideline made you much more easily to get the high quality products

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

21.4) you have to control the worker's harvesting process to control the products' quality

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

21.5) the box container and tools needed to check the contaminate

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

21.6) ……

……

IV. The beneficial of the GAP

22. After you become one of the GAP farmers, your productivities had be increased

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

23. The GAP guideline make you much more concern on the effect of agrochemical to your illness. You adopted the GAP standard for increased you healthy

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

24. GAP made you can reduce the production cost

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

25. GAP made you can much more easily to access to the market which can increase your income / price of your products

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

V. Extension services

26. Who is the most important introduced and extend the GAP standard to you?

……

……

27. The DOA provide the useful services for your GAP cultivation

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

What kind of those?

……

……

……

28. The GAP handbooks are easily to understand and follow in practices

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

29. The government officers always come to check and extend the GAP practical

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

30. The buyers / exporters always come to check and extend the GAP practical

☐ Strongly Agree ☐ Agree ☐ Natural ☐ Disagree ☐ Strongly Disagree

32. How much you satisfy the GAP extension services from the government side

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

Memo

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VI. Market conditions

33. Where are the main markets for you GAP products?

33.1) ……

33.2) ……

33.3) ……

33.4) ……

34. How much you satisfy the premium price from the GAP

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

35. How much the GAP price higher than the conservational farming

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

36. How much the quality of product from your point of view

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

37. How much the GAP product quality higher than the conservational farming

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

38. How much the GAP access market point satisfaction of yours

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

39. How much the different of GAP/Conservational access market point satisfaction of yours

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

40. How much you can easily sale your GAP products

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

41. How much the different you can easily sale your GAP/conservational products

☐ Very high ☐ High ☐ Medium ☐ Low ☐ Very low

Thank you for your kind attentions

Pongthong Pongvinyoo

Graduate School of Biosphere Science, Hiroshima University, Japan

Appendix 2.2: GAP farmers survey

Content summary

1. Personal Information

2. Good Agricultural Practices (GAP), and others standards experiences and learning process

3. Income of QGAP-based production

4. Cost of QGAP-based production

5. QGAP-farm management adoption procedures

6. Farm management control plan for HQ mangosteen

7. Selling and market distribution

8. QGAP training schedule

9. Opinion and suggestions

Interview schedule - Practical questionnaire for GAP mangosteen farmers

Questionnaires for QGAP-based farmers

Name of interviewee .....

Address ..... District .....

Telephone No .....

A. Personal information

1. Gender ( ) Male ( ) Female

2. Age ..... Years old

3. Marital status

( ) Single ( ) Married

( ) Widowed ( ) Divorced

4. Education

( ) Primary school ( ) Secondary school

( ) High school ( ) Diploma

( ) Bachelor ( ) Higher than bachelor

5. Number of family's member (included interviewee) ..... Persons

6. Number of fruit cultivation ..... Types

7. Experiences of fruit cultivation ..... Years

8. Total farm size for fruit cultivation ..... Rai

9. How many orchards do you have for fruit cultivation ..... Orchards

9.1 1st orchards size ..... Rai

Type ( ) Single crops ( ) Multi-crops which are:

Mangosteen ..... trees

Rambutan ..... trees

Durian ..... trees

Others ( ) ..... trees

9.2 2nd orchards size ..... Rai

Type ( ) Single crops ( ) Multi-crops

Mangosteen ..... trees

Rambutan ..... trees

Durian ..... trees

Others ( ) ..... trees

9.3 3rd orchards size ..... Rai

Type ( ) Single crops ( ) Multi-crops

Mangosteen ..... trees

Rambutan ..... trees

Durian ..... trees

Others ( ) ..... trees

(Sample map for fruit cultivation orchards) / Rai and average years of tree

10. Total income from agriculture ..... THB

10.1 Total income from fruit cultivation ..... THB

Mangosteen ..... THB

Rambutan ..... THB

Durian ..... THB

Others ( ) ..... THB

10.2 Total income from the others ( ) ..... THB

B. Good Agricultural Practices (GAP), and others standards experiences and learning process

11. How many standards were you promoted? ..... Standards

11.1 ..... by ( ) Government sector ( ) Private sector

11.2 ..... by ( ) Government sector ( ) Private sector

11.3 ..... by ( ) Government sector ( ) Private sector

12. How did you get the standard information (instruction, implementation, and technical method)?

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13. How many years have you cultivated fruit by following GAP standards? ..... Years

14. How much have you understand GAP instructions and practices on your farm cultivation?

( ) Highest ( ) High ( ) Normal ( ) Low ( ) Lowest

C. Income of QGAP-based production *(References prices/kg. from market survey)*

15. Total income from fruit cultivation ..... THB

15.1 Durian .....THB

How many kilograms ..... Kg.

( ) High quality ..... %

( ) Low quality ..... %

15.2 Rambutan .....THB

How many kilograms ..... Kg.

( ) High quality ..... %

( ) Low quality ..... %

15.3 Mangosteen .....THB

How many kilograms ..... Kg.

( ) High quality ..... %

( ) Low quality ..... %

15.4 Others ( ) .....THB

How many kilograms ..... Kg.

( ) High quality ..... %

( ) Low quality ..... %

D. Cost of QGAP-based production

16. Sources of finance for annual cultivation

( ) Saving ..... THB

( ) Debt ..... THB

1st..... For .....THB

2nd..... For .....THB

3rd..... For .....THB

Summary Total ..... THB (Equity ..... % Debt ..... %)

17. Land

( ) Rent ..... THB/rai/year

( ) Own

18. Preparation cost

18.1 Labor used (Frequency ..... Days)

( ) Household ..... Person Wage ..... THB/day

( ) Hire ..... Person Wage ..... THB/day

For (activities).....

18.2 Fertilizer*

Brand	Total expense	Bags	Fruit (Type)	For (Rai)	Summary (THB/rai)
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					

**note: Price was calculated for 2013*

18.3 Insecticide*

Brand	Total expense	Bags	Fruit (Type)	For (Rai)	Summary (THB/rai)
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					

**note: Price was calculated for 2013*

18.4 Agriculture water expense ..... THB/year

18.5 Agriculture electricity expense ..... THB/year

18.6 Agricultural oil expense ..... THB/year

18.7 Cultivated preparation machine

Contents	Price / Year purchased	Maintenance (THB/year)	Fruit (Type)	For (Years)	Summary (THB/rai)
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					

18.8 Cultivated preparation equipment

Contents	Price / Year purchased	Maintenance (THB/year)	Fruit (Type)	For (Years)	Summary (THB/rai)
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					

18.9 Preparation for new crops

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……

18.10 Others ……

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……

Summary Total preparation cost …… THB/year/rai (……..THB/month/rai)

19. Operation cost

19.1 Labor used (Frequency …… Days)

( ) Household …… Person Wage …… THB/day

( ) Hire …… Person Wage …… THB/day

For (activities)……

19.2 Fertilizer*

Brand	Total expense	Units	Fruit (Type)	For (Rai)	Summary (THB/rai)
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					

**note: Price was calculated for 2013*

19.3 Insecticide*

Brand	Total expense	Units	Fruit (Type)	For (Rai)	Summary (THB/rai)
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					

**note: Price was calculated for 2013*

19.4 Agriculture water expense …… THB/year

19.5 Agriculture electricity expense ..... THB/year

19.6 Agricultural oil expense ..... THB/year

19.7 Cultivation machine

Contents	Price / Year purchased	Maintenance (THB/year)	Fruit (Type)	For (Years)	Summary (THB/rai)
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					

19.8 Cultivation equipment

Contents	Price / Year purchased	Maintenance (THB/year)	Fruit (Type)	For (Years)	Summary (THB/rai)
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					

19.9 Cultivation for new crops

.....

.....

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19.10 Others .....

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Summary Total operation cost ..... THB/year/rai (.....THB/month/rai)

20. Harvesting, storage and transportation cost

20.1 Labor used (Frequency ..... Days)

( ) Household ..... Person Wage ..... THB/day

( ) Hire ..... Person Wage ..... THB/day

For (activities).....

20.2 Harvesting machine

Contents	Price / Year purchased	Maintenance (THB/year)	Fruit (Type)	For (Years)	Summary (THB/rai)
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					

20.3 Cultivation equipment

Contents	Price / Year purchased	Maintenance (THB/year)	Fruit (Type)	For (Years)	Summary (THB/rai)
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					

20.4 Cars, Tractors ..... Cars

( ) Rent ..... Cars Fee ..... THB/day

( ) Own ..... Cars

20.5 Agricultural oil expense ..... THB/year

20.6 Others .....

.....

.....

.....

.....

Summary Total post-harvest cost ..... THB/year/rai (.....THB/month/rai)

E. QGAP-farm management adoption procedures

No.	Contents	Scale of practices				
		5	4	3	2	1
	Water source/14 (FS 7, PQ 2, EN 5)					
1	Your ponds provided for agriculture did not contaminate by the sources of pollutions. (FS 1.1-1.2)					
2	At least once a year, you brought your agriculture water to check the contaminators at the DOA. (FS 1.3-1.4)					
3	You appropriately water the plants for keep the product quality. (Check techniques: PQ 1.5)					

4	You appropriately water the plants for keep the volume of water used, and manage the farm waste water to appropriate. (EN 1.6-1.7)					
5	You provide the water flowing machine for your ponds. (EN 1.8-1.10, FS 1.12-1.13)					
6	You provided enough water for your agricultural cultivation. (PQ 1.11)					
7	You appropriately used the water for cleaning your products. (FS 1.14)					
	Cultivation site/14 (FS 6, PQ 1, EN 6, WHSW 1)					
8	At least once a year, you brought your agriculture soil to check the contaminators at the DOA. (FS 2.1-2.3)					
9	You recorded, or consulted with the expert before using the chemical on the soil of cultivation site. (EN 2.4-2.8, 2.11)					
10	You plan your farm site cultivation with the awareness on FS, EN, PQ and WHSW. (FS, PQ, EN, and WHSW 2.6)					
11	You make the soil used plan. (FS 2.9-2.10)					
	Use of agricultural hazardous substances/27 (FS 14, EN 4, WHSW 9)					
12	You followed the suggestion, instruction and recommendation for the agrochemical-used consultancy from DOAE. (FS 3.1-3.2)					
13	You appropriately used the agrochemical by following the label instructions. (FS 3.3-3.6)					
14	You checked and clean the agrochemical machine for ready for safety using in your farm. (FS 3.5, 3.11 EN 3.11)					
15	You used the integrated farming to reduce the chemical use in your farm. (FS, EN 3.7)					
16	You appropriately stored the rest of chemical, and separate from the others contaminators. (FS 3.8-3.10, WHSW 3.9, EN 3.10)					
17	You appropriately terminate the agrochemical packaging, expired agrochemical. (Checking FS 3.12-3.13, WHSW 3.12)					
18	You recorded the use of agrochemical at the storage for easier to appropriately access (FS 3.14)					
19	You carefully learn the plant decease and proper used of agrochemical (Checking FS 3.15, WHSW 3.15-3.16)					
20	You used chemical spreading suit and shower (cleaning) after using. (Checking WHSW 3.17, 3.19)					
21	You learn the technical used process of agrochemical. (WHSW 3.18, EN 3.18)					
22	You provided the medical care at your far site. (WHSW 3.20-3.21)					
	Management of quality agricultural production/29 (FS 12, PQ 5, EN 6, WHSW 6)					
23	You had the appropriate good agricultural practices plan to follow for the production goals. (FS, PQ, EN, WHSW 4.1, 4.17)					
24	You made the report for the source of plants, seeds, fertilizer, agro-chemical those you had bought. (include date) (FS 4.2)					

25	You won't use the ambiguous plants without any clear of source. (FS 4.4, PQ 4.3, FS, PQ, EN, WHSW 4.5)					
26	You appropriately mixed the organic fertilizer to appropriate with the plants. (FS 4.6-4.8)					
27	You provided the separate place for fertilizer storage. (FS 4.9)					
28	You read and follow the fertilize label without the conventional using experiences. (FS 4.10-4.11)					
29	You provided enough equipment for the workers. (WHSW 4.12)					
30	You provided the appropriate equipment storage (safety and ready to use). (WHSW 4.13)					
31	The equipment were cleaned before and after using. (WHSW 4.14-4.16)					
32	You separate the agricultural waste and appropriately terminate. (EN 4.18-4.19)					
	Harvesting and post harvesting handling/14 *(FS 10 PQ 4)*					
33	You had the technical methods for harvesting which protecting of the product from contaminator. (PQ 5.1,5.3-5.4 FS 5.2,5.5)					
34	The harvesting equipment were cleaned and separated from the waste. (FS 5.6-5.9)					
35	The products were graded at the farm gate for HQ and LQ product. (PQ 5.10)					
36	The storage was carefully build to protect the contaminators. (FS 5.11)					
37	You had the strategy to protect the products from contaminators. (FS 5.12-5.14)					
	Product storage and om-site transportation/10 *(FS 6, PQ 4)*					
38	You protected your products by managing the food safety and product quality. (FS 6.1-6.3 PQ 6.1)					
39	The specific packages were provided for harvesting session which protected them from damage. (FS 6.4, 6.6 PQ 6.5, 6.7-6.8)					
40	After harvested the products, you immediately moved those to the storage. (FS 6.9)					
	Personal Health/10 *(FS 4, WHSW 6)*					
41	You was trained about the personal health and followed to avoid the mistake from this aspects. (FS 7.1-7.2 WHSW 7.1,7.8)					
42	You provided enough medical point to protect your products from contaminators. (FS 7.3, WHSW 7.3)					
43	At least workers had to health check once a year. (FS 7.4, WHSW 7.5)					
44	You provided the important facilities for your workers. (WHSW 7.6)					
45	The workers were trained about the good agricultural practices. (WHSW 7.7)					

	Data recording/34 *(FS 17 PQ 7 EN 6 WHSW 4)*					
46	You have the data recording form from DOA. (FS PQ EN WHSW)					
47	You provided the data about the ago-chemical usage on your farm (Check: Date, quality, brand) (FS)					
48	You provide the data about the product quality and harvesting process for HQ product. (PQ)					
49	You provided the data about the activities that relate to the environmental damage from your cultivation. (EN)					
50	You provided the data about the messages, requested from the workers which you can plan for responding. (WHSW)					

F. Farm management control plan for HQ mangosteen

1. Preparation after harvesting period

1.1 ( ) Check the unhealthy plants' branch, until there were not unhealthy and dry branches.

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* ( ) data recording

1.2 ( ) Improve the soil nutrients follow the instruction

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* ( ) data recording

( ) Use the organic fertilizer 20 – 30 Kg. / tree

( ) Use the fertilizer (15 – 15 – 15) 1/3 Kg. / tree

1.3 ( ) Check and protect the pest follow the instruction

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* ( ) data recording

1.4 ( ) Check and protect the weed which should more than 90% of cultivation or 30 cm.

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* ( ) data recording

( ) control and eliminated if there were weed higher than the instruction

2. Preparation before mangosteen flower coming out

2.1 ( ) Improve the soil nutrients follow the instruction

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* ( ) data recording

( ) If the young leaf have a small size and dry, spread fertilizer 15 – 30 – 15 or 20 – 20 – 20 60g / tree with the Huedric acid 20 ml.

( ) After the young leaf become older, fertilizer 8 – 24 - 24 or 9 – 24 – 24 1/3 of the Radius of tree's holes.

2.2 ( ) Stop giving the Nitrogen (watering and fertilizing)

( ) Improve the soil nutrients follow the instruction

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* ( ) data recording

2.3 ( ) Watering after continuously drying season

( ) Improve the soil nutrients follow the instruction

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* ( ) data recording

( ) Flowers less than 30%, stop watering once again

2.4 ( ) Check and protect the weed which should more than 90% of cultivation or 30 cm.

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* ( ) data recording

( ) control and eliminated if there were weed higher than the instruction

3. Manage the trees to accelerate the fruit

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* ( ) data recording

( ) use the fertilizer (3:1:4) follow the instructions

( ) spread the leaf fertilizer (4:1:6)100g: 20 ml. water

( ) watering once in three days / 80% of normal period

Others control point for the HQ

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* ( ) data recording

4. Harvesting handling

4.1 ( ) appropriately harvest with the time schedule

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* ( ) data recording

4.2 ( ) grading on farm gate

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* ( ) data recording

G. Selling and market distribution

1. Last year production (……Kg.)

2. Marketing distribution channel

( ) Mobile merchants …… Kg. Average price …… THB / Kg.

( ) Coop …… …… Kg. Average price …… THB / Kg.

( ) wholesale market …… Kg. Average price …… THB / Kg.

( ) other …… …… Kg. Average price …… THB / Kg.

( ) other …… …… Kg. Average price …… THB / Kg.

3. Why did you prefer to sell your mainly QGAP-based products to that channel?

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4. Did you get any benefit from GAP methods?

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4.1 Tangible benefit

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4.2 Intangible benefit

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H. QGAP training schedule

1. How many times did you have train on the QGAP program?

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2. Who was the main responsible to provide that program?

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2.1 How many times your faring methods has been checked the contents of QGAP? , by whom?

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3. Could you please briefly explain the contents of training procedure?

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4. How many percent of the contents can you adopt to your practices farming? Please explain

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5. After certified as the QGAP farmers, please remind and explain the benefit of both tangible and intangible benefits you got from the certification.

( ) Services

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( ) Cost of production

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( ) Product quality

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( ) Community environment

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( ) Worker health, safety and welfare

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( ) Others .....

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H. Opinion and suggestions

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Thank you for your cooperation

Pongthong Pongvinyoo

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