Doctoral Thesis

Improvement of Thai Farmers' Livelihood through Alternative Rice Farming: A Case Study of Japonica Rice in the Northern Thailand

代替稲作によるタイ農民の生計向上
ー北部のジャポニカ米生産の事例研究ー

Kanokon Seemanon

Graduate School of Biosphere Science
Hiroshima University
March 2017

Abstract

Improvement of Thai Farmers' Livelihood through Alternative Rice Farming: A Case Study of Japonica Rice in the Northern Thailand

代替稲作によるタイ農民の生計向上

ー北部のジャポニカ米生産の事例研究ー

Purpose and Objectives

The structures of Thai rice production and marketing have recently changed. Nowadays, farmers have faced many problems in rice cultivation influencing their income such as high production cost and lower market price and yield of paddy. Some farmers in many areas, especially young farmers have cultivated other crops or moved to non-agricultural sector more. Moreover, Thailand has lost a leadership of the largest rice exporter in the world rice market because of intense competition. These changes have deeply affected the situations of Thai rice production and marketing. Consequently, the government and private sectors have so far encouraged farmers to cultivate top-quality rice or alternative rice that can meet the needs of particular target consumers in specialty rice market. The aims of this encouragement were to increase farmers' income, and to add value and diversity to rice in Thailand to enhance the competitiveness in the world rice market. Naturally, the marketing processes of both ordinary and alternative rice are different. Alternative rice farming such as Japonica rice in the northern provinces produced through contract farming (CF) systems which are handled by particular rice mills. Alternative rice cultivation like Japonica rice may be a good way for increasing farmers' income due to high return and market certainty under the CF systems. However, it is difficult to identify whether or not agricultural production through the systems is beneficial for farmers because each rice mill has a different management approach.

This dissertation focused on the production and marketing of Thailand's Japonica rice (THJR) because demand for Japonica rice has continuously increased. The purpose of this

research is to investigate the farmers' benefit from current production and marketing of THJR. To achieve this purpose, the dissertation has four particular objectives, as follow: 1) to explore the economic characteristics of THJR production through CF systems; 2) to analyze costs and earnings of growers in selected research sites in the North, particularly in Chiang Rai Province; 3) to examine the current marketing system of THJR and 4) to evaluate the perspectives of Thai consumers towards THJR.

Methodology

Chiang Rai Province (Northern region) and Bangkok (Central region) were selected as study areas of this research. In production side, Chiang Rai Province was selected as a study area because it is a most proper area for planting Japonica rice. Two rice mills, 36 growers and 3 officers of Chiang Rai Rice Research Center (CRI) were selected as the representatives. They were interviewed according to the specific objective 1) and 2). In marketing side, 5 rice mills in Chiang Rai Province, 4 distributors, 3 retailers, 4 managers of Japanese restaurants and 385 Thai consumers in Bangkok were selected as the respondents for in-depth interviewing to answer the particular objective 3) and 4). All respondents were selected by using the purposive sampling method. Interviews were conducted basically using in-depth and face-to-face interviews by using structure questionnaires. The primary data collections were conducted during 2014 to 2015. This research adopted the following analysis tools: (1) quantitative data analysis (descriptive and inferential statistics), and (2) qualitative data analysis.

Japonica rice production through contract farming systems in the northern Thailand

The current characteristics of THJR production through CF systems were based on the intermediate model. The rice mills in the selected research sites needed to process through collectors who acted as a local coordinator and consultant for the contract farmers in the system. Japonica rice contract farming (JRCF) was regarded as a type of the production management contract, in which the contract rice mills would guarantee the purchase price of

paddy, and provided extension services and agricultural inputs, particularly Japonica rice seeds for growers. The CRI was a main producer of such seed to distribute to rice mills. Each rice mill had a different management on signing a contact, setting up purchase price, and commission and transportation fees for their collector. A strategy of pricing could attract farmers to participate in JRCF. The production of THJR had advantages rather than disadvantages, especially as regards high contract price and assured market, as well as high yield.

Costs and earnings of Japonica rice growers in the north through use of the contract farming systems

Moreover, some rice mills were not very strict with their contract farmers. They allowed the farmers to buy fertilizers and agricultural chemicals from any other suppliers whose prices were cheaper than the contract rice mills. However, the collector who also planted Japonica rice would mainly purchase such inputs on credit from their rice mills. They stocked and sold such inputs to their farmers, and used for their Japonica rice farming. Therefore, the collectors had higher production cost than contract farmers, which led to lower earning. The use of fertilizers provided from extension service of contract rice mills had a significant impact on the economic structure of growers. Nevertheless, the system of JRCF could help growers realize a higher price and high yields which brought more income. Japonica rice growers had a lower production cost and higher income than non-contract glutinous rice growers in the same region. Therefore, JRCF enhance income of growers in Chiang Rai Province.

Marketing system analysis of Thailand's Japonica rice in the domestic market

The current marketing system of THJR in domestic market found that rice mills had a significant role affecting the market price of Japonica rice. The retail price and paddy price of Japonica rice were quite distinct. Milled THJR from rice mills were distributed to domestic consumers through distributors or wholesalers who are located mainly in Bangkok, retailers and Japanese restaurants. The main users of polished THJR were Japanese restaurants, which

their cooking with such rice is increasing. Analysis on buyer attitudes towards marketing obstacles of THJR found that the key problem for development of its business was an imported Japonica rice from Vietnam because it is cheaper than THJR. However, such import is decreasing because Thailand has a great potential to produce Japonica rice more and more. An unstable market price of Japonica rice was an obstacle for trading THJR, which the Rice Pledging Scheme of government was a main factor affecting price of Japonica rice. A quality of milled THJR, especially yellow in color of grain was also a problem in the market, however, this problem rarely happened. With regard to the positive aspects for marketing of THJR, the buyers indicated that the government and private sectors should promote the planted area and consumption of THJR more.

The perspectives of Thai consumers towards Thailand's Japonica rice

The final party involved in the process of THJR distribution in domestic market was consumers. The most respondents enjoyed to consume Japanese cuisine at the restaurants, especially in the shopping malls. They visited the restaurants once a month. Their consumption is increasing when compared to the frequency of consumption in the past. Such behavior influenced the increase of demand for Japonica rice as well. The flavor of food in Japanese restaurants was the most important factor for choosing the restaurants. Therefore, selecting a good quality of food ingredients including Japonica rice can improve a good taste of Japanese cuisine as well. The evaluation of their preference for different Japonica rice choices found that THJR was chosen as the second best in all attributes, which its flavor, smell and soft sticky texture were similarly to the original Japanese rice from Japan. However, an imported Japonica rice from Vietnam was a competitor product for THJR because its attributes particularly smell and soft sticky texture were comparable to THJR. Analysis on respondent's attitudes toward THJR consumption, they had a positive attitude. They agreed that the northern region had a great potential to produce Japonica rice for consumption in the domestic market, and THJR would be a good alternative rice for Japanese restaurants and consumers by considering its attributes.

Conclusion and recommendation

According to the current study, farmers in the selected areas received the actual benefits from THJR production and marketing. They could produce Japonica rice with a high yield and more income because of the better knowledge of cultivation practices and other support services from extension officers of contract rice mill, except supply of fertilizers. They also obtained the high contract price and certain market under the JRCF. Moreover, the domestic consumption of THJR expands continuously because of increasing consumption behaviors for Japanese cuisine. The buyers of THJR have also continued to purchase milled Japonica rice from their suppliers with the same amount. Furthermore, consumers had a positive attitude toward THJR consumption. These viewpoints have a positive impact on THJR production in Chiang Rai Province. However, the CRI should more improve and develop a quality of Japonica rice seed, in order to increase the efficiency of Japonica rice production and to be more suitable for the environment in the northern part.

Table of Contents

	Page
Abstract	i
List of Tables	xi
List of Figures	xiii
Abbreviations	xv
Acknowledgement	xvii
Chapter 1 Introduction	1
1.1 Background	1
1.2 The statement of problems	4
1.3 Research questions	5
1.4 Research objectives	6
1.5 Summary of dissertation	6
Chapter 2 Theoretical reviews	11
2.1 Rice production in Thailand	11
2.1.1 Rice planted area and yield	11
2.1.2 Rice varieties	12
2.1.3 Alternative rice crop	14
2.1.4 Cropping seasons and methods	15
2.1.5 Rice production in Chiang Rai Province	17
2.1.6 Production cost and income of rice farmers	18
2.2 Rice marketing in Thailand	22
2.2.1 Domestic rice market	22
2.2.2 Exports of Thai rice	25
2.2.3 Rice mills in Thailand	26
2.2.4 Alternative rice market	30
2.3 Contract farming (CF)	32
2.3.1 Models and typology of contract farming	34
2.3.2 Role of parties involved in contract farming	36

Chapter 2 (continue)

2.3.3 Advantages and disadvantages of contract farming 38
2.3.4 Cost and income of production through contract farming 39
2.4 Behavior, attitude and preferences of consumers 41
2.4.1 Rice consumption behavior of consumers 42
2.4.2 Consumer attitudes towards rice consumption 43
2.4.3 Consumer preferences of rice consumption 45
2.5 Conceptual framework 47
Chapter 3 Methodology 51
3.1 The reasons for selecting Japonica rice 51
3.2 Study areas and respondents 53
3.2.1 Study area in Chiang Rai Province 54
3.2.1.1 Study area background and information 54
3.2.1.2 Respondents in study area 56
3.2.2 Study area in Bangkok 58
3.2.2.1 Study area background and information 58
3.2.2.2 Respondents in study area 60
3.3 Survey procedure 61
3.4 Data collection 61
3.4.1 Primary data 62
3.4.2 Secondary data 62
3.5 Data analysis tools 62
Chapter 4 Japonica rice production through contract farming systems in the northern Thailand 65
4.1 Introduction 65
4.2 Methodology 68
4.3 Results and Discussions 69
4.3.1 Socio-economic profile of respondents 69
4.3.2 Model and management of Japonica rice contract farming 72
4.3.3 Important roles of parties in Japonica rice production 76

Chapter 4 (continue)

4.3.4 Advantages and disadvantages of Japonica rice contract farming 78

4.4 Conclusion 81

Chapter 5 Costs and earnings of Japonica rice growers in the north through use of the contract farming systems 83

5.1 Introduction 83

5.2 Methodology 86

5.3 Outline of the respondents 87

5.4 Results and Discussions 88

5.4.1 Economic structures of Japonica rice growers 88

5.4.2 Factors influencing the economic structure of Japonica rice growers 91

5.4.3 Economic characteristics of Japonica rice and glutinous rice growers 93

5.5 Conclusion 95

Chapter 6 Marketing system analysis of Thailand's Japonica rice in the domestic market 97

6.1 Introduction 97

6.2 Methodology 99

6.3 Results and Discussions 100

6.3.1 Outline of the respondents 100

6.3.2 Domestic distribution channel of milled Japonica rice 101

6.3.3 Important roles of parties involved in the process of milled Japonica rice 103

6.3.4 The marketing obstacles of Thailand's Japonica rice 106

6.4 Conclusion 109

Chapter 7 The perspectives of Thai consumers towards Thailand's Japonica rice from the north 111

7.1 Introduction 111

7.2 Methodology 114

7.3 Results and Discussions 115

7.3.1 Socio-economic profile of respondents 115

Chapter 7 (continue)

7.3.2	Respondents' consumption behavior for Japanese cuisine	116
7.3.3	Respondents' preference for different Japonica rice choices	118
7.3.4	Respondents' attitude towards Thailand's Japonica rice consumption	121
7.4	Conclusion	123
Chapter 8 Conclusions and recommendations		125
8.1	Conclusions	125
8.1.1	Thailand's Japonica rice production through contract farming systems	125
8.1.2	Costs and earnings of Japonica rice growers	126
8.1.3	The marketing system of Thailand's Japonica rice	127
8.1.4	Thai consumer perspectives towards Thailand's Japonica rice	129
8.1.5	The benefits from production and marketing of Thailand's Japonica rice for farmers	130
8.2	Recommendations	131
8.2.1	Improving and developing a quality of Thailand's Japonica rice seed	131
8.2.2	Promoting Japonica rice cultivation through the GAP system	131
8.2.3	Collecting statistical data on Japonica rice production for providing actual information	132
8.2.4	Promoting the use of fertilizers in an appropriate amount	132
8.2.5	Promoting the producing source of Thailand's Japonica rice	132
8.2.6	Improving a management in contract farming system of rice mill	133
8.2.7	Forming a group of Japonica rice farmers without contract with rice mills	133
References		135
Appendix		149
1	The first survey (Chiang Rai Province on October, 2014)	150
2	The second survey (Chiang Rai Province and Bangkok on October, 2015)	163

List of Tables

Table No	Contents	Page
2.1	The estimated planted areas and production of four alternative rice groups in 2014	15
2.2	The proportion of farmers' farm and non-farm incomes from 2009 to 2014	18
2.3	The number of rice mills classified by size of rice mill	28
2.4	Advantageous points of contract farming systems	38
2.5	Disadvantageous points of contract farming systems	39
3.1	Seasons in Chiang Rai Province	54
3.2	The total respondents in Chiang Rai Province	58
3.3	The registered residents in Bangkok during the period from 2012-2016	59
3.4	The total respondents in Bangkok	60
4.1	Profiles of two rice mills in Chiang Rai Province	70
4.2	Profiles of six collectors in Japonica rice contract farming	70
4.3	Profiles of thirty contract farmers in Japonica rice contract farming systems	71
4.4	Advantages and disadvantages of Japonica rice production	79
5.1	Socio-economic profile of Japonica rice growers	87
5.2	Economic structures of Japonica rice growers in major rice crop of 2014	89
5.3	Relation between each variable cost set and each factor group	92
5.4	Relation between extension services by staff of rice mills and average yield and income of growers	93
5.5	Economic characteristics of Japonica rice and glutinous rice growers	94
6.1	Profiles of respondents	101

6.2	Buyers attitudes towards marketing obstacles of Thailand's Japonica rice	108
7.1	Socio-economic profile of 385 respondents	116
7.2	Respondents' consumption behaviors for Japanese cuisine (n=385)	117
7.3	Respondents' preference in each attribute of three Japonica rice choices	120
7.4	Respondents' attitudes towards Thailand's Japonica rice consumption (n=385)	123

List of Figures

Figure No	Contents	Page
2.1	Rice planted area and average yield from 2010 to 2015	12
2.2	Three groups of Indica rice varieties for planting in the suitable areas	13
2.3	Times of rice planting and harvesting in Indica and Japonica rice	16
2.4	Average rice production cost, farm price and profit of rice farmers during 2009-2015	19
2.5	The estimated proportion of rice production cost of farmers	20
2.6	Milled rice consumption in Thailand	23
2.7	Paddy and milled rice markets in Thailand	24
2.8	Process of rice milling both long and short grains	29
2.9	The domestic marketing channels of organic jasmine rice	31
2.10	Intermediary model of contract farming system in Thailand	35
2.11	Sources of fertilizers and insecticides for contract farmers	41
2.12	Components of consumer attitude	44
2.13	Conceptual framework	49
3.1	The estimated planted areas of alternative rice categories in 2014	51
3.2	Exports of Thailand's Japonica rice	52
3.3	Map of two study areas in Thailand	53
3.4	Crop planted areas in Chiang Rai Province in 2015	55
3.5	Rice planted areas of the upper northern provinces in 2015	55
4.1	Model of Japonica rice contract farming of RM1	74
4.2	Model of Japonica rice contract farming of RM2	75
4.3	Flow of Japonica rice production under contract farming systems	76
5.1	Sources of fertilizers for Japonica rice growers	84

6.1	Distribution channel of Thailand's milled Japonica rice in the domestic market	103
6.2	Price of Japonica rice in each party involved	106
7.1	Import of Japonica rice	113
7.2	Preference evaluation of respondents for different Japonica rice choices	115
7.3	Respondents' preference of different Japonica rice choices	121

Abbreviations

CF : Contract farming

CRI : Chiang Rai Rice Research Center

JRCF : Japonica rice contract farming

THJR : Thailand's Japonica rice (including DOA1 and DOA2)

Acknowledgement

Firstly, I would like to express my sincere gratitude to my advisor Professor Dr. Masahiro Yamao for the continuous support of my Ph.D study and related research, for his patience, motivation, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better advisor and mentor for my Ph.D study.

Besides my advisor, I would like to thank the rest of my thesis committee: Professor Dr. Hirofumi Saneoka, Professor Dr. Yoshihiro Sambongi, and Associate Professor Dr. Kenji Hosono, for their insightful comments and encouragement, but also for the hard question which incented me to widen my research from various perspectives. I also would like to thank to Dr. Lawrence M. Liao, visiting professor of the Graduate School of Biosphere Science for his academic suggestion. In addition, I appreciate the valuable help of Dr. Michiko Amano, an assistance professor of the Graduate School of Biosphere Science, for her help during my Ph.D process.

Moreover, I would like to thank my friends in laboratory: Mr. Riski (Indonesia), Mr. Oka (Indonesia), Dr. Dai (China), Dr. Wai (Myanmar), Dr. Ko (Thailand), Dr. Imran (Indonesia), Dr. Roni (Indonesia), Ms. Fumiko (Japan) and other Japanese and foreign students for accepting nothing less than excellence from me. I also would like to express my deep thanks to the experts who were involved in my survey. Furthermore, I have the special thanks to the staffs of Student Support Office of Graduate School of Biosphere Science, especially to Ms. Himiko Koi. I believe that my study in Japan will never be accomplished without their support.

In addition, I would like to thank all professors of Department of Cooperatives, Faculty of Economic, Kasetsart University who supported me to study in doctoral program. I also would like to thank the Japanese Government for their financial support granted through my study in Hiroshima University (MEXT Scholarship). Last but not the least, I would like to thank my family: parents, brother and my husband, and to my relatives for supporting me spiritually throughout writing this thesis and my life in Japan.

Chapter 1 Introduction

1.1 Background

Thailand is located in the temperate zone where it is suitable to grow Indica rice varieties (long grain rice). Rice Department (2013a) has classified Indica rice into three groups: fragrant, non-fragrant white and glutinous rice groups. International Rice Research Institute (2015a) mentioned that global rice trade can be broadly divided into fragrant (jasmine rice) and non-fragrant rice (white, parboiled and glutinous rice). Rice is the most significant crop for Thai farmers that has generated income for them. It represents significant roles in domestic consumption, international demand, and the gross domestic product (GDP) contribution from export (Chulaphan et al., 2012).

With regard to the domestic consumption of rice, the United States Department of Agriculture (USDA) Foreign Agricultural Service (2016a) indicated that Thai people both in city and rural consumed rice per capita at 80 kg and 155 kg, respectively. In 2015, the average consumption was 106 kg, decreasing from 190 kg over the past decade because of changing lifestyle of people to western style. However, during the period from 2015 to 2016, the utilization of rice increased approximately 9%, due to a large demand for broken rice in business of swine feed. Moreover, rice is ranked at the first among the major food crop exported by Thailand (Office of Agricultural Economics, 2014d). Thailand has ranked as one of the three major rice exporters in the world for many years.

From 1982 to 2013, Thai government implemented a policy regarding the Rice Pledging Scheme of long grain rice, which was used as means to support small farmers' income, and to raise Thai rice export prices. The government intervened rice price, being higher than the market price. As a result, it often destroyed the market mechanism (Chulaphan et al., 2012). The Rice Pledging Scheme represented a guarantee by the state to purchase unlimited amounts of paddy from local farmers. Such scheme affected small traders who supplied rice to buyers, since the government became the main rice supplier in the rice markets at that

time. During implementation of the scheme, rice markets were integrated. The study of Chulaphan et al. (2012) indicated that price transmission in each party were imperfect. This means that they do not receive the same effects if rice price changes. Since guaranteed price of the scheme was high, many farmers attended to this program in order to improve their income and living standards. As a result, rice was increasingly planted and produced. This policy gave a great economic incentive to farmers.

After the Rice Pledging Scheme failed in 2013, planted areas of long grain rice declined approximately 26.6% in 2015, compared to 2011 (started the scheme). It was due to lower price of paddy, thereby causing the smaller income of farmers. Moreover, average yield of paddy reportedly dropped significantly due to insufficient water supplies. It fell 435 kg/rai in 2015 from 451 kg/rai in 2014 (1 rai = 0.16 ha), based on the major rice crop (Office of Agricultural Economics, 2015a). From these aspects, some farmers especially outside the irrigated areas have shifted to plant other crops such as sugarcane that can resist the drought, or some have changed to cultivate other crops with a higher yield and price.

Moreover, the Rice Pledging Scheme directly influenced the export prices, resulting in the export of Thai rice decreased; for example, in 2013, rice export reduced approximately 6.61 tons from 10.71 tons in 2011 (Office of Agricultural Economics, 2013). This was because export price of Thai rice was higher than that of competitors such as India and Vietnam; for instance, 1,000 USD/ton for Thai jasmines rice and 600 USD/ton for Vietnamese jasmine rice. Therefore, some rice importers moved to purchase rice from those exporters who supplied at a cheaper price. Thailand slipped down as the world's second largest exporter of rice. In the world rice market, the present main exporters are India, Thailand, Vietnam and Pakistan, respectively. Moreover, Myanmar and Cambodia may become bigger exporters because they have the potential to produce rice such as Cambodian jasmine rice (Phka Malis or Phka Rumduol) and Myanmar jasmine rice (International Rice Research Institute, 2015a; Office of Agricultural Economics, 2015c). These rice from neighboring countries may replace Thai jasmine rice in the future due to their cheaper price.

One of impact on export price of Thai rice is a high cost of rice production. This is also a key factor affecting farmers' income. The farmers still rely on chemical fertilizers and pesticides for rice farming, whose prices are more expensive. Due to high production cost, their income was relatively small. Although Thai government, particularly the Rice Department and the Ministry of Agriculture and Cooperatives have provided farmers with the guidelines of good practice for planting rice, it is difficult for farmers to decrease rice production cost. According to the research of Homjumjung and Sriwaranun (2015), farmers could insignificantly reduce production cost and increase yield by following the government's practice guidelines. However, it is hard to change farmers' habit of using fertilizers and chemicals in conventional farming.

Consequently, farmers should seek for new technologies and suitable farm inputs for their rice farming, or cultivate alternative crops including rice that have more yield and higher price, such as Japonica rice or short grain rice. At present, the Rice Department has important role in exploring and improving high quality seed. Moreover, the Ministry of Agriculture and Cooperatives and the Ministry of Commerce have so far promoted farmers to generate more their income by choosing top-quality crops or planting alternative rice in the suitable areas through the system of contract farming (CF). Alternative rice includes the organic rice, Geographical Indications (GI) rice, high-nutrient rice and Japonica rice (Rice Department, 2014a).

Such rice varieties are promoted to meet an increasing demand from target consumers in domestic market. The Rice Trader of International Commodity Institute (2015) mentioned that people have more consumed the specialty rice, especially fragrant and Japonica rice. Demands for these varieties are expanding. Japonica rice is regarded as a crucial alternative rice. Small areas in the North, especially Chiang Rai Province is appropriate to grow Japonica rice varieties. It considers as a good opportunity for Thailand's Japonica rice (THJR) in the market. Therefore, this research focused to study on THJR production and marketing.

1.2 The statement of problems

Change of rice production structure in Thailand

As has already been mentioned, due to high production cost and lower earning, rice farmers in many areas have changed to cultivate other crops such as sugar cane, rubber, corn, and cassava. Rice is not attractive in economic terms. Some farmers, especially young farmers moved to non-agricultural sector, by considering the fact that income of farmers that obtained from farming decreased approximately 6.2% in 2014, compared to 2011 (Office of Agricultural Economics, 2014b). However, rice farming is still dominant economic activity in rural Thailand. The aspects regarding aging farmers and moving to non-agricultural sector of young farmers have caused labor shortage in rice cultivation resulting in the rising wages. Consequently, the farmers should be encouraged to generate more earning from rice farming.

With the diversity of rice varieties in Thailand, farmers can choose and grow whatever lucrative varieties. They can produce both ordinary rice and alternative rice that provide higher return and market certainty. The majority of alternative rice cultivation such as Japonica rice is handled by rice mills, which is produced through CF systems. It is a form of vertical integration within process of agricultural products. However, many researches pointed out that the CF systems have both advantages and disadvantages, which is difficult to identify whether agricultural production through CF systems is a good way for farmers.

Change of rice marketing system in Thailand

Because of intense competition in the word rice market, Thailand has lost the position of the largest rice exporter. The government, especially the Ministry of Commerce has expanded the specialty rice market, or the market for top-quality rice or alternative rice to add value and a variety of Thai rice in the market. Therefore, the domestic market has two kinds of rice: ordinary rice and alternative rice. One-half of the ordinary rice production is for consumption in farmers' household. The rest paddy is sold in the domestic market. The farmers may sell

it directly or indirectly to agricultural cooperatives, rice mills and local merchants. Meanwhile, alternative rice is produced through CF system by rice mills. The contract farmers have to sell the total paddy to particular rice mills. Naturally, the processes of both rice marketing are different. However, rice mills are the key intermediary in the structure of rice marketing, which have the integration of rice marketing more and more. In addition, the mills play the significant role in the CF systems of alternative rice; of course, each rice mill has a different management in the system. The market of alternative rice is still a small market. It is produced to meet the needs of particular target consumers. However, alternative rice consumption including organic fragrant rice and Japonica rice have increased, since consumers earn more incomes and change consumption behavior, attitude and lifestyle.

1.3 Research questions

In situations of changing Thai rice production and marketing, cultivation of alternative rice like Japonica rice is recommended by the government and private sectors for improving farmers' income. In fact, rice cultivation is a main income source and skill for farmers. Japonica rice planting through a CF system may bring an increase of farmers' income in the North, because its contract secures price and high yield. Moreover, specialty rice market is expanding in which demand for Japonica rice has continuously increased. Therefore, this dissertation focused on the following four specific questions in order to investigate the characteristics of THJR production and marketing.

1) What are the characteristics of currently prevailing CF systems of Japonica rice in the northern Thailand?

2) How are the economic structures of Japonica rice farming? Do the prevailing CF systems enhance income of growers in the North?

3) What is the current marketing system of THJR in the domestic market?

4) Are the attitudes of Thai consumers toward THJR consumption moving in a positive direction?

1.4 Research objectives

Considering the abovementioned specific questions, the purpose of this dissertation is to investigate the farmers' benefit from current production and marketing of THJR. To approach the purpose, this dissertation has four particular objectives, as follow:

1) To explore the characteristics of THJR production through CF systems

2) To analyze costs and earnings of Japonica rice growers in selected research sites in the northern Thailand, particularly in Chiang Rai Province

3) To examine the current marketing system of THJR in the domestic market

4) To evaluate the perspectives of Thai consumers towards THJR consumption

1.5 Summary of dissertation

The summary of dissertation will be described as follows:

Chapter 1 is the introductory part of this dissertation. Thailand has faced the intense competitive in the world rice market, which has lost a leadership of the largest rice exporter. Moreover, farmers still have faced many problems in rice production such as lower yield and price, and high production cost, thereby suffering from low income. As a result, a large number of farmers have migrated to get jobs in urban areas, or have changed to cultivate other crops. Therefore, private and government sectors have so far encouraged farmers to cultivate top-quality rice or alternative rice for specialty markets such as organic rice and Japonica rice in order to increase farmers' income. This also enhances the competitiveness

in the world rice market, with adding value and diversity of rice varieties in Thailand. Moreover, alternative rice production is to meet the needs of consumers who would change their lifestyle, and to expand the specialty rice market more and more. This chapter as the introductory part explains background and rational of studying on alternative rice such as Japonica rice, and describes the statement problems, research questions and objectives.

Chapter 2 presents the literature reviews to lead the achievement of this study. The recent economic characteristics of rice production and marketing in Thailand were discussed in this chapter, since structures of both parts have rapidly changed from the past. Nowadays, farmers have faced many problems in rice cultivation such as high production cost and lower market price, which have impacted their income. The production cost and earning of rice farmers also reviewed in the section of rice production. From such problems, the government and private sectors have so far encouraged farmers to cultivate alternative rice such as Japonica rice in the north for improving farmers' income, which alternative rice farming was mentioned in this study. Moreover, the rice marketing, including alternative rice marketing was also mentioned. Alternative rice cultivation was mainly produced through CF systems. Therefore, a part of this chapter focused on the CF systems referring to both advantages and disadvantages. In addition, consumers' behavior, preferences and attitude toward ordinary rice consumption were also discussed in this research. The conceptual framework of this dissertation was presented and discussed in the last section of this chapter.

Chapter 3 describes the methodology of this research. The reasons for selecting and studying Japonica rice were explained in-depth in this chapter. Background information of study areas in terms of geographical and socioeconomic aspects, and choosing the respondents in the study areas were also included. In-depth and face-to-face interviews by using structured questionnaires were implemented for collecting primary data. The quantitative data analysis by descriptive and inferential statistics, and the method of qualitative data collection were applied to disclose the findings of this research.

Chapter 4 reveals the current characteristics of Japonica rice production in the North, especially Chiang Rai Province. In the beginning of this chapter, the socioeconomic profiles of respondents were explored. Then, the model and management of Japonica rice contract farming (JRCF) were examined in this study. Each rice mill had the different details of management in system. The important roles of parties involved in a system of JRCF were investigated in this chapter. Moreover, the growers would identify the advantages and disadvantages of Japonica rice production through CF systems.

Chapter 5 analyzes costs and earnings of Japonica rice growers, including contract farmers and collectors. During the survey, they received a high secured price in a CF system influencing their income. However, production cost and yield of paddy involved with their income, too. These factors were analyzed in this chapter. Analysis on factors affecting production costs and earnings of growers were also revealed in this chapter. Moreover, economic characteristics of Japonica rice and ordinary rice (non-contract glutinous rice) growers were compared to indicate that the Japonica rice production was a good alternative rice for farmers in the North.

Chapter 6 investigates the marketing system of THJR, especially in domestic market. Japonica rice is an alternative rice, which is produced to distribute to the specialty market. Therefore, its process is rather different from the ordinary rice market. A case study of paddy market of Japonica rice was conducted in Chapter 4. Therefore, this chapter examined the distribution channel of milled THJR in the domestic market. An important role of each party involved in this rice process was explored in this research. Moreover, the buyer attitudes towards marketing obstacles of THJR were analyzed in this chapter.

Chapter 7 evaluates the perspectives of consumers towards THJR. A final party involved in distribution channel of milled Japonica rice was consumers. This chapter explored the consumer behaviors for Japanese cuisine because such behavior should influence the Japonica rice consumption. In domestic market, except THJR, Japanese rice imported from Japan and Vietnam's Japonica rice were distributed, too. Therefore, consumer' preferences

for different Japonica rice choices were evaluated in this study. Their attitudes toward consumption of THJR were also pointed out in the last section of this chapter.

Chapter 8 provides the conclusions and recommendations of this research. According to the studies on the economic characteristics of THJR production and marketing, this study can point out that what are the actual benefits for contract farmers, particularly in Chiang Rai Province from selecting Japonica rice cultivation, which the answers were mentioned in this chapter. With regard to the recommendations of this dissertation, they were specified in the last section of this chapter, for example, the CRI should improve and develop a quality of THJR seed to be more suitable for the environment in the northern part and more resist to blast disease, and all contract farmers should be encouraged to cultivate THJR through the Good Agricultural Practice (GAP) system to raise the standards of production, and to expand exports to foreign countries.

Chapter 2 Theoretical reviews

The main purpose of this study was to investigate the benefits of Thai farmers from planting alternative rice, especially Japonica rice in the northern region. The outline of literature reviews related to special concerns of rice production and marketing in Thailand. Part of rice production included rice planted area and yield, rice varieties, alternative rice crop, cropping seasons and methods, rice production in Chiang Rai Province and production cost and income of rice farmers. Rice marketing section comprised of domestic rice market, exports of Thai rice, rice mills in Thailand and alternative rice market. This review also included the contract farming (CF) part which related to models and typology of CF, role of parties involved in CF, its advantages and disadvantages and cost and income of production through CF system. Moreover, consumers' behavior, preferences and attitude toward rice consumption were also reviewed in this research. The conceptual framework of this dissertation was discussed in the last section of this chapter.

2.1 Rice production in Thailand

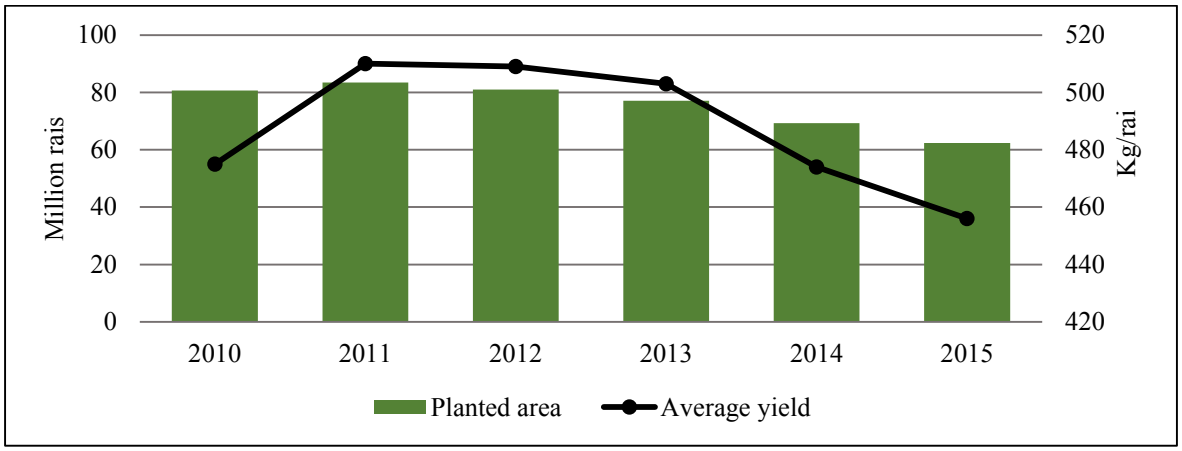
2.1.1 Rice planted area and yield

The geographical regions in Thailand are divided into four regions comprising the north, northeast, center and south (Figure 2.2). The lowland of northeast, northern and central parts are the most important rice growing regions with shares of 61%, 22% and 15% of the total rice planted areas, respectively (Office of Agricultural Economics, 2015a). An average farm size of farmers is around 19.7 rais/household (1 rai = 0.16 ha), which was not very different in the last ten years (National Statistical Office, 2013a).

Figure 2.1 presents the decreases of rice planted areas and average yield of the whole country. The planted areas declined from 83.41 million rais in 2011 to 62.32 million rais in 2015 (1 rai = 0.16 ha), and average yield dropped from 510 kg/rai in 2011 to 456 kg/rai in 2015 (1 rai = 0.16 ha) (Office of Agricultural Economics, 2015a). Reasons of reducing rice planted

areas were the change of government policy regarding the Rice Pledging Scheme which started in 2011 and failed in 2013, and the fall of market price. Therefore, farmers changed from rice to other crops such as sugar cane, rubber, cassava, oil palm, green bean and soybean. Some farmers did not cultivate anything. They moved to work in the industrial city (Office of Agricultural Economics, 2015a). Moreover, their yield of paddy has fluctuated due to a development of rice breeds, irrigation, cultivation practices and a use of mechanization of farmers (Maneechansook, 2011). The farmers obtained an average yield of paddy in the major rice crop at 435 kg/rai, and 636 kg/rai in the second rice crop; the average rice yield in the world was 478 kg/rai (1 rai = 0.16 ha) (Office of Agricultural Economics, 2015a). Although rice planted areas have decreased, rice cultivation is the main crop in the agricultural sector covering 51.3% of the total agricultural areas (National Statistical Office, 2013a).

Figure 2.1: Rice planted area and average yield from 2010 to 2015



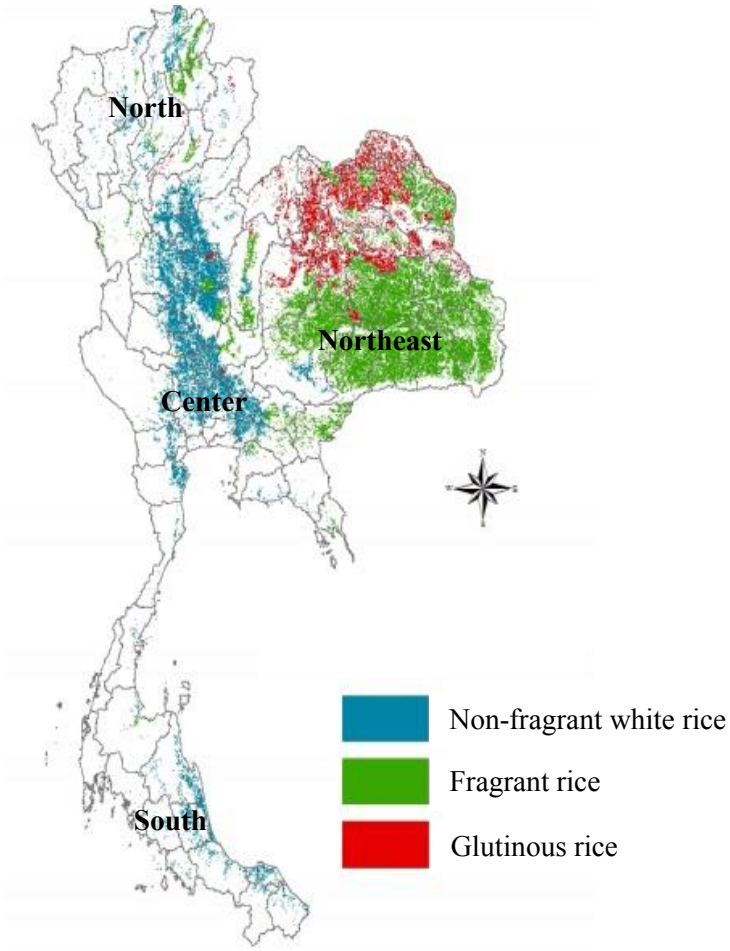
Note: 1 rai = 0.16 ha
Source: Office of Agricultural Economics (2015a)

2.1.2 Rice varieties

Thai rice is renowned for its quality, especially jasmine rice (Thai Hom Mali) or widely known as Thai fragrant rice. Basically, rice, especially Indica rice varieties (long grain rice),

the scientific name of these varieties is *Oryza sativa* subsp. *indica* which are grown throughout the country can be given out in three groups: fragrant, non-fragrant white and glutinous rice. Fragrant rice group is grown in the northeast and upper northern parts. Non-fragrant white rice group is mostly cultivated in the central and lower northern parts. Glutinous rice group is mainly planted in the upper northeast and northern parts, as shown in Figure 2.2 (Rice Department, 2013a). In addition, Japonica rice (short grain rice; *Oryza sativa* subsp. *japonica*) is grouped into an alternative rice variety in Thailand. It is largely grown in the northern region (Titapiwatanakun, 2012).

Figure 2.2: Three groups of Indica rice varieties for planting in the suitable areas



Source: Rice Department (2013a)

2.1.3 Alternative rice crop

The Government of Thailand, especially the Ministry of Agriculture and Cooperatives and the Ministry of Commerce have so far promoted alternative rice cultivation according to the potential of area, in order to improve farmers' income. This is contained officially in the Third Thai Rice Strategic Plan (2015-2019) (Rice Department, 2014b). The Rice Department has classified alternative rice varieties into four categories. Firstly, organic rice includes organic jasmine rice. The most planted areas of this rice is the northeast region, especially Surin Province. Secondary, rice indicates the origin area or Geographical Indications (GI) such as Sung Yod Muang Phatthalung rice in Phattalung Province (the southern part) and Jek Chuey Sao Hai rice in Saraburi Province (the central part).

Thirdly, high-nutrition rice composes Riceberry, Hom Nil and Purple rice as consumers would prefer for their health. These varieties are broadly planted in the central region. Fourthly, Japonica rice consists of DOA1 and DOA2 varieties that were improved in Thailand. DOA is named after the Department of Agriculture (DOA) certified Japonica rice varieties for cultivation. The majority planted areas of these varieties is the North, especially Chiang Rai Province (Rice Department, 2014a; Chiang Rai Rice Research Center (CRI), 2014). Farmers would select such alternative rice cultivation according to the suitable areas.

In 2014, the total planted areas of four alternative rice categories was 212,748 rais (1 rai = 0.16 ha). Moreover, the total paddy production of these alternative rice was 126,374 tons (Rice Department, 2014a; CRI, 2014), as shown the details in Table 2.1. The table shows that Japonica rice varieties have been grown in more planted areas than other alternative rice. The estimated planted areas of Japonica rice have increased from 25,000 rais in 2003 to 80,000 rais in 2014 (1 rai = 0.16 ha) (United States Department of Agriculture Foreign Agricultural Service, 2004; CRI, 2014).

Table 2.1: The estimated planted areas and production of four alternative rice groups in 2014

Alternative rice categories	Planted areas (rais)	Paddy production (tons)	Provinces
1. Organic rice	**63,229**	**31,615**	
1.1 Organic jasmine rice	62,520	31,260	Si Sa Ket, Nong Khai, Amnat Charoen, Yasothon and Surin
1.2 Organic Sang Yod rice	709	355	Phatthalung
2. GI rice	**56,323**	**28,161**	
2.1 Sung Yod Muang Phatthalung rice	5,000	2,500	Phatthalung
2.2 Jek Chuey Sao Hai rice	300	150	Saraburi
2.3 Khao Wong Kalasin glutinous rice	3,700	1,850	Kalasin
2.4 Hang Hom Thong Sakon Tawapee rice	1,500	750	Sakon Nakhon
2.5 Leum Pua rice	813	406	Phetchaboon
2.6 Hom Mali Thung Kula Rong Hai rice	45,010	22,505	Surin, Si Sa Ket, Yasothon, Maha Sarakham and Roi Et
3. High-nutrition rice	**13,196**	**6,598**	
3.1 Hom Nin rice	9,514	4,757	All regions
3.2 Purple rice	22	11	Phayao
3.3 Riceberry rice	1,060	530	Nakhon Sawan, Phichit, Lamphun, Uttaradit, Uthai Thani, Lop Buri, Saraburi and Sing Buri
3.4 Hom Gra Dang Ngah rice	2,600	1,300	Narathiwat
4. Japonica rice	**80,000**	**60,000**	Chiang Rai, Chiang Mai, Tak, Phrae and Phayao

Note: 1 rai = 0.16 ha
Source: Rice Department (2014a) and CRI (2014)

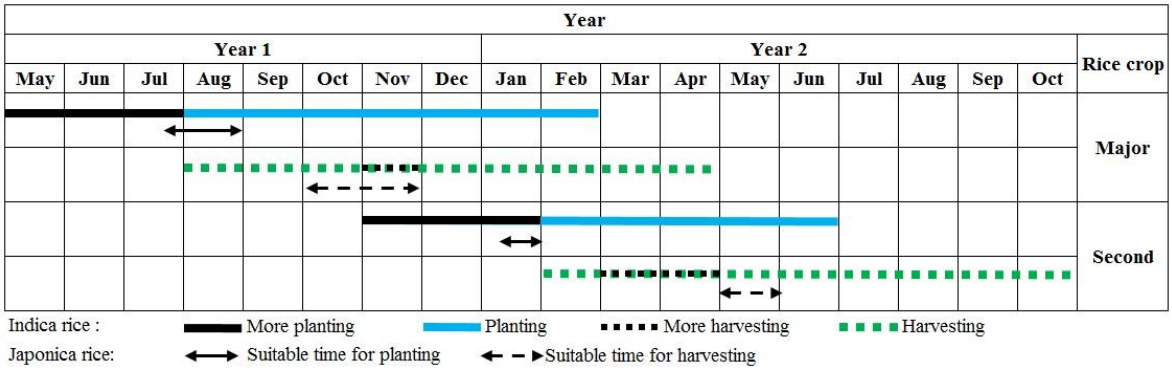
2.1.4 Cropping seasons and methods

Thailand has two main cropping seasons: the major and second crops of rice. Farmers can cultivate rice in the major rice crop (wet season) from May to October. The second rice (dry season) is cultivated during the period from November to April of the following year. In the major rice crop season, Japonica rice varieties are cultivated in the end of July, and harvested in October to November. In the second crop season, these varieties are cultivated in mid-

January, and harvested in May, as shown in the Figure 2.3. However, the period of cultivation depends on the climate and water conditions.

Since 1960s, farmers have cultivated rice two or three crops a year because modern rice varieties (MVs) have been widely adopted in farmlands (Isvilanonda, 2010). Such varieties have high yield and high response to fertilizer in the irrigated areas. Increase in rice yield per rai could be achieved by improving the socio-economic characteristics of Thai farmers (Songsrirod, 2007). Some rice varieties have a short duration (less than 100 days) in the rice cropping such as RD29 and RD43 varieties. Farmers can grow these varieties if they will cultivate three crops a year. According to Ruensuk and Binahamad (2014), farmers mostly cultivated rice varieties with 110-120 days in the rice cropping. If they planted with same rice varieties, they could not cultivate three crops. Therefore, they have to cultivate rice by alternating between the short and long duration rice varieties; for example, they cultivate Phitsanulok 2 variety (120 days), RD29 (99 days) and RD43 (95 days) varieties, in descending order. A farmer generally grows different rice varieties at the same time, which are codified into two main types consisting of strong and less sensitivity. Rice with strong sensitivity is grown during the wet season while rice with less sensitivity is suitable for cultivation in dry season (Katchawattana, 2015).

Figure 2.3: Times of rice planting and harvesting in Indica rice and Japonica rice



Source: Office of Agricultural Economics (2014b) and Warinrak (2013)

Moreover, the rice cropping methods compose three main systems: transplanting, seed broadcasting and seed drilling methods, among which transplanting method has the highest production cost (Arayaphong, 2012). Those farmers who grow Japonica rice adopt transplanting and seed broadcasting (Warinrak, 2013). However, the researchers in the CRI recommend that the transplanting is the best method for Japonica rice (Warinrak, 2013).

2.1.5 Rice production in Chiang Rai Province

The northern Thailand is the mountainous area which can be divided into two areas depended on geographical condition, upper and lower north (Maneechansook, 2011). According to the Rice Pledging Scheme of government which started in 2011 and failed in 2013, the planted areas of long grain rice in the northern region have decreased from 21.35 million rais in 2011 to 15.53 million rais in 2015 (1 rai = 0.16 ha). Meanwhile, the total paddy production of long grain was approximately 8.86 million tons in 2015 which declined from 11.80 tons in 2011 (Office of Agricultural Economics, 2015a). This scheme was the significant reason for reducing rice planted areas and paddy production of farmers due to the lower price at farm level when the scheme failed. In accordance with Jierwiriyapant et al. (2012), the northern farmers tend to look for crops with high marketable and valuable varieties.

The upper north, especially Chiang Rai Province, can cultivate both long and short grain rice varieties. Many rice farmers in the upper north have produced glutinous rice of household consumption, and have planted another rice varieties with higher price and high market demand such as Japonica rice varieties (Isvilanonda, 2010). Rice varieties cultivated in this province include fragrant rice such as Khao Dawk Mali 105, RD15; glutinous rice: RD6, RD10, San-pah-tawng; non-fragrant white rice: Phitsanulok2; and Japonica rice: DOA1 and DOA2 (Rice Department, 2013a). In 2015, the planted areas of Chiang Rai Province were approximately 1.66 million rais, and the paddy production was approximately 1.02 million tons, with a 640 kg/rai of average yield (1 rai = 0.16 ha) (Office of Agricultural Economics, 2015a). The paddy production in Thailand should not exceed both domestic and foreign demands at 33 million tons (Department of Foreign Trade, 2015).

2.1.6 Production cost and income of rice farmers

Rice cultivation depends on uncontrollable factors such as weather (flooding and drought), resulting in uncertain rice yields and supplies. Yet another factor is the fluctuated market price. These factors have affected production and income of farmers (Chainuvati and Athipanan, 2001). Thai farmers are still regarded as the poorest group in the country (Chainuvati and Athipanan, 2001), in which a farmer has to take responsibility of risk by himself or herself (Arayaphong, 2012). As a result, some farmers moved to more non-farming activities. Income from farming of farmers decreased from 60.62% of all incomes in 2009 to 52.40% in 2014. On the contrary, non-farming income increased from 39.38% in 2009 to 47.60% in 2014, shown in Table 2.2 (Office of Agricultural Economics, 2013; 2015b). These figures implied that non-farm sector has increasingly provided employment opportunities for rural labors. In addition, labor migration from farm to non-farm sectors is a key factor that causes a labor shortage and high wage in agricultural sector, thus leading to higher production costs (Chainuvati and Athipanan, 2001).

Table 2.2: The proportion of farmers' farm and non-farm incomes from 2009 to 2014

Year	Farm income (%)					Non-farm income (%)				
	Total	North	Northeast	Center	South	Total	North	Northeast	Center	South
2009	60.62	68.18	41.35	70.25	71.21	39.38	31.82	58.65	29.75	28.79
2010	60.74	67.87	42.61	69.52	70.47	39.26	32.13	57.39	30.48	29.53
2011	58.51	66.87	41.60	66.68	68.42	41.49	33.13	58.40	33.32	31.58
2012	59.07	67.92	42.10	67.07	64.02	40.93	32.08	57.90	32.93	35.98
2013	55.25	62.19	41.10	66.13	61.25	44.75	37.81	58.90	33.87	38.75
2014	52.40	61.17	38.27	65.34	56.77	47.60	38.83	61.73	34.66	43.23

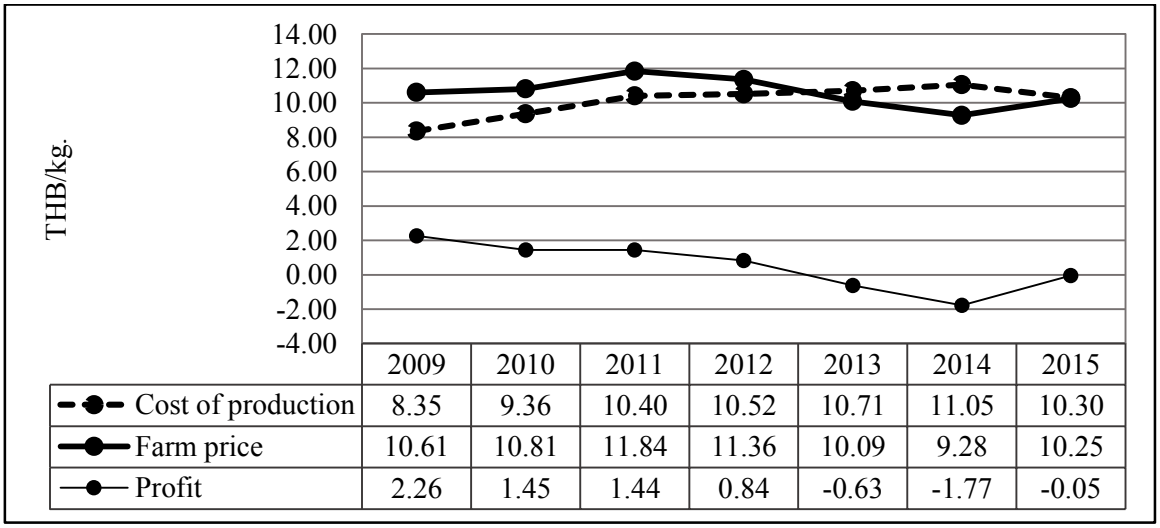
Source: Office of Agricultural Economics (2013; 2015b)

Figure 2.4 shows the rice farmers production cost more and more, while farm gate price of paddy fluctuated. Paddy price at farm gate is different between major and second rice crops (Arayaphong, 2012). If the price of paddy does not increase to reflect higher costs, it may

affect incomes of farmers. During the period from 2013 to 2015 in the figure, farmers lost earning because paddy prices were less than production cost. The Office of Agricultural Economics (2015f) mentioned that the Rice Pledging Scheme made the price at farm level dropped, while the production cost increased or remained. This affected farmers' income.

The cost of Thailand's rice production was higher than the competitors, especially Vietnam; for example, in wet season of 2014, Thailand had approximately 190 USD/ton of rice production cost, while production cost of Vietnam was around 180 USD/ton. Meanwhile, cost of India's rice production was approximately 200 USD/ton, which was higher than Thailand (International Rice Research Institute, 2015b). However, rice of Thailand is still disadvantageous in the world market because high production costs causing export prices of Thai rice were higher than the competitors. From the above mentioned, not only production cost and farm price, but also yield of rice have a significant impact on earning of farmers, which yield of paddy has to be developed more by the government sector (Sittisak et al., 2014).

Figure 2.4: Average rice production cost, farm price and profit of rice farmers during 2009-2015



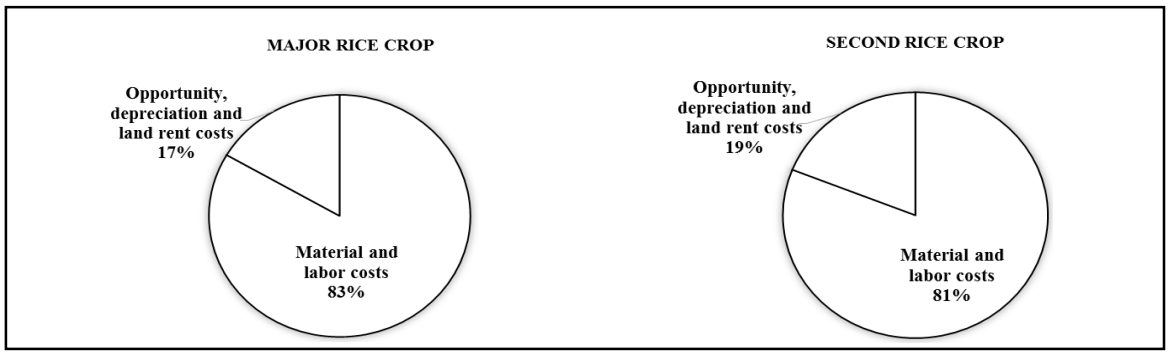
	2009	2010	2011	2012	2013	2014	2015
Cost of production	8.35	9.36	10.40	10.52	10.71	11.05	10.30
Farm price	10.61	10.81	11.84	11.36	10.09	9.28	10.25
Profit	2.26	1.45	1.44	0.84	-0.63	-1.77	-0.05

Source: Office of Agricultural Economics (2009-2015)

In 2014, Rice production cost of farmers has remained high comparing the last five years. The Office of Agricultural Economics classifies the production cost of rice including the materials, labor, land rent, and opportunity and depreciation costs. In 2014, the average cost of rice production was 4,778.55 THB/rai in major crop, and 5,967.64 THB/rai in second crop (1 rai = 0.16 ha) (Office of Agricultural Economics, 2014c), as shown in Figure 2.5.

Moreover, Suksutti (2015) estimated that the average rice production cost of the whole country was 4,787 THB/rai, which included 3,989 THB/rai of the variable cost and 798 THB/rai of the fixed cost. The key production costs were agricultural inputs, especially fertilizers and insecticides (18.80%) and machine (18.38%). Rice production cost of the central region was 5,750 THB/rai which was more than other regions, while cost of rice production in the northern part was 4,970 THB/rai (1 rai = 0.16 ha). Such a highest cost included the expenses of seeds, fertilizers, insecticides and farmland rents. Farmers need to use more fertilizers and insecticides to increase yield and to reduce disease and insect problems. Price rise of such inputs would affect the production cost of farmers (Titapiwatanakun, 2012).

Figure 2.5: The estimated proportion of rice production cost of farmers



Source: Office of Agricultural Economics (2014c)

In addition, increasing cost was caused by disbursement of fuel and using machines or hiring labors to replace family labors (Suksutti, 2015). Isvilanonda (2010) indicated that the main proportion of rice production cost consisted in machine (19.08%) and fertilizers (15.26%).

In addition, Sansong (2012) identified that the main costs of rice production involved with labor (19.90%), fertilizers (18.01%) and seed (10.23%). From many findings in cost and earning of rice production, farmers have faced the rising production cost, low yield and price, thus making their income lower. If they can drop the use of agricultural inputs, especially fertilizers and insecticides, their production cost will reduce, and they will receive more income. Moreover, appropriate farming practices and knowledge are also been needed for farmers to improve their production.

At present, Thai government, particularly the Rice Department and the Ministry of Agriculture and Cooperatives have encouraged farmers to reduce cost of rice production, especially the costs of fertilizers and pesticides. They have created a pilot community project for reducing rice production cost and have provided the good practice guidelines for farmers' rice cultivation (Rice Department, 2013b). However, such encouragement has just started a few years ago. According to Homjumjung and Sriwaranun (2015), farmers fell their production cost and increased yield by following the government's practice guidelines. The cost was calculated 3,734 THB/rai, which slightly decreased from 3,812 THB/rai before they followed. On the other hand, their yield after followed the guidelines of government was 448 kg/rai which insignificantly increased from 447 kg/rai before they followed (1 rai = 0.16 ha). Changing the behavior of farmers for dropping production cost, especially chemical fertilizer was difficult. They concerned that if they followed the government's practice guidelines, their yield of paddy would reduce (Homjumjung and Sriwaranun, 2015).

If reducing production cost is difficult for farmers, the government encourages them to make more their income by choosing top-quality crops or planting alternative rice such as Japonica rice and organic rice. Chainuvati and Athipanan (2001) mentioned that farmers considered whether the income generated by the alternative crops could generate more income than the ordinary ones. They would not accept the alternative crops if they could not perceive a market opportunity.

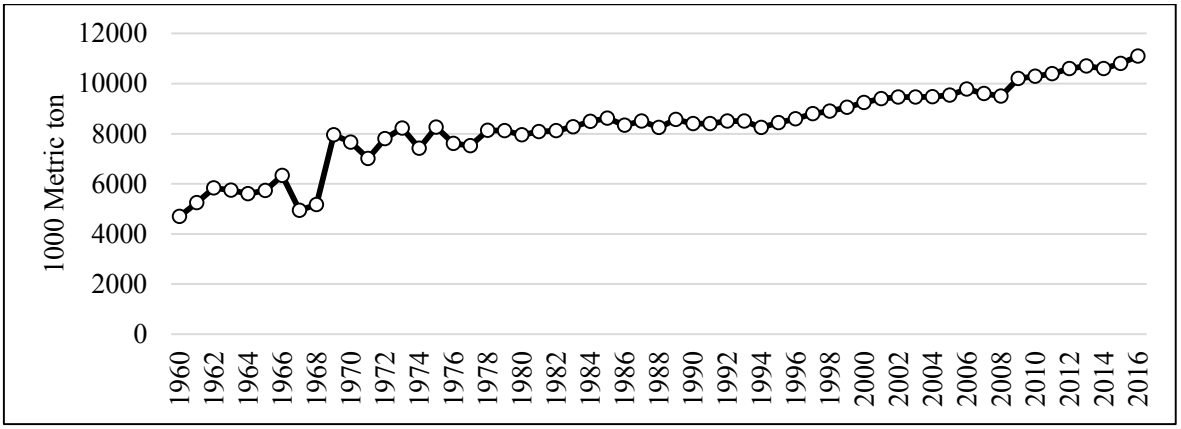
As already been mentioned, even if farmers would reduce planted areas of rice and moved to outside agriculture, rice is still a main crop for Thai farmers. The diversity of rice varieties in Thailand is a challenge for them. They can produce both ordinary rice and alternative rice varieties. Farming of alternative rice varieties, such as Japonica rice may be a good way for increasing farmers' income in upper north, because this rice has a higher yield and contract price. Furthermore, Japonica rice is still desirable for consumers. In addition, the market demand for Japonica rice is relatively large due to the fact that Japanese restaurants in Thailand have so far extended their chains and branches through the country as a whole.

2.2 Rice marketing in Thailand

2.2.1 Domestic rice market

In Thailand, rice is the staple food and a very important export commodity that have earned foreign currencies so long. It is distributed to both domestic and foreign markets. According to the statistical data of FAO in 2013, more than half of Thailand's total milled rice was consumed in domestic market (FAOSTAT, 2013). This is regarded as a major market of rice production. Figure 2.6 indicates that domestic utilization of milled rice is increasing. The utilization of rice can be gathered into direct consumption, seeds for next crop, animal feed and raw materials for related industries; for example, noodle, alcohol and flour. The direct consumption shares the biggest use of rice production because rice is the main staple food for Thai people (Maneechansook, 2011). Daily rice consumption per capita was 115 kg in 2013 (FAOSTAT, 2013).

Figure 2.6: Milled rice consumption in Thailand



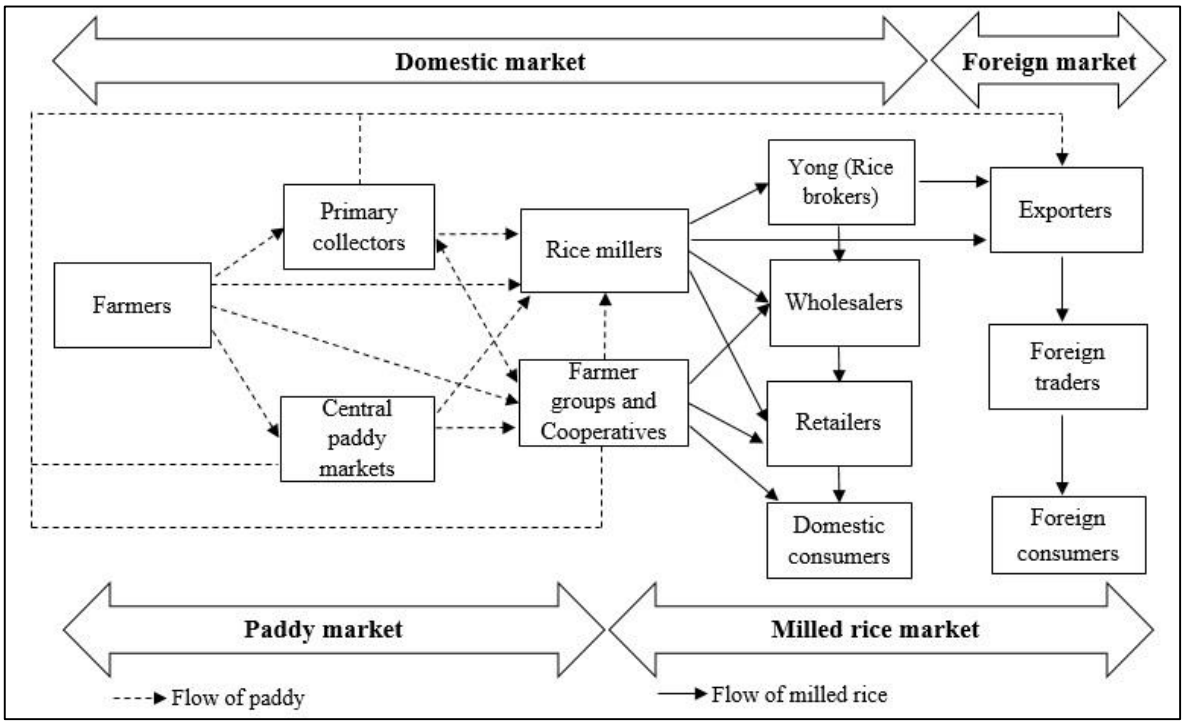
Source: FAOSTAT (2013)

The domestic market distribution of rice is segregated into two markets, comprising paddy market and milled rice market (Ekasingh et al., 2007; Thoucharee and Pitakaso, 2012; Srisompun, 2014), as shown in Figure 2.7. Paddy market or local market is a place where producers (farmers) and local assemblers trade their commodities. Milled rice market or regional/terminal market is an assembly market for transporting milled rice either to the terminal markets in Bangkok or delivering it to other provinces (Itharattana, 1999). Ekasingh et al. (2007) indicated that various intermediaries involved rice process in Thailand. The intermediaries included the local buyers or assemblers, cooperatives, farmer groups, central market, millers, commission agents, exporters, wholesalers and retailers. It takes the long stages from producers to domestic consumers.

In paddy market, Thai farmers have several ways to sell their paddy in the domestic market. They may sell it directly or indirectly to agricultural cooperatives, rice mills and local merchants. Paddy process has a variety of channels under highly competitive conditions (Thoucharee and Pitakaso, 2012; Srisompun, 2014). Each party in the rice process has a role and gets payments for his/her role (Sajjad et al., 2008). In addition, Muthayya et al. (2014) indicated the parties involved in paddy market comprising farmers, rice collectors and rice millers.

With regard to milled rice market, rice millers and traders in terminal market are either through direct business-to-business sales or through indirect transactions with the so-called rice brokers ('Yong' in Thai) (Titapiwatanakun, 2012). The manufacturers of rice in Thailand include rice millers and agricultural cooperatives, and rice's dealer cluster comprising exporters, rice brokers, wholesalers and retailers (Thoucharee and Pitakaso, 2012; Srisompun, 2014). Moreover, Muthayya et al. (2014) showed the parties involved in milled rice market as follows: rice millers, wholesalers, retailers, food processors and consumers. Rice millers and traders are the key players in the midstream activities at the paddy processing level of the rice industry (Titapiwatanakun, 2012). Furthermore, rice millers are important players in the structures of paddy and milled rice markets in Thailand, which stand in between both markets (Isvilanonda, 2010).

Figure 2.7: Paddy and milled rice markets in Thailand



Source: Adapted from Thoucharee and Pitakaso (2012) and Srisompun (2014)

2.2.2 Exports of Thai rice

In foreign market, Thailand is an outstanding player in the world rice market. It is the world's second largest exporter of rice, followed by India (Arunmas, 2016). Thai rice is distributed by exporters which have collected rice from rice brokers or may directly collect from rice mills. Moreover, many exporters have their own rice mills, and they have a connection with an importer associated the quality standards and types of rice (Ekasingh et al., 2007), as shown in Figure 2.7. The majority of exporters in Thailand are handles by the private sector which have to register under the provision of the Rice Trading ACT B.E. 2489 by the Ministry of Commerce.

Titapiwatanakun (2012) indicated that the exporters sold their rice through three channels: international rice brokers or private rice importers, the government of the importing countries, and the Thai government for further export to the government of the importing countries. The most of the international rice trade takes place through international rice brokers; for example, export of rice from Thailand to Sweden involves with Thai exporters who trade rice to Sweden and Swedish rice brokers or importers who import and distribute rice products to consumers (Maneechansook, 2011).

The demand for rice in the world market is increasing in accordance with a rapid growth of the world population. It is estimated to increase by 11% from 435 million tons in 2010 to 483 million tons in 2015 (Government Public Relations Department, 2015). In 2015, the main importers of Thai rice were China, the Philippines, Republic of Benin, Nigeria and South Africa. Thailand exported 9.80 million tons of rice to the world market, valued at 155,912 million THB (1USD=36THB), which declined from 10.97 million tons in 2014. The export price of Thai rice was higher than the competitors' by 20-30 USD a ton. As a result, some rice importers moved to other countries, especially Vietnam and India (Office of Agricultural Economics, 2015a). Moreover, Thailand has also imported some specialty rice such as Italian risotto, Basmati and short grain Japanese rice from foreign countries (Xie and Napasintuwong, 2014).

2.2.3 Rice mills in Thailand

In local areas, farmers mill their paddy from services of village mills or small commercial mills located near their farms, and then stored milled rice for their own consumption (Ekasingh et al., 2007). The village millers will process the farmer's small amount of paddy rice with free of cost in exchange for rice bran (Muthayya et al., 2014). In 2002, Thai government greatly intervened in the paddy market, especially the policy regarding the Rice Pledging Scheme. The government set paddy price more than market price, and expanded the scheme by increasing the volume of paddy. As a result, farmers changed to sell their paddy from central paddy markets and rice terminals to the government through rice mills more and more. Therefore, the government became as a large buyer during the period 2002-2008. Meanwhile, some central paddy markets had to close down of their business, and rice terminals have reduced their role (Isvilanonda, 2010).

The central paddy markets were under the supervision of Department of Internal Trade of the Ministry of Commerce, Bank for Agriculture and Agricultural Cooperatives, and primary cooperative which were located in main production areas. These markets provided the facilities such as labor, moisture gauges, drying lawns, warehouses and loans, which depended on the size of the central paddy markets. The center played as a real intermediary which allowed many buyers and sellers to meet and bargain. They made a freedom in trading and pricing. These centers were an alternative way for farmers to sell paddy at a suitable price.

With regards to the rice traders in rice terminals or village collectors would buy paddy from small farmers, then would sell paddy to rice mills or the central paddy markets or collectors outside the village. Normally, they own trucks and arrange for transportation between farmers and buyers. Some village collectors may have their own rice mill. At present, they are still operating in some areas (Isvilanonda, 2010).

The policy on the Rice Pledging Scheme has led to the existence of many rice mills with a variety of sizes and technologies in almost all regions. In Thailand, the small scale rice mills with capacity of 1-12 tons a day, including mills of agricultural cooperatives are mostly established in the villages or communities. The medium and large rice mills are located in districts or trading routs. Most medium rice mills (13- 59 tons a day of capacity) and large rice mills (more than 60 tons a day of capacity) belong to the private sector. They not only deal in processing but also act as speculators by collecting rice at low prices and selling at higher price (Itharattana, 1999; Wasantiwong, 2003; Department of Industry Promotion, 2009; Isvilanonda, 2010).

The rice mills have become an important intermediate in rice production and marketing units. They involve the paddy buying, processing, packaging, storage, milled rice selling and distribution to the market (Titapiwatanakun, 2012). In accordance with Makasiri et al. (2011), rice mill has become the place of integrated services of rice trading. At present, rice mill businesses are highly competitive businesses in the rice marketing systems. Moreover, rice millers have also played the powerful role in the specialty rice market (Seemanon et al., 2015). They would supply alternative rice to such market, in which the most of alternative rice is produced through a CF system. They will contract farmers before planting, through which rice millers may provide the technical assistance, agricultural inputs on credit such as seed, fertilizers, and an assured market for their farmers.

A high competition in the rice market and changing consumers' preference for food consumption, rice millers have developed their business in order to cope with such changeable situations. They have adjusted the management efficiency of business within their rice mill by reducing the production cost and producing various rice varieties such as herb rice, brown rice and native rice varieties. Moreover, they have invested and developed their rice mill by adapting the Good Manufacturing Practice (GMP) for rice mill and setting up the Hazard Analysis and Critical Control Point (HACCP) (Vasantiwong et al., 2011; Rice Department, 2014c). These aspects would guarantee the food safety for consumers, create a good image for the rice millers' product, and indicate the potential for exporting rice.

Table 2.3 shows a change in number of rice mills in Thailand based on the number of large and medium-sized rice mills (Makasiri et al., 2011). Most of them are located in the central region. In 2011, the amount of large-size rice mills increased from 2000 and 2008, while that of medium-size ones reduced. This may imply that rice mills expanded the production capacity from medium to large-size, and/or new large rice mills were established more and more, especially in the northeast part. If numeral of rice mills is increasing, competition as regards purchasing of millers will become stiff. They seek for producing several rice varieties such as alternative rice categories.

Table 2.3: The number of rice mills classified by size of rice mill

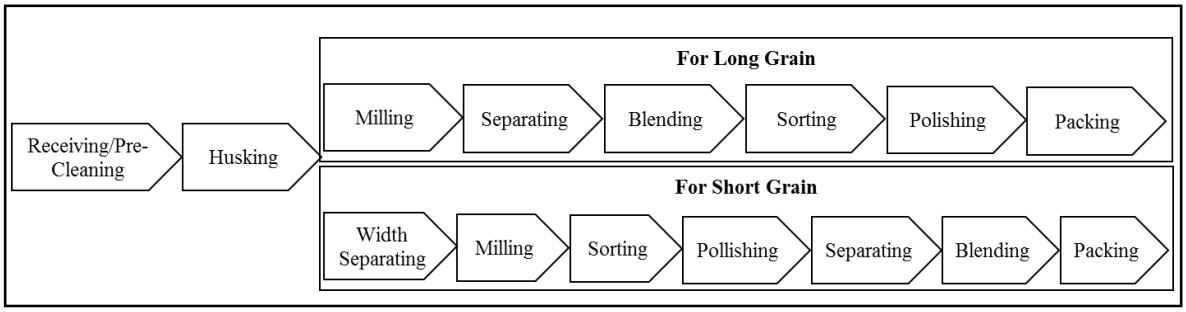
Year	Regions	Number of rice mills		
		Large size	Medium size	Total
2000	**Total**	**871**	**823**	**1,694**
	Center	399	336	735
	North	195	200	395
	Northeast	269	189	458
	South	8	98	106
2008	**Total**	**1,148**	**387**	**1,535**
	Center	468	160	628
	North	308	114	422
	Northeast	355	57	412
	South	17	56	73
2011	**Total**	**1,212**	**380**	**1,592**
	Center	485	137	622
	North	297	116	413
	Northeast	383	77	460
	South	47	50	97

Source: Isvilanonda (2010)

After rice millers purchase paddy from farmers through intermediaries or buy directly from them, they mill and distribute it to the market. The process of milling rice can be separated into three steps. Firstly, the harvesting of rice is primary step to get paddy. This step creates some losses from seeds and post-harvest. Secondly, it is threshing or winnowing paddy to separate the husk from the grain. Brown rice is the product of this step. Thirdly, the brown rice is milled to polish rice bran in order to get smooth and shiny rice grain without any coats. Raw rice bran is a by-product of this step which is used as a material for rice bran oil

extraction (Nielsen, 2004). On average, paddy produces 25% husk, 10% bran and germ, and 65% white rice (Muthayya et al., 2014). According to Satake Corporation (n.d.), the process of rice milling both long and short grains are different in the process, as shown in Figure 2.8. The rice millers receive most of the income earned from providing milling services to customers. They also got the income from by-products such as small broken rice, husk and bran (Ekasingh et al., 2007).

Figure 2.8: Process of rice milling both long and short grains



Source: Satake Corporation (n.d.)

Milled rice from rice millers are marketed to traders by direct sales to wholesalers and retailers in domestic market. Some large millers have either direct contact with exporters or foreign importers. Ekasingh et al. (2007) mentioned that rice millers played the significant role in price formation. They are intermediaries who have good connections about rice prices gathering information from brokers, exporters and among themselves to calculate the purchase and sale prices. Therefore, the price information from the rice millers and other sources such as brokers and exporters also set the price for rice in the market. However, the rice price varies year by year which is depended on many factors such as climate change, natural disaster, quality of paddy, yield and competition in the export market. A study of Chouichom (2011) pointed out that rice millers were traders serving as important market players by influencing the rice market prices. Each miller defined the pricing of milled rice after calculating milling costs based on the current prices and other factors. Small farmers could not bargain with rice millers (Isvilanonda, 2010), and they could not access the source of price information (Makasiri et al., 2011).

2.2.4 Alternative rice market

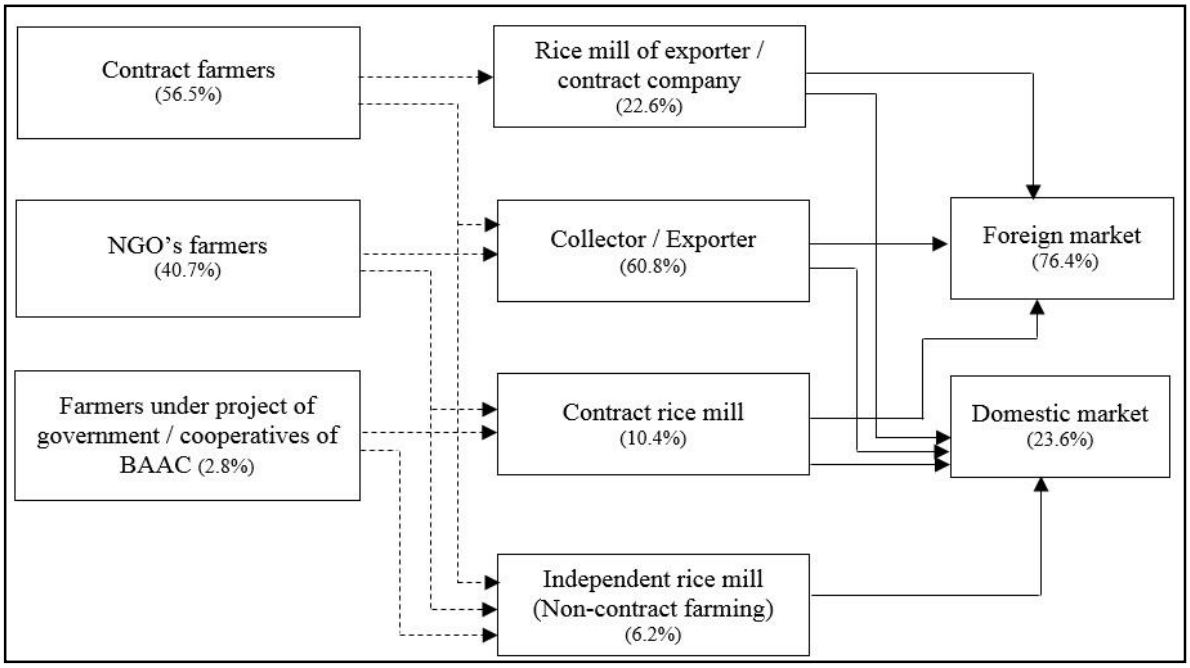
Thailand has lost a leadership position as the largest rice exporter in the world rice market. Moreover, rice production cost of Thai farmers have increased while rice prices have changed according to the situation of the global rice market. In addition, farmers may face the risk of natural disasters that affect their production and income. Therefore, they seek for cultivating alternative crops that can improve their livelihoods. Alternative rice cultivation is a good choice for farmers due to higher market price than ordinary rice. Furthermore, the government has intended to develop rice varieties with high yield and reducing production cost to help Thailand return to the leadership position and to enhance the competitiveness in the world market. The government has also promoted the production of top-quality rice for specialty rice market such as organic rice, Japonica rice, and so on. This objective is to add value and diversity to rice in Thailand (Rice Department, 2014b). Therefore, rice marketing in Thailand has two characteristics as follows: ordinary rice for mass market and alternative rice for specialty rice market.

The Rice Trader of International Commodity Institute (2015) pointed out that consumers still consume specialty rice or alternative rice comprising fragrant and Japonica rice. In 2015, trade of fragrant rice in the world market was 3.5 million tons and priced at 500-1,170 USD a ton, while that of Japonica rice was approximately 2.5 million tons, priced at 800-950 USD a ton. In addition, the domestic market demand for Japonica rice is relatively high considering Japanese restaurants have extended their chains and branches through the country as a whole. In fact, restaurant chains from Japan, Korea and China have increasingly invested in Thailand to open Japanese restaurants at a growth rate of 10-15% per year. As a result, Thailand was the fifth in the world in the number of Japanese restaurants (Kasikorn Research Center, 2010).

The market of alternative rice is still a small market. Farmers who produce alternative rice such as organic rice gather into a specific set and have advanced agreement with buyers (Suchato, 2013). According to the Thailand Development Research Institute (2010), the route

organic jasmine rice that was produced through CF was shorter than that of ordinary rice. The exporters had to contract directly with farmers because they were strict regarding the quality of organic jasmine rice. The farmers in this production can be split into three types: farmers who made a contract with exporters (56.5%), farmers who contracted with those agricultural cooperatives supported by NGO (40.7%), and farmers under project of Thai government (2.8%). The marketing channel of organic rice rarely appears between independent rice mills and wholesalers or retailers, as shown in Figure 2.9.

Figure 2.9: The domestic marketing channels of organic jasmine rice



Source: Thailand Development Research Institute (2010)

Moreover, the study of Waiyawuththanapoom et al. (2015) indicated that riceberry chain for a specialty market had four channels comprising direct sale, cooperative, merchant and social media distribution channels. In addition, Seemanon et al. (2015) studied the native rice of Chiang Rai Province namely Kiaw Ngu native glutinous rice variety (GS No. 8974) to prepare for expanding in the new AEC market. This rice has to produce through the CF systems because it is a renewed and specialty product. Before it would be distribute to the

new AEC market, it would be sold in the domestic market such as convenient stores, restaurants and Thai dessert shops.

From previous studies, rice market in Thailand has included ordinary rice and alternative rice markets. While Thailand has faced intense competition in the world rice market, expanding specialty rice market such as Japonica rice to meet the needs of consumer targets has a good choice for the country. Furthermore, both private and government sectors have encouraged to develop specialty rice market more and more. Such market has the rice millers as a significant player, and they are a key intermediary in both paddy and milled rice markets, especially pricing of rice in market.

2.3 Contract farming (CF)

In the 1950s, CF started in Europe which had been regarded as a form of promotion and development of agricultural products. It creates stability and sustainability for both farmers/sellers/producers and companies/buyers. The contract farmers have a ready market for their products, while the buyers will receive quality products and set quantity to meet the requirements in an agreement (Klakhai, 2012). CF is a form of vertical integration within agricultural commodity chains, through which the company has greater control over the production process, as well as the quantity, quality, characteristics and the timing of production (Prowse, 2012; Zhang, 2013). Peterson et al. (2001) mentioned that part of the food systems has become tightly integrated such as the poultry and pork. Tightening of vertical linkages has been characterized by movement from open markets to various forms of managed coordination, such as contracting and single ownership of multiple market stages.

CF system has expanded worldwide. For example, Brazil had over 70% of poultry production and 30% of soya production through CF (Prowse, 2012). Nestle company's biggest milk processing facility in India contracted with over 140,000 farmers (McMichael, 2009). In addition, the CF in the United States rose from 12% of agricultural production in 1969 to 36% in 2004. Furthermore, the policies for developing agro-industrial sector of India,

Vietnam, Morocco, Thailand and others have so far developed for promoting the CF (Will, 2013). At present, CF system has become more and more popular in developing countries. Demand for food and agricultural products expands every year due to income per capita ever-increases in many developing countries, and a rapid growth of population. The United Nations Population Division estimates that the world's population will increase to 9.2 billion by 2050 (Prowse, 2012).

In Thailand, the expansion of CF is a key strategy of the Thai Government to involve the private sector and foreign investment in the development of the Thai agricultural sector (FAO, 2013). Since the Fourth National Economic and Social Development Plan (1977–1981), CF has been used to increase the exports of high value-added and high-quality products. The Sixth National Economic and Social Development Plan (1987–1991) recommended that CF should be further promoted, on condition that the provisions of such agreements are improved to be more effective and beneficial to all parties concerned (Sriboonchitta and Wiboonpoongse, 2008). In the early 1970s, Charoen Pokphand Company (CP) which is nowadays a huge conglomerate company had started a CF business. Since 1987, it has expanded the CF systems into many agricultural commodities such as cassava, sugar cane, baby corn, palm oil, fragrant rice, barley, sorghum, cashew nuts, poultry, swine, etc. (Goss et al., 2000; Singh, 2005a). Especially in poultry and shrimp, CP have successfully created effective models of CF and expanded through neighboring countries.

CF system has expanded in all regions of Thailand. According to Sriboonchitta and Wiboonpoongse (2008), CF in the north has been expanded from Chiang Mai Province to other provinces such as poultry, swine, Japonica rice, organic rice, vegetable seed, corn seed and various kinds of fresh vegetables for frozen and pickled products. That means that farmers have more skills and experiences in production through CF systems. As a result, many organizations in Thailand including the Marketing Organization for Farmers (MOF) which is a state enterprise intends to develop an integrative business model based on CF of native product, especially Kiaw Ngu native glutinous rice varieties (GS No. 8974) in Chiang Rai Province turned into a unique product (Seemanon et al., 2015). Moreover, some northern

farmers have cultivated the purple rice under contractual agreement, which supplier of inputs and buyer of products are typically the same person (Jierwiriyapant et al., 2012).

CF system can aid farmers to access to better inputs and involve in more efficient production (Singh, 2005b; Will, 2013; Ruammake, 2014). Some companies support technology, dissemination of information, supply agricultural inputs and credit for investment. Contract farmers can learn some important skills through a CF system regarding data record, methods of applying chemicals and fertilizers, and the efficient use of farm resources (Silva, 2011; Prowse, 2012). Moreover, the details of agreement contract depend on type of products and parties. Pansin and Khamkaew (2012) explained that most of those farmers who produce agricultural commodities under a CF system need to sell their products exclusively to the contractor company that provides input. Therefore, the CF means that a company/buyer sets up a business link with farmers/sellers by written or verbal agreement, in which these parties have to comply with strictly in the aspect of price, quality, quantity and time. Both seller and buyer have to agree on the conditions of the contract. However, the changes in agreement will usually not result in legal prosecution (Singh, 2005a; FAO, 2012; Klakhai, 2012; Ruammek, 2014; Wang et al., 2014).

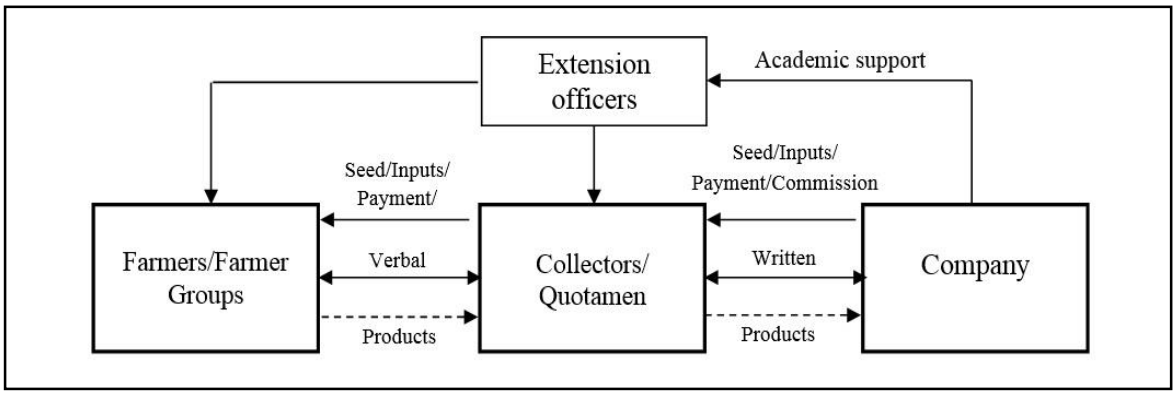
2.3.1 Models and typology of contract farming

Models of CF have many characteristics which depend on the nature and type of contracting company, technology, nature of crop or produce, objective, resource of contractor, experience of farmer and local and national contexts. Such characteristics can be arranged into five models comprising 1) the centralized model, 2) the nucleus estate model, 3) the multipartite model, 4) the informal model, and 5) the intermediary model (Sriboonchitta and Wiboonpoongse, 2008; Prowse, 2012; Will, 2013).

The most common practice in Thailand as well as Southeast Asia is the intermediary model, as shown in Figure 2.10 (Sriboonchitta and Wiboonpoongse, 2008); for example, the large food processing companies purchased agricultural commodities from contract farmers

through collectors or farmer committees with which all parties have a business link. The company also has the extension officers to support technical information for the collectors and their farmers. The intermediary model appears to be particularly suited to staple food crops, and can be run successfully in many different country contexts because an intermediary can assist the contractor company to control of production processes and quality assurance (Prowse, 2012).

Figure 2.10: Intermediary model of contract farming system in Thailand



Source: Adopted from Sriboonchitta and Wiboonpoongse (2008)

In addition, Mighell and Jones (1963) established a classic typology of contracts between farmers and their customers by distinguishing between market-specification, production management and resource-providing contracts. These contracts differ in their main objectives. The marketing contract is a pre-harvest agreement between producers and contractors, in which the conditions include time and location of sales, as well as the quality of the products. The farmers under this contract bear most of the risk of their production activities. This contract can reduce the cost of gathering and exchanging information about demand, quality, timing and price, as well as reducing the uncertainty and market risks.

Under the production contract, contractors inspect production processes and specify input usage, which contract farmers agree to follow such methods and inputs. This contract specifies cultivation practices to achieve quality, timing and least-cost production. Moreover,

it may also support skills development of the producers. In the resource-providing contract, contractors not only provide a market outlet for the product, but also provide the key inputs. This contract can include the production management but just focus on providing inputs. This type of contract can reduce the cost of obtaining credit, input and extension services (FAO, 2013).

2.3.2 Role of parties involved in contract farming

CF system has the parties involved such as contract agency, intermediate or collector, farmer, government sector and bank. The contract will succeed in collaboration among all parties, they have to understand their own role and function. Farmers or producers who participate in a CF system are responsible for the investment of their labor, land, equipment and devices (Putsyainunt et al., 2014). Moreover, they have the responsibility to adhere to the CF regulations such as producing commodities according to standards that contractor defined (Limsombunchai and Kao-ian, 2010). Before farmers sign a contract with a company, they request to be granted access to all available information and education on the risks. They are often forced to buy seeds, livestock breeds, fertilizers, animal feeds or chemical substance through cash or credit from the contract company (Pansin and Khamkaew, 2012).

In part of contract companies, they are responsible for providing seeds or animals, fertilizers, supplementary food, medicine or other materials and extension services (officers) for contract farmers. Moreover, the company will buy all products from the contract farmers at a price agreed in advance by both parties. In addition, the contractors inspect or control the production process and regulate the conditions of purchase (Pansin and Khamkaew, 2012). Generally, they have financial stability and support their farmers in various fields such as technology and information. Furthermore, they explain clearly the details in an agreement with farmers and always give advice to farmers (Limnirankul et al., 2006; Klakhai, 2012; Ruammek, 2014).

The intermediates or collectors who informally or formally contract with farmers in a CF system are responsible for quality control in all field activities from sowing to harvesting. This case found in Thailand, especially the collectors of soybeans, green beans and baby corn contract farming (Eaton, 2001). However, some cases found that the collectors had partial responsibility in the system; for example, sugarcane farmers in Laos contacted their collector or their heads of farmers when they needed to clear land, or needed fertilizers, or for advice with problems related to the sugarcane field (Ayuwat and Phoumanivong, 2013).

The collectors would receive a commission from contractor based on the total production of their farmers. They work together with the extension officers of the company (Eaton, 2001; Prowse, 2012; Will, 2013). In other words, they can play an active role in quota allocation and collect products according to the quotas that are specified by the contract company (Sriboonchitta and Wiboonpoongse, 2005). Contract farmers, collectors and company have to build a good relationship based on honesty and sincerity to success of the production under the CF systems. In addition, the company has to share in the risk of production, and the farmers can negotiate with the company for the price of commodity (Limnirankul et al., 2006; Klakhai, 2012).

The role of government sectors is to promote the CF system to speed up commercialization of the agricultural sector. For a further development of CF, it has to provide special services in cases where the company cannot arrange in a proper way such as agricultural inputs, information and technology. However, the government also has knowledge and understanding of the principles and methods of a CF system before its promotion. Naturally, they prepare suitable laws and an efficient legal system to protect stakeholders. The bank provides financial services, including analysis on the return of investment of farmers before they can participate in a CF system. Moreover, a bank may provide finance for contract companies if special case such as natural disasters happen (Singh, 2005a; Limnirankul et al., 2006; Klakhai, 2012; Ruammek, 2014).

2.3.3 Advantages and disadvantages of contract farming

CF may transform traditional and conventional agriculture into a modern and innovative one which has both advantages and disadvantages. The most advantageous point is that contract farmers can secure the certainty of market, price and income. Contractor (buyers) can obtain a particular product on time and meet their requirement. Moreover, consumers purchase agricultural commodity with a certain level of quality produced under a well-managed CF system. Table 2.4 shows other advantages of the CF systems (Klakhai, 2012; Singh, 2005a; Wang et al., 2014).

Table 2.4: Advantageous points of contract farming systems

Sectors	Advantageous points
Farmer/ Seller/ Producer	1. Market certainty 2. Price stability 3. Income certainty 4. Receiving input, production services, credit, new technology and skills 5. Incremental productivity
Company/ Buyer	1. Receiving quality products on time and meet their requirement 2. Planning the production and marketing 3. Reducing production costs from large scale production
Consumer and overall economy	1. Improvements of product quality and safety for consumers 2. Export of products more and more 3. Continuous manufacture of agricultural products 4. Continuous employment in companies

Source: Klakhai (2012), Singh (2005a) and Wang et al. (2014)

On the other hand, there are several disadvantages of CF as shown in Table 2.5. When contract farmers cultivate a new product, they face some risks as caused by both production and marketing. If a company has poor management such as delayed payment and lack of consultation on farming technologies, it may lead to farmer discontent. Such a mismanagement may cause problems of farmers' livelihood, thus making them hesitant to continuously participate in CF systems. Meanwhile, if farmers sell products to other than the

contractor, the company will miss its supply requirement. It often happens when the farmers use credit for other purposes than their proper investment in farmland, which leads to the reduction of yields and worse quality of product. Moreover, a CF often destroys the environment because the growers emphasize on mass production by inputting many chemicals to accelerate the production (Singh, 2005a; Limnirankul et al., 2006; Klakhai, 2012).

Table 2.5: Disadvantageous points of contract farming systems

Sectors	Disadvantageous points
Farmer/ Seller/ Producer	1. Risks in new product 2. No market to sell surplus products 3. Company exploits contract farmers with monopoly production 4. Staff of company may corrupt in allocation of quotas 5. Company delays payment 6. No compensation for natural disaster from contract company
Company/ Buyer	1. Mismanagement of companies have effect on farmers' participation 2. Farmers sell their products to outside contract 3. Yields and quality of product reduce because farmers used loan incorrectly
Environment and social	1. Environmental destruction due to mass production 2. Noncompliance with contract leads to poor relationship

Source: Singh (2005a), Limnirankul et al. (2006) and Klakhai (2012)

2.3.4 Cost and income of production through contract farming

Singh (2005b) indicated that increased production costs was the reason for the emergence of the CF systems in some countries such as Japan and Spain during the 1950s. This approach was an appropriate way to reduce the costs of plant cultivation and helped farmers access better production materials and more efficient production methods. However, in the study of Ayuwat and Phoumanivong (2013), those farmers who cultivated sugarcane through the CF system suffered from a heavy burden of debt because of high production costs despite low production levels, especially fertilizer and sugarcane stalk seed. In fact, fertilizer price was

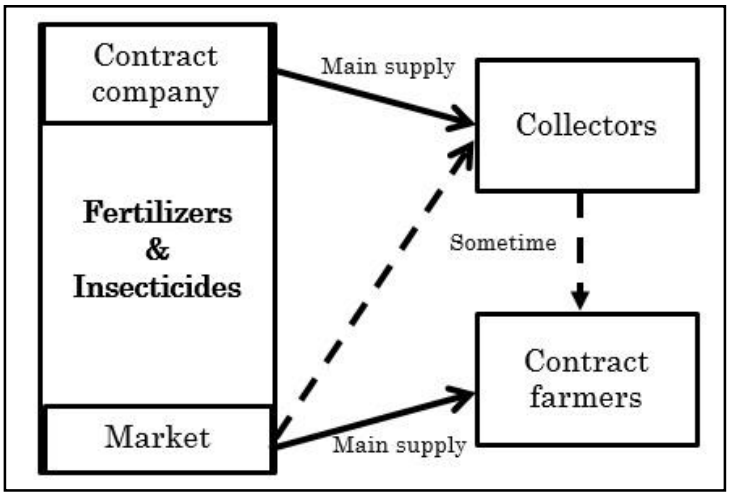
1,000 THB a bag (50 Kg), but farmers had to pay 1,200 THB/bag to contractor. Moreover, contract farmers had to buy 1,500 THB/ton for sugarcane stalk seed from the company which was expensive than the outside contract (1,000 THB/ton). These reasons were not easy for farmers to save on the cost of production because almost all inputs depend on their contractor.

In addition, Kaewmaneechai (2001) showed that the total costs of asparagus production under the CF system was higher than those without contract. Contract farmers had to follow the regulations of the system such as control of hygiene standard in production process and quality of product. These regulations would increase the production cost of contract farmers. The highest production costs of crops through CF system consisted of charges for seeds, fertilizers, insecticides, labor and machines as well as opportunity costs of household labor (Ekasingh et al., 2014).

Normally, contract farmers who lack capital will buy inputs from a company on credit and repay the debt when they sell their crops. However, some contract companies allowed client farmers to buy inputs, especially fertilizers and insecticides, from outside markets (Ekasingh et al., 2014), as shown in Figure 2.11. Studies by Sriboonchitta and Wiboonpoongse (2008) indicated that the production costs of contract farmers were less than those of non-contract farmers in the production of the same crops.

Many studies have shown that the income of farmers has increased from the use of the CF systems. According to Singh (2005b), farmers had more reliable incomes from contracting. Moreover, Minot (2007) indicated that the CF facilitated the integration of small farmers into commercial agriculture leading to income growth and poverty reduction. Sriboonchitta and Wiboonpoongse (2008) also found that 74% of all samples who participated in the potatoes CF could increase their income. Tongchure and Hoang (2013) showed that the main opportunity from a CF is the promise of higher incomes. Furthermore, Wang et al. (2014) concluded that CF enhanced income and welfare, and reduced the poverty levels of contract farmers. CF is an effective way to improve the quality of life of farmers, although there is much disagreement on its advantageous points.

Figure 2.11: Sources of fertilizers and insecticides for contract farmers



Source: Adapted from Ekasingh et al. (2014) and from field survey (2014)

From many previous studies, whatever type of CF systems is regarded as the important form of companies which apply to produce several agricultural commodities. The contract farmers have some impacts from the CF systems in both positive and negative aspects. Certainly, they have secured price and market for their products, while negative impacts include high cost of inputs. Farmers were taking advantage of the company, especially agricultural inputs. It may influence their decision to participate in a CF system. Moreover, price fluctuation and other risk aspects such as low yield and natural disaster have influenced farmers' production and income. These issues may lead to the failure of production through the CF systems that is farmers have more debt. Nevertheless, it also depends on farm management and habit of each farmer.

2.4 Behavior, attitude and preferences of consumers

Consumers pay to goods and services produced, which is the last person in chain of distribution. They will purchase products according to their needs, preferences and buying power. Consumers' changeable demand for food is an important element in the formulation of various agricultural and food policies. Food choices by consumers influence the types of

crops that farmers grow, the prices farmers receive, and the way in which various crops are transformed into food products (United States Department of Agriculture Foreign Agricultural Service, 2016b). Without consumer demand, producers would lack one of the key motivations to produce and to sell to consumers. Many factors have a strong impact on food consumption of them such as taste, price, convenience and nutrition. Their consumption of higher-value food products has risen in recent years due to more incomes. While changes in income has affected consumption patterns of consumers, changing their behavior, lifestyle, and attitude toward food preferences are also an important driver for their food consumption (Jones and Sheats, 2016).

2.4.1 Rice consumption behavior of consumers

Consumer behavior is a complex, dynamic, multidimensional process, and all marketing decisions are based on the assumption of consumer behavior. Kotler and Armstrong (2012) mentioned that consumer behavior refers to purchasing goods and services for personal consumption, which may depend on four main factors: cultural, social, personal and psychological factors. Chamberlain et al. (2013) and Feldmann and Hamm (2015) also pointed out that the consumers' personal characteristics, including age and income had varying impact on their purchasing behaviors. Azabagaoglu and Gaytancioglu (2009) and Musa et al. (2011) studied the purchasing behavior of consumers based on the following aspects: reasons for the selection of the kinds of product (attributes of product), location of purchase, frequency of purchasing product, and quantity of product purchased. In addition, consumers' purchasing power and the price of products were the economic factors for predicting consumer behaviors (Jisana, 2014). Moreover, Ibitoye et al. (2014) indicated that findings from study on the consumer behavior would help the parties involved understand the underlying pattern of consumers' choices towards purchasing products.

There are many studies regarding consumer behavior for rice consumption. Musa et al. (2011) found that, in Malaysia the majority of respondents (68%) preferred to purchase only one pack (5 kg) when they purchased rice. Moreover, they purchased rice from supermarkets

rather than the mini markets and retailers, because the location of supermarkets was near their homes and had various kinds of products. In addition, more than half of respondents consumed rice once a day, normally during lunch hour. This implied that there was a decreasing trend in rice consumption in Malaysia.

In accordance with Sricham et al. (2014), Thai consumers were more willing to spend for premium organic rice although its selling price was 30% more expensive than regular one, because they were more health concerned. In addition, Kongsom and Kongsom (2016) found that Thai consumers purchased organic rice once to twice a month at the supermarkets and green shops, which bought approximately 200 to 400 THB each time. The main reason for buying organic products were safety and free chemicals. The findings of Suwannaporn and Linnemann (2008) indicated that jasmine rice from Thailand had the potential to be a good export product. However, understanding of its market and consumer behavior were needed to target potential consumers in the best possible way.

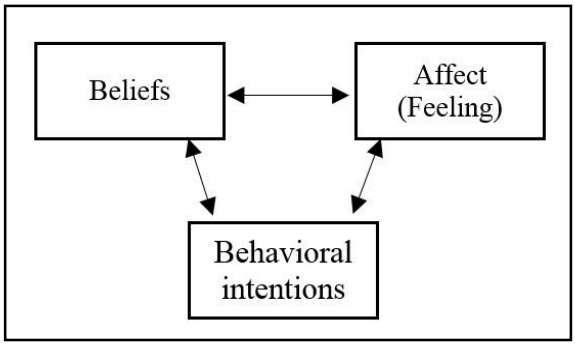
Studying consumer behavior is based on consumer buying behavior. It is a behavior that is expressed by the people in planning, purchasing, using products and services. The buying decision of the individual consumer is different in each person because they have unlike desires and needs. Although the consumer behavior is difficult to predict, but studying the trends of consumer behavior is a tool to achieve objectives and target of marketing. Moreover, understanding the consumer behavior assists in knowing real demand natures of consumers. Therefore, investigating consumer behavior on purchasing and using goods or services is essential.

2.4.2 Consumer attitudes towards rice consumption

Consumer attitude simplifies as a composite of a consumer's beliefs, feelings, and behavioral intentions toward some object within the context of marketing, as shown in Figure 2.12. A consumer can hold negative or positive beliefs or feelings toward a product or service. A

behavioral intention is defined by the consumer's belief or feeling regarding the product or service (Perner, 2010).

Figure 2.12: Components of consumer attitude



Source: Perner (2010)

Moreover, attitudes are reflected to customers' steadily favorable or unfavorable assessments, feelings, and inclinations towards object or idea (Akbar and James, 2014). An attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor or like or dislike an object and person (Jaroenwanit and Kantatasiri, 2014). Furthermore, consumers' attitudes have also impacted their behavior in terms of willingness to pay or purchase products and final decision in the consumer buying behavior (Aygen, 2012; Basha et al., 2015). Consumer attitudes were examined in many studies on local products. The most frequently named attitudes that result in local product purchases were related to product quality (freshness and taste), consumers' personal health, food safety, care for the environment and support of the local economy (Feldmann and Hamm, 2015).

Regarding consumer attitudes towards rice consumption, Supakornchuwong and Suwannaporn (2012) indicated that rice was rated more positively than potatoes and pasta for almost every attitude of consumers. Consumers' intentions to increase rice consumption in the near future were significantly associated with perceptions regarding four attributes of rice: good taste, good quality, low calorie and specialty. Alfred and Adekayode (2014) showed unfavorable consumers' attitudes towards imported rice. Some consumers agreed

that local rice tastes and cooks better than the imported rice. The findings of Jaroenwanit and Kantatasiri (2014) mentioned that Thai consumers had a positive attitude towards Hommali rice (jasmine rice), because of its good flavor and smell. Moreover, they tended to buy such rice and would recommend this rice to other people.

Several studies indicated that the attitudes of consumers have influenced their purchasing decisions. Sometimes they may have a conflict between their attitude and expressions due to social influence, ability to spend on each person, and so on. Measuring consumer attitudes is rather difficult. However, many previous findings show that attitudes play an important role because it guides consumers' thoughts, feeling and behavior as well. When deciding on his/her purchase, the consumer will buy the product which is his/her favorite one. Therefore it is very important for parties involved to know the attitudes of consumers.

2.4.3 Consumer preferences of rice consumption

According to Azabagaoglu and Gaytancioglu (2009), consumers' preference analysis towards attributes of products' different varieties was especially an interesting issue in the field of marketing. It can be used to predict consumer acceptability for product in the market. Moreover, Feldmann and Hamm (2015) mentioned that trends for the popularity of a product or disapproval of another product can be obtained from the results of consumers' preference evaluation. Therefore, the analyzing consumer preference is a set of assumptions that determines whether consumers have a preference for one good over the other. Ghose and Lowengart (2013) suggested that businessmen could get a better view for their business from understanding consumers' preferences and choices.

In studies regarding rice consumption preferences of consumers, Suwannaporn and Linnemann (2008) mentioned that rice preference is usually spread through the migration, colonization, and ethnic cuisine. Normally, Chinese and Taiwanese consumers eat and prefer short grain, but are willing to switch sometimes to change taste. Currently, they have accepted jasmine rice from Thailand. In fact, consumers make their preference on specific goods and

services that give them maximum level of utility. Improving on the quality of rice such as white colored grain, fragrance and taste will improve consumer's acceptability and encourage rice production in country (Abbeam, et al., 2014). Tomlins et al. (2005) pointed out that a country is a multi-ethnic society, developing or improving a rice product is difficult because of various consumer preferences. However, prediction of consumer acceptability from rice attributes will be determined.

Attributes of rice are also very important to consumer preferences. Musa et al. (2011) specified that the rice attributes have become the main reasons and normally used to estimate rice quality and taste. The consumers (30.6%) would likely to buy a particular attribute of rice largely due to its flavor of cooking. Price was also becoming the important factor for consumers (19.7%) to concern during purchasing rice. Anang et al. (2011) found that the attributes that define the quality of rice most preferred by consumers were taste, cooking quality, cooking time and aroma. The attributes least preferred by consumers were price, impurities and the source of rice. Moreover, Farah et al. (2011) explained that the most important attributes affecting consumer purchasing decisions for Basmati rice were quality and texture after cooked (87.7% and 84.2%, respectively).

Regarding consumer preferences of imported and local rice, Azabagaoglu and Gaytancioglu (2009) defined that the palatability, flavor, and suitable price were some reasons for imported rice consumption. However, consumers favored more domestic rice than imported rice, if its attributes are similar to imported rice and its price is cheaper than imported rice. The findings of Abbeam et al. (2014) presented that the taste of local rice was a key factor for consumer preferences. Moreover, the majority of the consumers (70%) preferred to purchase local white rice in small packs over the imported rice due to its cheaper price and easily available at retail outlets. On the other hand, some consumers (13%) bough an imported rice due to its quality (Musa et al., 2011). Peterson and Yoshida (2004) also defined that consumers preferred the flavor of imported rice more than any other reasons. Suwannaporn and Linnemann (2008) specified that country of origin was frequently

mentioned as an important factor for their rice consumption preference such as jasmine rice of Thailand, Japanese rice of Japan, India/ Pakistan's Basmati rice and Risotto rice with Italy.

According to the findings of previous studies, consumer preference is a very essential factor in marketing management. The preference of consumers on products can help the marketers to produce the desirable characteristics of product to markets. Purchasing goods does not only rely on a consumer's likes or dislikes, but also depends on income of consumers and price of products. In terms of rice product, the consumers prefer different physical appearances according to their choice such as cooked rice texture, taste and fragrance. There are many factors involved with consumers' preference evaluation such as an individual taste, diet culture, product price and income conditions of consumers. However, study on consumers' preference of rice product at that time will reflect the consumer acceptability for rice product in the market and may affect the farmers' rice cultivation, especially rice for specialty market which farmers are still worried about its market.

2.5 Conceptual framework

The conceptual framework of this dissertation shows in Figure 2.13. The main purpose of this study was to investigate the benefits of Thai farmers from planting alternative rice. 'Benefits' in this dissertation means farmers obtained the advantages from current production and marketing of Thailand's Japonica rice.

According to the changes of rice production and marketing structures in Thailand, the alternative rice cultivation has become a good way for farmers to improve their income. Japonica rice in the North, especially Chiang Rai Province was selected as alternative rice for studying because this province is the most suitable temperature for farming Japonica rice. This study mainly focuses on both Japonica rice production and marketing sides. The production part would be analyzed in the Chapter 4 and 5. With regard to the marketing section would display in the Chapter 6 and 7.

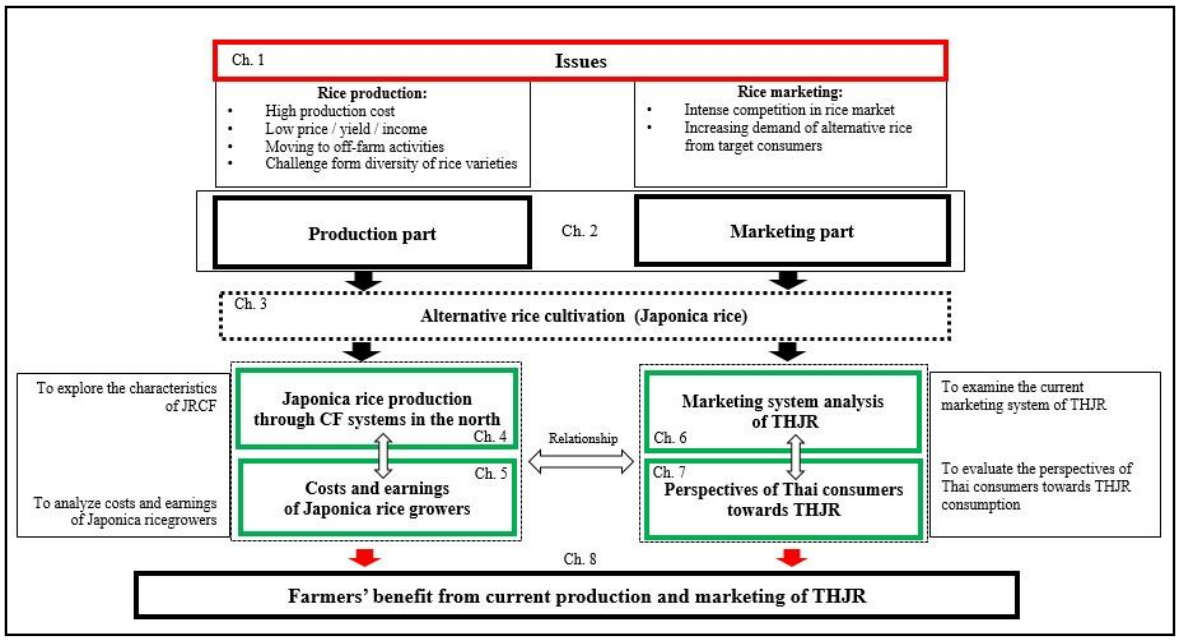
To approach the purpose, this dissertation gave the specific objectives out in four aspects according to Chapter 4 to 7. Chapter 4 aims to explore the currently prevailing CF systems of Japonica rice in the North. This chapter principally studies the model of JRCF and management in the systems, advantages and disadvantages of Japonica rice production, and important roles of parties involved in the production. These results were derived from interviews with rice millers, Japonica rice growers and CRI officers in Chiang Rai Province.

Then, Japonica rice growers, including contract farmers and collectors were also interviewed regarding the earning after participated in systems of JRCF, shown in Chapter 5. This chapter would analyze production costs and earnings of growers, effect of factors on their economic structure. Moreover, it shows the comparison between economic characteristics of Japonica rice and glutinous rice growers. 'Earnings' in this dissertation means 'income' of farmers deducted from their 'production cost'. Farmers obtained 'income' from yield of paddy multiplied contract price.

After the growers harvested Japonica rice and sold paddy to their particular rice mill, the millers would mill paddy, and then distribute milled Japonica rice to market, as shown in Chapter 6. This chapter mainly focuses on the current marketing system of THJR in the domestic market. Rice millers are the key party in both paddy and milled Japonica rice markets. Therefore, rice millers in the study area were interviewed to collect data. However, other parties involved comprising distributors, retailers and the owners/managers of Japanese restaurants also were interviewed in-depth by the research team.

In addition, Thai consumers in Bangkok were interviewed in Japonica rice marketing side, shown in Chapter 7. This chapter would expose their consumption behavior of Japanese cuisine, their preference for different Japonica rice choices and their attitudes towards THJR consumption. Finally, we could investigate the benefits of Thai farmers from planting THJR which is the main purpose of this study.

Figure 2.13: Conceptual framework



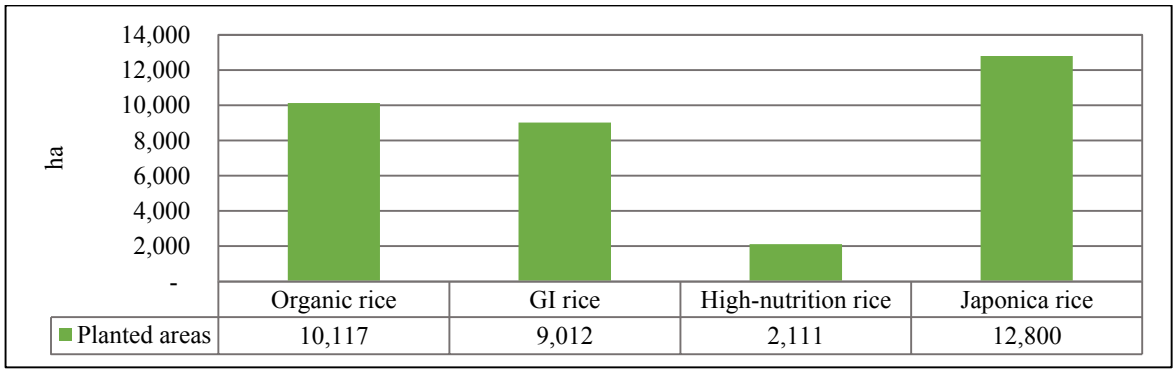
Chapter 3 Methodology

This chapter describes the details of the reasons for selecting Japonica rice, study areas and respondents, survey procedure, data collection and data analysis tools of this study as follow:

3.1 The reasons for selecting Japonica rice

Based on the changes of rice production and marketing structures in Thailand, as has already been mentioned in Chapter 2, the cultivation of alternative rice is one effective tool to improve farmers' livelihood, and expand specialty rice market. Although farmers have a lot of choices of crops to plant in their farmland, rice cultivation is a main income source and skill for them. Farmers are encouraged to cultivate many alternative rice groups, such as organic rice, Geographical Indications (GI) rice, high-nutrition rice and Japonica rice, as shown in Figure 3.1, by both government and private sectors. Each variety can be well grown depending on a suitable area. Unfortunately, no statistical data show the areas of paddy field cultivated for these alternative rice and the number of farmers who planted these rice groups. However, Japonica rice planted areas have increased approximately 3.2 folds from last ten years (United States Department of Agriculture Foreign Agricultural Service, 2004; CRI, 2014).

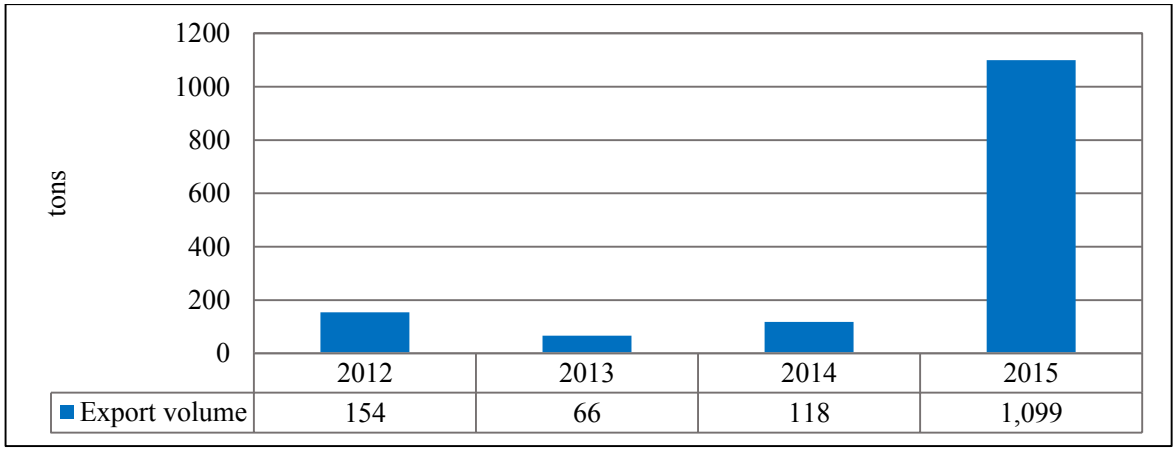
Figure 3.1: The estimated planted areas of alternative rice categories in 2014



Source: Rice Department (2014a) and CRI (2014)

Japonica rice was selected as a case study for alternative rice of Thai farmers, especially in the North. Only this part of the country, especially Chiang Rai Province is considered as a suitable area for planting Thailand's Japonica rice (THJR). DOA1 and DOA2 Japonica rice varieties have been experimented and developed for over 50 years by researchers of the Chiang Rai Rice Research Center (CRI) of the Rice Department. They researched the peculiarity of Japonica rice and explored its appropriate production technology, which would be adapted to environments of Thai farms and satisfied with fitted into domestic market requirements. Since last 30 years, these Japonica rice varieties have been produced through the CF systems managed by companies involving rice business. The demand for Japonica rice in the domestic market is relatively high, considering from the statistical data of increased Japanese restaurants in Thailand. In 2015, Japanese restaurants amounted 2,364 which increased approximately 12% compared to 2014 (JRO, 2015). Not only the needs of domestic market, but also the foreign market needs Japonica rice of Thailand, as shown in Figure 3.2. In 2015, the important importers of THJR were Singapore, China, Indonesia and Australia.

Figure 3.2: Exports of Thailand's Japonica rice



Source: ICT and the Customs Department (2015)

3.2 Study areas and respondents

Chiang Rai Province and Bangkok were selected as the study areas of this research, which are located in the northern and central parts of Thailand, respectively. The location of these study areas are indicated in Figure 3.3. The reasons for selecting each area as the study areas were described in depth as follows.

Figure 3.3: Map of two study areas in Thailand

Source: Google Map (8th August, 2016)

3.2.1 Study area in Chiang Rai Province

3.2.1.1 Study area background and information

Chiang Rai Province is located on the top of the country, which is far from Bangkok approximately 785 kilometers. This province is the sixth biggest north with approximately 11,678.4 square kilometers land area. Its average temperature is around 24 degrees Celsius, with an average high temperature of 30.7 degrees Celsius in April. The average low temperature is 18.6 degrees Celsius in January. The average relative humidity throughout the year is 76.1%, and average rainfall is approximately 1,768 millimeters a year. There are three periods of climate, as shown in Table 3.1.

Table 3.1: Seasons in Chiang Rai Province

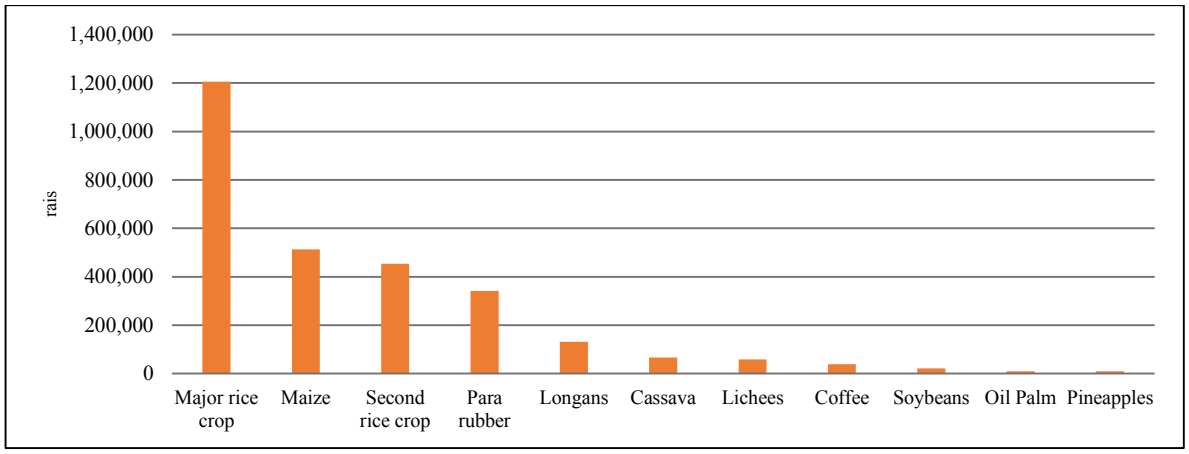
Season	Period
Summer	Middle of February - Middle of May
Rainy	Middle of May - Middle of October
Winter	November to February

Source: Thai Meteorological Department (2016)

At present, Chiang Rai Province is a center of economy, trade and tourism in the Mekong River Region, which has improved transportation routes leading to neighboring countries (Chiang Rai Governor Office, 2016). Its area is mostly planted crops such as rice, maize, soybean, cassava, longans, lichees, and coffee. In 2013, 81.1% of the total households in this province were registered as the land tenure. The most size of land holdings was between 10-19 rais/household (1.6-3.04 ha/household). About 53% of the total households cultivated agricultural products in their own land, and 30% of them operated under non-owned land (Chiang Rai Province Statistical Office, 2013).

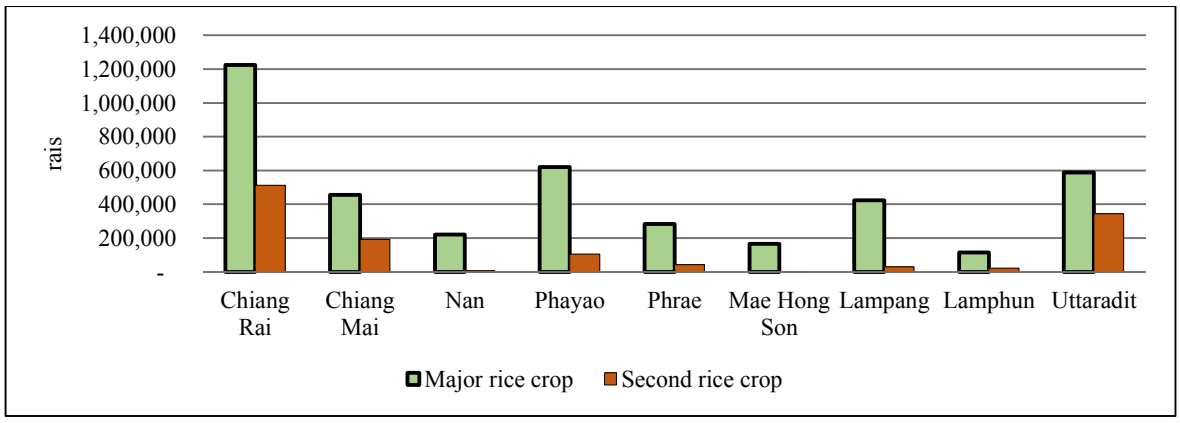
Rice is the main crop for farmers in Chiang Rai Province, as Figure 3.4 indicates. Farmers have cultivated rice in traditional farming styles with so much synthetic fertilizers and pesticides (Laosunthara et al., 2015). Although the rice planted areas declined from 1.87 million rais in 2012 to 1.66 million rais in 2015 (1 rai = 0.16 ha) (Office of Agricultural Economics, 2015a), they have planted rice more than other upper northern provinces, shown in Figure 3.5.

Figure 3.4: Crop planted areas in Chiang Rai Province in 2015



Source: Office of Agricultural Economics (2015a)

Figure 3.5: Rice planted areas of the upper northern provinces in 2015



Source: Office of Agricultural Economics (2015a)

Moreover, farmers in Chiang Rai Province have so far implemented a CF directly with companies dealing such as asparagus, bush beans, soybeans, potato, and onion (Sriboonchitta and Wiboonpoongse, 2008). The average volume of bush beans, potato and onion products were 1,215 kg/rai, 2,548 kg/rai and 3,371 kg/rai, respectively (1 rai = 0.16 ha) which these products have expanded in many areas of the province (Palidta, 2014). Moreover, organic rice, especially riceberry that were developed varieties by crossing between Hom Nil rice and Khao Dawk Mali 105, has also been expanded through the CF systems in the province and other province (Kulreangsub, 2015). As a result, the farmers have various experiences and skills of alternative rice in the CF systems.

Meanwhile, rice mills and government sector have encouraged farmers, especially in Chiang Rai Province, to cultivate Japonica rice varieties. Irrigated areas in this province such as the Phan, Mueang Chiang Rai, Mae Chan, Mae Sai, Mae Suai, Wiang Pa Pao and Wiang Chiang Rung districts are suitable for Japonica rice cultivation. Moreover, this province is ranked as the top Japonica rice producer in Thailand due to suitable temperature with 18-25 degrees Celsius on average. In addition, about 62% of the total Japonica rice mills in Thailand, including a rice mill dealing in the largest volume of Japonica rice, are located in this province (CRI, 2014). Furthermore, the CRI has continuously experimented and developed Japonica rice varieties. Therefore, Chiang Rai Province was selected as a case study area.

3.2.1.2 Respondents in study area

In 2014, 13 entrepreneurs or rice millers in Thailand encouraged farmers to plant Japonica rice through the CF systems. Ten owners of rice mills participated in the membership of the Association of Japonica Rice Producers in Thailand, and three non-member entrepreneurs were the processors and exporters of Japonica rice. They were the large-scale private companies that had various business branches across the country with growing sales volumes. Only eight rice mills from all were located in Chiang Rai Province (CRI, 2014).

Five rice mills in Chiang Rai Province, accounting for 62.5% of all rice mills were selected as the respondents by using the purposive sampling. Their assumed names for this study were RM1, RM2, RM3, RM4 and RM5. RM2 and RM3 only dealt in Japonica rice, while the other rice mills dealt in both Japonica rice and Thai rice. The selected rice mills are located in the Mueang Chiang Rai (RM1 and RM5), Mae Suai (RM2 and RM4) and Phan (RM3) districts. The capacity of these rice mills are approximately 60-80 tons a day, which are categorized as a large-scale one. Rice millers are crucial for this study, because they have determined a characteristic and how to manage the systems of Japonica rice contract farming (JRCF). Moreover, they are the suppliers of milled Japonica rice to distribute to market. All respondents were interviewed in-depth by the research team at their rice mill factories.

Only the owners of RM1 and RM2 were selected to interview in-depth for comparing the characteristics of JRCF. RM1 was selected because it was a new rice mill that has encouraged farmers to cultivate Japonica rice. Meanwhile, RM2 was the first rice mill in Chiang Rai Province that has engaged in Japonica rice business and has encouraged farmers to cultivate Japonica rice for a long time. A deep analysis on both RM1 and RM2 may show differences as regards to model, management and advantages and disadvantages of JRCF systems.

The millers of RM1 and RM2 had a contract with their Japonica rice farmers in many areas. Wiang Pa Pao district is an area where they had contracted with their farmers. This district was a new area for RM1's business. It had a contract with 150 farmers whose planted areas were approximately 500 rais (1 rai = 0.16 ha). Moreover, RM2 had a contract with farmers in this district to cultivate Japonica rice for a long time. It established a business contract with 400 farmers in this district. The total areas of paddy fields were approximately 3,000 rais (1 rai = 0.16 ha). Therefore, Japonica rice growers who included contract farmers and collectors in Wiang Pa Pao district were selected as the respondents. Only 36 representatives were selected by using purposive sampling to interview at their leader or collector house, because they cultivated Japonica rice by using similar methods. They were interviewed by using structured questionnaires regarding Japonica rice production, including its cost and earning under CF systems. Moreover, Japonica rice varieties were developed by the CRI. Therefore,

three CRI officers were also selected for in-depth interviews by the research team. The total respondents in Chiang Rai Province presents in the Table 3.2.

Table 3.2: The total respondents in Chiang Rai Province

Respondents	Number (n)
Owners of rice mills	5
Contract farmers	30
Collectors	6
CRI officers	3

Source: Field survey (2014 and 2015)

3.2.2 Study area in Bangkok

3.2.2.1 Study area background and information

Bangkok is the capital and most populous city of Thailand. Its ranking is the 69th among the 77 provinces, with approximately 1,568.7 square kilometers land area, covered with 50 districts. It is the economic center of Thailand, and the heart of the country's investment and development. Moreover, it is an international hub for transportation and health care, and has emerged as a regional center for the arts, fashion and entertainment. In 2014, according to the civil registration, Bangkok's population was approximately 5.69 million or 8.74% of the total country's population, being larger than any other provinces. It has increased continuously, as shown in Table 3.3 (Strategy and Evaluation Department, 2014). In fact, the population in Bangkok had over 10 million comprising the civil registration, latent population without registered residents, and foreigners.

The average monthly income in Bangkok was approximately 49,191 THB per household or 16,397 THB per capita of 2013. Meanwhile, their average monthly expenditure was approximately 35,024 THB per household or 11,674 THB per capita. Both averages were

more than the averages of other provinces, and increased continuously (National Statistic Office, 2013b).

Table 3.3: The registered residents in Bangkok during the period from 2012-2016

Areas	Population (million)				
	2012	**2013**	**2014**	**2015**	**2016**
Thailand	64.46	64.79	65.12	65.68	66.20
Bangkok	5.67	5.69	5.70	5.72	5.74

Source: Strategy and Evaluation Department (2014)

In 2015, there was approximately 19.59 million of foreign tourists in Bangkok, which increased in number by approximately 15%, compared to 2014 (Department of Tourism, 2015). Different cultures of people in Bangkok influence many businesses, particularly food businesses including chain restaurants that are rapidly growing with stiff competition. The number of eating places is increasing, especially restaurant of legal persons in Bangkok. It had 4,642 stores which accounted for 45% of the total stores in Thailand (Department of Business Development, 2015). Japanese restaurants are also widely extended there. In 2015, there were approximately 1,579 stores, which increased in number by approximately 9.42%, compared to 2014 (JRO, 2015).

Based on the diversity of society, culture, economic, lifestyle, food consumption, and increasing population and Japanese restaurants, Bangkok was selected to interview Thai consumers in terms of Japanese cuisine consumption, including Japonica rice. Moreover, some parties involved in the marketing chain of Japonica rice in the city were also surveyed in this study.

3.2.2.2 Respondents in study area

Japanese cuisine consumers in Thailand can be categorized into three groups based on spending preferences. The first group is comprised of the high-end consumers who spend more than 400 THB/dish. The second group is the middle class consumers who preferred dishes between 100-400 THB, and the last one is the mass consumers who paid less than 100 THB/dish (Positioningmag, 2011). As such, any consumers could easily access Japanese cuisine according to their price preferences. In fact, the mass produced type of Japanese restaurants popular among Thai consumers, because of their price-setting being at low to medium levels. In Bangkok, 385 Thai consumers were selected as the respondents by using the purposive sampling method. The structured questionnaires were used to collect the information on consumers' socio-economic background, their consumption behavior of Japanese cuisine, their preference for different Japonica rice choices, and their attitudes towards THJR consumption.

Based on evaluating their preference for different Japonica rice choices, these choices were controlled heat, smell, flavor and soft sticky texture of cooked Japonica rice. These conditions were the limitations of choosing the optimal places for interviewing the respondents. Not only Thai consumers, but also the mangers of Japanese restaurants, distributors and retailers in Bangkok involving in Japonica rice marketing process were included in this study, as shown in Table 3.4. They were interviewed by using structured questionnaires.

Table 3.4: The total respondents in Bangkok

Respondents	Number (n)
Distributors	4
Retailers	3
Mangers of Japanese restaurants	4
Thai consumers	385

Source: Field survey (2015)

3.3 Survey procedure

Data collection was conducted during two periods: October in 2014 and October in 2015. The data used in this research were gathered from interviews that were conducted by using structured questionnaires. These instruments consisted of qualitative and quantitative questions including open and close questions. The questionnaires concerned both Japonica rice production and marketing parts (see the Appendix).

Section of Japonica rice production through CF systems in Chapter 4 and 5, the rice millers, contract farmers, collectors and CRI officers in Chiang Rai Province were target respondents. The survey was aimed to investigate Japonica rice production which has produced through the CF systems. This survey focused on economic characteristics of Japonica rice growers, consisting of both contract farmers and collectors. The roles of parties involved in a CF system, and its advantages and disadvantages were also identified in this study.

The respondents in Bangkok were Thai consumers, distributors, retailers and managers of Japanese restaurants. They were interviewed in Japonica rice marketing section which presented in Chapter 6 and 7. Moreover, rice millers were interviewed in Japonica rice marketing section, too. The survey was proposed to investigate the domestic market of paddy and milled Japonica rice from rice millers in Chiang Rai Province to consumers in Bangkok. Thai consumers were surveyed involving their Japanese cuisine consumption behaviors, their preference on Japonica rice choices, and their attitude toward THJR consumption.

3.4 Data collection

Data collection of this dissertation was grouped into two main types of data: primary and secondary data.

3.4.1 Primary data

In order to obtain both quantitative and qualitative data of this study, in-depth and face-to-face interviews by using structured questionnaires were implemented for collecting data. The purposive sampling method was adopted. Data were collected from 36 Japonica rice growers, 5 rice millers, 3 CRI officers in Chiang Rai province, and 4 distributors, 3 retailers, 4 mangers of Japanese restaurants and 385 Thai consumers in Bangkok, (see pictures in the Appendix).

3.4.2 Secondary data

Not only were those primary data obtained from the field survey but the secondary data were also obtained from statistical data, published books, scientific journals, official reports and books of agricultural organizations in Thailand such as the Ministry of Agriculture and Cooperatives, Department of Agriculture, Rice Department, Chiang Rai Rice Research Center, Office of Agricultural Economics and other resources.

3.5 Data analysis tools

The findings of this research were analyzed by using the quantitative and qualitative data analysis methods. The quantitative analysis includes descriptive and inferential statistics. Descriptive statistics in this study included frequency distribution, percentages (%), mean or average, and Standard Deviation (S.D.). They were applied to analyze the socio economics conditions of respondents (used in Chapter 4-7), advantages and disadvantages of CF systems (used in Chapter 4), economic characteristics of Japonica rice growers (used in Chapter 5), the marketing obstacles of THJR (used in Chapter 6), Japanese cuisine consumption behaviors of respondents, their attitudes towards THJR consumption and their preferences of Japonica rice choices (used in Chapter 7).

Inferential statistics in this study consisted of contingency table (cross tabulation) and Chi-square analysis. The significance of P-values level is 0.05. If the probability associated with

the Chi-square statistics is 0.05 or less, then it can refer that the independent variable can be used to predict scores on the dependent variable. These statistics were applied to analyze the factor that might have affected the economic characteristics of Japonica rice growers in Chapter 5.

With regard to the qualitative analysis, it is the conclusion from the data which did not used statistic. It is used to gain an understanding of underlying reasons, opinions and motivations, by interviewing the target groups. The sample size for collecting data is typically small. In this study, it was applied to analyze the characteristics of Japonica rice production, role of parties involved in the CF systems (used in Chapter 4) and Japonica rice marketing systems in Chapter 6.

Chapter 4 Japonica rice production through contract farming systems in the northern Thailand

At present, Thai farmers have changed rice planting in their farmlands to an alternative rice. Some have divided their lands to plant both an ordinary rice and alternative rice to increase income from rice farming. In North, particularly Chiang Rai Province, Japonica rice is a variety of alternative rice. It is noteworthy that such alternative rice is mainly produced through CF systems. This chapter will study on the characteristics of Japonica rice production. Few studies have been conducted to survey the current situation and details of Japonica rice contract farming (JRCF).

4.1 Introduction

Since the expansion of modern rice varieties (MVs) in farmlands (1960s), Thai farmers have cultivated several Indica rice varieties (long grain rice) such as RD1, RD7, RD11, Suphan Buri 60, Pathum Thani 1, Chai Nat 1, and so on (Isvilanonda, 2010). These varieties were improved to cultivate in farmers' fields with high yield and high response to fertilizers. Moreover, farmers in irrigated areas can grow rice at least two crops a year, thereby bring more income. However, it depends on the variety that farmers select, and the timing of cultivation in each rice variety (Ruensuk and Binahamad, 2014).

Farmers in the whole country decreased rice cultivation from 81.4 million rais (1 rai = 0.16 ha) in 2011 to 64.3 million rais in 2015, or decreasing 26.6%. Moreover, their paddy yield dropped from 510 kg/rai in 2011 to 456 kg/rai in 2015 (Office of Agricultural Economics, 2015a). The number of rice planted areas reduced because of the conditions of the weather (less rainfall, flood, drought), the fall of market price, and the abrogation of the Rice Pledging Scheme of government in 2013 (the Scheme started in 2011). In addition, the lower level of rainfall and the spread of insects were a serious cause of the decreasing paddy yield (Office of Agricultural Economics, 2015a). Although farmers decreased rice farming, Thai farmers have more experiences and skills for rice cultivation, and rice is still a main crop and an

important income source of their household. As reported by the National Statistical Office (2013a), more than haft of the total agricultural areas was utilized for rice production.

The important problems of rice planting for farmers such as lower paddy price and yield, and high cost of rice production still effect their incomes. As a result, a number of farmers, especially young generation, may move to off-farm activities in industrial sector. In consonance with the survey of the Office of Agricultural Economics (2015b), income of households' off-farm activities increased from 39.4% in 2009 to 47.6% in 2014. Alternatively, they may change to grow other crops in their fields such as maize, soybean, sugar cane and cassava. Returning rice cultivation of farmers, parties involved have to increase an incentive such as price at farm gate and a good technology for planting rice to reduce production cost and to increase yield of paddy.

Currently, the government sector, particularly the Rice Department has promoted farmers to reduce the production cost such as using rice seed with a good quality and reducing the use of fertilizers and agricultural chemicals (Rice Department, 2013b). In case they cannot lower their cost, the government, particularly the Ministry of Agriculture and Cooperatives and the Ministry of Commerce, and private sectors encourages them to cultivate an alternative rice in farmlands. The farmers may make more benefits from its farming due to high price and yield. According to the Rice Department's classification, alternative rice group can be categorized into four groups; organic rice, GI rice, high-nutrition rice, and Japonica rice groups. The cultivation of each alternative rice is depended on a suitable area. The aims of such encouragement are to improve income of farmers, and to enhance the competitiveness by adding the diversity of rice varieties in the market (Rice Department, 2014b).

From alternative rice categories, Japonica rice may be a good way for farmers, especially in the North. From 2004 to 2014, Japonica rice planted areas in Thailand had increased 3.2 times, according to the reports of the United States Department of Agriculture Foreign Agricultural Service (2004) and the CRI (2014). In 2014, the total of Japonica rice planted areas in the whole country was approximately 80,000 rais (1 rai = 0.16 ha) in which 6,000

contract farmers involved. There was approximately 60,000 tons of total yields of paddy, and the volume of milled Japonica rice was 36,000 tons (CRI, 2014). During the period between 2014 and 2015, the number of Japanese restaurants in Thailand increased approximately 12.0% (JRO, 2015). These figures indicate that Japonica rice is still needed for the domestic market.

In the 1960s, Japonica rice of Thailand (shot grain rice) was developed the varieties by adopting from real Japanese rice varieties of Japan. Up to now, there are only two Japonica rice varieties comprising the DOA1 (from Sasanishiki strain) and DOA2 (from Akitakomachi strain) that are suitable for planting in the north (Warinrak, 2013). They resist to hot weather and are stronger than other Japonica rice varieties in the seed storage room of the CRI, which has collected 58 varieties of Japonica rice. Among them, DOA1 and DOA2 are similar in a high yield and good quality. They have a 750 kg/rai (1 rai = 0.16 ha) of average yield according to the CRI's report, which are more than ordinary rice with a 640 kg/rai of average yield in Chiang Rai Province (Office of Agricultural Economics, 2015a). A cropping duration of them is approximately 120 days (CRI, 2014).

In North, especially Chiang Rai Province, the government and private sectors have so far promoted farmers to grow Japonica rice in their farmlands under the CF systems. It has a high yield and contract price, and a climate in this province is suitable for cropping it. Normally, ordinary sticky rice such as RD6 and San-pah-tawng were cultivated in this province (Rice Department, 2013a). If farmers will plant Japonica rice to improve their income, it may be easily for them because they are familiar in rice cropping. Moreover, some of them have so far participated in the CF systems with companies to produce various agricultural commodities such as asparagus, bush beans, potato, onion, and organic rice. This implies that they have more experiences and familiarities in the CF systems.

Thailand's Japonica rice (THJR) is cultivated only through the CF systems. The contract farmers will receive the secure income, which a contractor (rice miller) sets up a certain purchase price for paddy (Warinrak, 2013). Of course, their income is depended on the

management in the CF system of each contract rice mill, and its appropriate production technology. In fact, many agricultural companies have adopted a CF system to produce various agricultural commodities in their businesses, which has the impacts on contract farmers in both positive and negative aspects. If it has the disadvantages more than advantages, farmers may not continue to participate in a CF system.

This chapter purposed to explore the currently prevailing CF systems of Japonica rice in the North. Specific objectives were to indicate the model of JRCF and management of each rice mill in the system, to examine important roles of parties involved in this production, and to identify the advantages and disadvantages of Japonica rice production.

4.2 Methodology

A study area of this research was Chiang Rai Province. It was selected as a study area for interviewing in-depth the parties involved because this province is outstanding in a Japonica rice production due to a proper climate. As a result, Japonica rice entrepreneur and the government sectors have promoted Japonica rice as an alternative rice for cropping in farmers' irrigated area such as the Phan, Mae Chan, Mae Suai and Wiang Pa Pao districts. The most Japonica rice entrepreneurs or rice mills (8 rice mills) in Thailand are located in this province. In addition, Japonica rice varieties are still continuously developed and experimented by staffs of the CRI.

As already been mentioned in Chapter 3, only RM1 and RM2 were selected as the respondents by using the purposive sampling method to compare the systems of JRCF. The both respondents may present differences regarding model and how to manage the CF system of Japonica rice. 17 contract farmers and 3 collectors of RM1, and 13 contract farmers and 3 collectors of RM2 were also selected as the respondents by using purposive sampling. Moreover, 3 CRI officers were interviewed in this study, too. In-depth and face-to-face interviews by using structured questionnaires were conducted for collecting data. The respondents were interviewed by the research team at each office, rice mill and house of

collector. The structured questionnaires were used to collect the information on the background of respondents, the model and management of CF system in both rice mills, role of parties involved in Japonica rice production, and advantage and disadvantage aspects of Japonica rice production. The data were arranged and analyzed by using qualitative analysis and descriptive statistical tools.

4.3 Results and Discussions

4.3.1 Socio-economic profile of respondents

Table 4.1 shows the profiles of RM1 and RM2 in 2014. They had experiences in Japonica rice production for 8 years (since 2006) and 18 years (since 1996), respectively. RM1 had business links with 12 collectors and 500 contract farmers. The planted areas of Japonica rice under contract of RM1 amounted approximately to 2,000 rais (1 rai = 0.16 ha) which were dispersed in many districts and nearby provinces such as Chiang Mai and Phayao. Meanwhile, RM2 dealt in with 34 collectors, 1,500 contract farmers, and their planted areas were approximately 10,000 rais, which also were dispersed in many districts and close provinces.

RM1 could produce milled Japonica rice approximately 2,000 tons a year or 5.5 tons a day, while RM2 could mill approximately 5,000 tons a year or 13.7 tons a day. The owner of RM1 distributed all milled Japonica rice to customers in the domestic market. Moreover, he also produced the processed products from rice bran and germ of Japonica rice in order to sell it to consumers. About 90.0% of all milled Japonica rice of RM2 was sold to buyers in the domestic market, and the remainder was directly sold to the Japanese restaurants in Chiang Rai Province and the nearby provinces. Both RM1 and RM2 would produce milled Japonica rice by following the purchase order of buyers.

Table 4.1: Profiles of two rice mills in Chiang Rai Province

Contents		Respondents	
		RM1	**RM2**
(1) Location	(district)	Mueang	Mae Suai
(2) Experience in Japonica rice production	(year)	8	18
(3) Capacity	(ton/day)	5.5	13.7
(4) Number of collector	(person)	12	34
(5) Number of contract farmer	(person)	500	1,500
(6) Planted area	(rai)	2,000	10,000

Note: 1 rai = 0.16 ha
Source: Field survey on October, 2014

Table 4.2 presents the profiles of six collectors in Wiang Pa Pao district composing of 3 collectors from RM1 and 3 collectors from RM2. In this study four males and two females were interviewed. Their average age was 58.5 years. The total of collectors attended primary school, and they had experience as Japonica rice collector for more than 4 years, with some having experiences of 8 to 18 years. The collectors have to purchase paddy from their contract farmers. Meanwhile, they also have to cultivate Japonica rice in order to understand all production steps and to give advice to their farmers correctly.

Table 4.2: Profiles of six collectors in Japonica rice contract farming

Contents		Respondents					
		RM1			**RM2**		
		1	**2**	**3**	**1**	**2**	**3**
(1) Gender		Male	Male	Male	Female	Female	Male
(2) Age	(year)	54	63	60	62	54	58
(3) Education		Primary	Primary	Primary	Primary	Primary	Primary
(4) Experience in collecting Japonica rice	(year)	8	5	4	18	8	10
(5) Experience with rice mill	(mill)	1	3	1	1	1	1
(6) Number of quota (a)	(rai)	120	117	98	150	60	250
(7) Number of contract farmer	(person)	12	22	13	15	5	61
(8) Ability of production ((a) x 750 kg/rai)	(kg)	90,000	87,750	73,500	112,500	45,000	187,500
(9) Commission fee	(THB/kg)	0.20	0.20	0.20	0.50	0.50	0.50

Note: Average yield of Japonica rice was 750 kg/rai (1 rai = 0.16 ha)
Source: Field survey on October, 2014

Almost all collectors were trusted by their rice miller and they relied on mutual respect. Therefore, the collectors had never changed their business link with a particular rice mill. Moreover, they were satisfied the commission fee, which obtained from rice mills. The fees of RM1 and RM2 were 0.20 THB/kg, and 0.50 THB/kg, respectively. Japonica rice production was under the allocation of cultivated areas. Rice miller would specify the quota of cultivated areas in each collector. In 2014, one collector of RM1 allocated the planted areas according to the number of quota 98-120 rais (1 rai = 0.16 ha), with 12-22 contract farmers. Meanwhile, one collector of RM2 allocated 60-250 rais (1 rai = 0.16 ha) of cultivated areas with 5-61contract farmers.

In Wiang Pa Pao district, 17 contract farmers producing RM1, and 13 farmers producing RM2 were selected for this study. Male farmers accounted for 66.7% of the total, and the remainder was female. About 73.0% of respondents was more than 50 years old, and their education level was primary school (86.7% of them). In addition, 63.3% of them cultivated Japonica rice in their whole paddy fields. Moreover, half of respondents had less than ten years of experience on Japonica rice cultivation. The representatives under RM2 had never established any business link with other rice mills, while 88.2 % of representatives in RM1 had sold Japonica rice to other rice mills before contract with RM1, as shown in Table 4.3. This means that the owner of RM1 might have a tactic in attraction for cultivation.

Table 4.3: Profiles of thirty contract farmers in Japonica rice contract farming systems

Contents			**Respondents**					
			RM1 (n=17)		**RM2 (n=13)**		**Total (n=30)**	
			n	**%**	**n**	**%**	**n**	**%**
(1) Gender		Male	14	82.4	6	46.2	20	66.7
		Female	3	17.6	7	53.8	10	33.3
(2) Age	(year)	41-45	2	11.8	1	7.7	3	10.0
		46-50	1	5.9	4	30.8	5	16.7
		51-55	6	35.3	6	46.2	12	40.0
		56-60	3	17.6	1	7.7	4	13.3
		More than 60	5	29.4	1	7.7	6	20.0
(3) Civil status		Single	0	0	0	0	0	0
		Married	17	100	13	100	30	100

Table 4.3: (continue)

Contents			Respondents					
			RM1 (n=17)		RM2 (n=13)		Total (n=30)	
			n	%	n	%	n	%
(4) Education		Less than primary school	0	0	1	7.7	1	3.3
		Primary school	16	94.1	10	77.0	26	86.7
		High school	1	5.9	2	15.3	3	10.0
(5) Experience in Japonica rice cultivation	(year)	1-10	9	52.9	6	46.2	15	50.0
		11-20	6	35.3	7	53.8	13	43.3
		21-30	1	5.9	0	0	1	3.3
		31-40	1	5.9	0	0	1	3.3
(6) Experience with rice mill	(mill)	1	2	11.8	13	100	15	50.0
		2	12	70.6	0	0	12	40.0
		3	3	17.6	0	0	3	10.0
(7) Japonica rice planted area	(rai)	1-5	6	35.3	1	7.7	7	23.4
		6-10	9	52.9	4	30.8	13	43.3
		11-15	2	11.8	8	61.5	10	33.3
(8) Total areas	(rai)	1-5	4	23.5	1	7.7	5	16.7
		6-10	10	58.8	3	23.1	13	43.3
		11-15	1	5.9	7	53.8	8	26.7
		16-20	1	5.9	2	15.4	3	10.0
		21-25	1	5.9	0	0	1	3.3

Source: Field survey on October, 2014

4.3.2 Model and management of Japonica rice contract farming

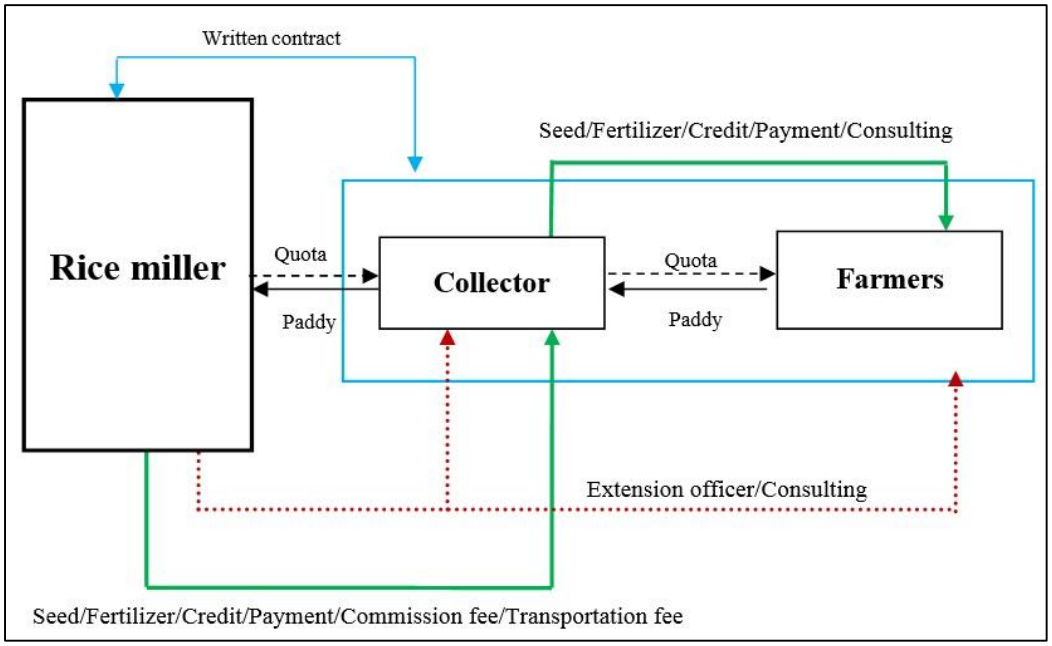
The system of JRCF was mainly an intermediary model; collectors have a key role standing between contract rice miller and farmers. It is noteworthy that RM1 and RM2 modified this basic model to become more-workable for their business operation. Under such a modified intermediary model, a buyer formally has a contract with a collector who has his own informal arrangements with farmers (Eaton, 2001).

Figure 4.1 presents the business operation regarding JRCF of RM1. This operation was based on a written contract with collectors and farmers in each group because RM1 owner had less experience with Japonica rice production than the owner of RM2. Therefore, the holder of RM1 had to develop a written contract in the CF system to build a confidence with his collectors and farmers. However, he did not force them to sign a contract. According to

findings of other scholars, both company and farmers signed a contract in advance in order to establish terms and conditions together. Of course, the company cannot force farmers to sign a contract (Putsyainunt et al., 2014). FAO (2012) also mentioned that farmers have to know the details of an agreement before contract, which contract company has to clearly explain the information in a contract. If farmers do not receive any notice from their company, it may become a cause of non-compliance with contract requirements (Kunthongjan, 2013).

The management of RM1 owner in JRCF system found that since RM1 is located about 90 km from Wiang Pa Pao district, he gave an additional 0.50 THB/kg transportation fee and charged 0.20 THB/kg commission fee for his collectors. Moreover, he paid to contract farmers according to the quality of paddy. The paddy price of RM1 varied according to season and humidity, such as 10 THB/kg for second rice season and 9 THB/kg for major rice crop with no more than 25% humidity, or 11.5 THB/kg for dry season and 10.5 THB/kg for wet season with less than 25% humidity and more than 900 kg/rai of paddy yield. These conditions were a good tactic in pricing of him. He set up higher contract prices to attract farmers to participate in Japonica rice cultivation, and to encourage farmers taking care their Japonica rice field more and more. As a result, the paddy yield increases and has a good quality.

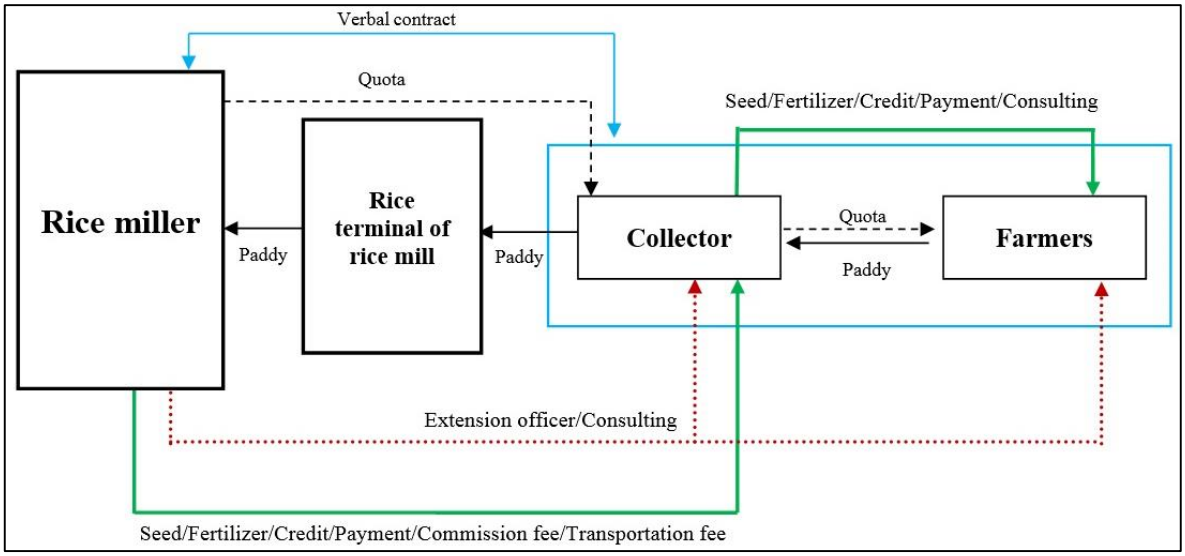
Figure 4.1: Model of Japonica rice contract farming of RM1



Source: Field survey on October, 2014

The owner of RM2 had a large number of contract Japonica rice farmers in Wiang Pa Pao district. Therefore, he has opened a rice terminals there. The CF of RM2 was based on a verbal contract, as shown in Figure 4.2. He relied on close relationship with his collectors and contract farmers. With more experience on Japonica rice production of him, he had a good relationship with his collectors and contract farmers, and gained the confidence from them. According to the study of Kunthongjan (2013), a written contract was disadvantageous for illiterate farmers. In addition, Bijman (2008) mentioned that many countries still use verbal agreements in a CF system which the parties relied on with mutual respect. A good relationship between farmers and company dealing, and between company and community influenced contract negotiation (Limnirankul et al., 2006).

Figure 4.2: Model of Japonica rice contract farming of RM2



Source: Field survey on October, 2014

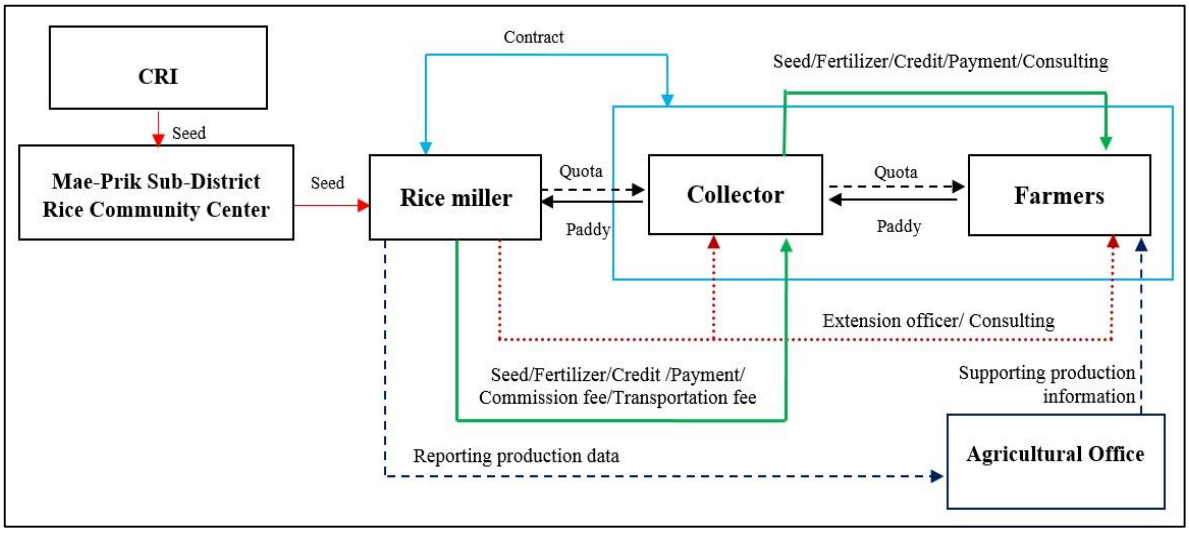
Moreover, the owner of RM2 managed the system of JRCF as follows; 0.10 THB/kg of transportation fee and 0.50 THB/kg of commission fee for collectors. His transportation fee was less than RM1 because he had a rice terminal near the paddy field. The commission fee was an incentive for those who wanted to be a contract collector. Moreover, he decided a fixed contract price, being 10 THB/kg for second rice and 9 THB/kg for major rice. Without any consideration of humidity, the rice miller, collectors and farmers made consensus on the market price.

With regards to pricing paddy of Japonica rice, both RM1 and RM2 set up higher purchase price of Japonica rice than the ordinary rice at 2 THB/kg; for example, a purchase price of ordinary rice such as RD6 price is 8 THB/kg while Japonica rice price is set 10 THB/kg of a contract price.

From the models of JRCF of both RM1 and RM2, their CF characteristics were not much different. However, each rice miller had the difference of management in the CF system. The

CF flows from rice miller to farmers by passing a collector of both rice mills can be combined as shown in Figure 4.3. In part of Japonica rice production, rice millers purchase Japonica rice seed from the CRI, and then they will distribute it to their collectors. Therefore, the CRI is the main producer of Japonica rice seed for rice mills. In addition, government sector such as the Agricultural Office in Chiang Rai Province needs to more involve in the production especially in terms of production data.

Figure 4.3: Flow of Japonica rice production under contract farming systems



Source: Field survey on October, 2014

4.3.3 Important roles of parties in Japonica rice production

The parties involved and their functions in systems of JRCF can be categorized into at least four groups as follows; rice miller, collector, contract farmer and state agency. Firstly, rice mill had multifarious functions such as extension service, provision of productive materials, financial support, and purchasing of rice at secured prices. The materials were provided by the rice millers like seeds, fertilizers and insecticides by without any interest charge of credit. Moreover, rice mills had the extension staffs who disseminate knowledge and consult for by the contract farmers. Such knowledge and advices comprise the production and maintenance

of Japonica rice, and techniques for cropping of plant. Package of productive material and credit was regarded as the most effective tool to manage a CF system (Putsyainunt et al., 2014). However, contract farmers can buy more inputs from the outside which rice millers do not prohibit. In addition, purchase prices can be set by the rice millers which depend on the quality of paddy.

Secondly, the collector acted as a local coordinator and/or a consultant. In other words, he or she was called as a leader of farmers group. Normally, collectors are the important person for rice millers because they stand in between a particular rice miller and contract farmers in a certain defined local area. Furthermore, they give advices on Japonica rice production and taking care of paddy field to their contract farmers, thereby reducing troubles of rice millers' management. Meanwhile, the collectors also cultivate Japonica rice, which have to clearly understand in the whole steps of planting in order to give an advice to their farmers correctly. Thirdly, contract farmers produced Japonica rice and used particular kinds of productive materials provided by a contracted rice mill.

Finally, the CRI had a substantial role in seed production. At present, the supply of Japonica rice seeds is not enough to meet increasing demand from growers. The CRI can produce rice seeds only 3-5 tons/year while the demands have grown to more than 60 tons/year. In 2014, the CRI established the Mae-Prik District Rice Community Center in order to expand the production of such seeds. This center is mainly responsible for producing seed and distributing to the contractors namely rice millers. In addition, the CRI and Department of Agriculture had a significant role in the extension and implementation of Good Agricultural Practice (GAP) which just started in 2014.

Thai government has encouraged farmers to cultivate Japonica rice through GAP systems to raise the standards of production for competition in the global market (Office of Agricultural Economics, 2015e). The government has supported private companies to produce and expand exports to foreign countries. At present, consumers have focused on the quality of products. Moreover, food and health have become important issues for people's living in many

countries. Furthermore, the Agricultural Office in this province needed to participate in Japonica rice production. They required many data from rice mills such as the number of contract farmers and cultivated areas in order to collect as agricultural statistics.

4.3.4 Advantages and disadvantages of Japonica rice contract farming

This study found both advantages and disadvantages of Japonica rice production through CF systems from viewpoints of growers in each rice mill. Table 4.4 shows the advantage and disadvantage aspects which can be divided into four sides as follows; contract, cultivation, taking care and harvesting sides. The classification of advantages in JRCF were justified according to the percentage of the total growers' attitude toward CF. It was justified into three categories as follows; 0.0% - 33.3% means disadvantage, 33.4% - 66.6% implies not sure, and 66.7% - 100% signifies advantage.

The respondents pointed out that high contract price and assured market of Japonica rice were the first of all advantages. Its secured contract price ranged between 9 and 12 THB/kg, while price of ordinary rice varieties in the area, especially San Pa Tong and RD6 glutinous rice ranged between 7-8 THB/kg. Farmers could raise income from participation in a CF system because of higher contract price (Minot, 2007). The rice millers would buy total paddy of their contract farmers although it exceeded the quotas. According to the study of Kunthongjan (2013), company would buy the total products from farmers, even if they produced in more quantities than the specified contract. Moreover, 88.8 % of the total respondents were satisfied with yield of Japonica rice. The growers produced paddy between 600-1,000 kg/rai, especially in second rice crop. The CRI identified the average yield of Japonica rice at 750 kg/rai (1 rai = 0.16 ha).

About 86.1% of all represents indicated that the extension staffs and/or collectors of rice mills assisted them and offered consultation them throughout production process. Kaur (2014) explained that good communication and close monitoring of company resulted in a good relationship and a sense of trust between the company and contract farmers, which led

to a reduction in breach of contract. Furthermore, 61.1% of them specified that they could take care of their paddy field easily. However, they have found some problems such as blast disease and insects. Even if they have operated according to the instructions of rice mills' extension staffs and/or collectors, these problems still affect their production.

Table 4.4: Advantages and disadvantages of Japonica rice production

Contents	RM1 (n=20)		RM2 (n=16)		Total (n= 36)		Classification*
	Ad.	Dis.	Ad.	Dis.	Ad.	Dis.	
1. Contract side							**Advantage**
1.1 Higher contract price	20 (100%)	0 (0%)	16 (100%)	0 (0%)	36 (100%)	0 (0%)	Advantage
1.2 A certain market	20 (100%)	0 (0%)	16 (100%)	0 (0%)	36 (100%)	0 (0%)	Advantage
1.3 A certain pricing	20 (100%)	0 (0%)	6 (37.5%)	10 (62.5%)	26 (72.2%)	10 (27.8%)	Advantage
1.4 Exact date of payment	20 (100%)	0 (0%)	3 (18.7%)	13 (81.3%)	23 (63.9%)	13 (36.1%)	Not sure
1.5 Miller does not exploited his farmers/collectors	18 (90.0%)	2 (10.0%)	13 (81.3%)	3 (18.7%)	31 (86.1%)	5 (13.9%)	Advantage
2. Cultivation side							**Advantage**
2.1 Farmers are satisfied with yield	18 (90.0%)	2 (10.0%)	14 (87.5%)	2 (12.5%)	32 (88.8%)	4 (11.2%)	Advantage
2.2 Extension staff of rice mill and/or collector assisted and consulted them throughout the cultivation	20 (100%)	0 (0%)	11 (68.7%)	5 (31.3%)	31 (86.1%)	5 (13.9%)	Advantage
2.3 It is easy to grow (the procedure is not complicated)	16 (80.0%)	4 (20.0%)	13 (81.3%)	3 (18.7%)	29 (80.5%)	7 (19.5%)	Advantage
3. Taking care side							**Not sure**
3.1 It is easy to take care	12 (60.0%)	8 (40.0%)	10 (62.5%)	6 (37.5%)	22 (61.1%)	14 (38.9%)	Not sure
3.2 Less disease and insects	13 (65.0%)	7 (35.0%)	9 (56.3%)	7 (43.7%)	22 (61.1%)	14 (38.9%)	Not sure
4. Harvesting side							**Advantage**
4.1 It is easy to harvest	19 (95.0%)	1 (5.0%)	13 (81.3%)	3 (18.7%)	32 (88.8%)	4 (11.2%)	Advantage
4.2 Extension staff of rice mill and/or collector checked the quality of rice before harvest	20 (100%)	0 (0%)	11 (68.7%)	5 (31.3%)	31 (86.1%)	5 (13.9%)	Advantage

Note: * The classification of advantages in JRCF were justified according to the percentage of the total farmers' attitude toward CF. It was justified into three categorized: 0.0-33.3%: disadvantage, 33.4-66.6%: Not sure, and 66.7-100.0%: advantage.

Source: Field survey on October, 2014

The great majority of respondents (88.8%) identified that harvesting Japonica rice was easy because harvester machine services were available for a fee of 700-800 THB/rai if farmers

lack labors. In addition, the extension staffs of rice mills and/or collectors visited farmers in paddy field and checked the quality of rice 15 days before harvesting, in terms of contaminated rice and immature rice seed. If there were any problems such as contaminated rice in farmland, farmers had to eliminate these problems before harvest. Otherwise, they could not sell paddy to their collector. Likewise, the study of Simmons et al. (2005), extension staff found contaminated rice in farmers' paddy field resulting they could not sell their product to contractor.

The disadvantages of Japonica rice production through the CF systems can be found in three main aspects. First side was a tardy payment of rice miller. The respondents, especially for RM2 (81.3% of them) indicated that the owner of RM2 delayed payment due to the lack of liquidity even if he informs the exact date of payment to farmers. Therefore, the collectors could not get money to pay to their contract farmers. Some had to advance the payment to contract farmers first. In practice, the rice millers transfer money to each account of collectors within 15 days after they buy paddy from them. Then the collectors will pay the farmers.

In fact, contract farmers could hardly sell their paddy to outside their contract, because other rice mills did not purchase paddy from non-contract farmers. If rice millers found that their collector brought Japonica rice from outside the contract or their contract farmer sold their paddy to others, they declared such person as a defaulter and a blacklisted person. Likewise, a case study of Kaur (2014) found that the processing firm namely PepsiCo Plant did not allow their contract farmers to sell their potatoes outside contract.

Second point was the RM2's reduced contract price. About 62.5% of respondents exposed that RM2 owner lowered a purchase price from 13 THB/kg to 10 THB/kg, because he reduced costs of business operation to compete in the market. This caused a decrease in the income of contract farmers and did not conform to the agreement. As a result, they may change the contract from RM2 to others in next crop. According to Putsyainunt et al. (2014), the companies had an advantage over the contract farmers due to the fact that they controlled

the production systems and markets. However, the agricultural companies did not force farmers to sign a contract, if they feel dissatisfied with the details of conditions.

Third part was a complicated taking care of paddy field. Although cultivation of Japonica rice was easy for them, about 38.9% of respondents identified that the taking care of Japonica rice field was rather complicated than Indica rice, especially fertilization. Practically, Japonica rice responds to nitrogen fertilizer at a higher rate (12-30 kg/rai; 1 rai = 0.16 ha). It requires a thorough maintenance more and punctual planting, and it does not resist pests and blast disease. Contract farmers need to work more for protecting, checking paddy field and disposing of these problems properly.

4.4 Conclusion

The rice millers modified the models and management of JRCF from the intermediate model. Their models and managements needed to process through intermediaries or collectors. Therefore, the collectors played the significant role in CF systems. They could reduce the management trouble of rice millers. The contracts in this study was categorized into the production management contract, in which the contract rice millers guaranteed the purchase price of paddy, and provided extension officers and agricultural inputs, especially Japonica rice seeds for growers. For the fertilizer and agricultural chemicals, they allowed their farmers to buy from outside the contract, which means that the system is still not very strict. Each rice mill adopted different management policy on signing a contact (once a year), purchase price according to quality of paddy, and commission and transportation fees for their collector. Moreover, the rice miller, especially RM1 established a strategy of pricing which could attract farmers to participate in this production system.

The production of Japonica rice through CF systems had advantages more than disadvantages, especially high contract price (9-12 THB/kg) and assured market, as well as high yield (600-1,000 kg/rai; 1 rai = 0.16 ha). However, some growers, particularly in RM2 faced the delay of payment and the reduction of purchase price. These aspects influenced

signing a contact of farmers in next crop, which may change to cultivate other crops. Furthermore, shortage of seeds with good quality is still an obstacle for the Japonica rice production in Thailand. At this moment, the CRI and Department of Agriculture have encouraged farmers to cultivate Japonica rice through systems of Good Agricultural Practice in order to raise the standards of production. The Thai government has pushed the standard of this rice production to be desirable in both the domestic and international markets which is a good direction in the future.

According to the farmers in the study area have changed or moved to cultivate Japonica rice which is an alternative rice, the results of this study showed that Japonica rice production through the CF systems is a good way and a good crop for growers in there. Its high contract price and yield had an effect on their income. However, cost of production is a key factor influencing their income. In the next chapter, the costs and earnings of Japonica rice production will be analyzed.

Chapter 5 Costs and earnings of Japonica rice growers in the north through use of the contract farming systems

The previous chapters explored the current contract farming (CF) features of Japonica rice in the North. Each rice mill provided agricultural inputs such as Japonica rice seeds and fertilizers, extension officers and credits for their growers. Japonica rice growers including contract farmers and collectors received a high secured price and yield influencing their earning. An important factor that effected the growers' income was production cost. Therefore, costs and earnings of Japonica rice production are analyzed in-depth in this chapter.

5.1 Introduction

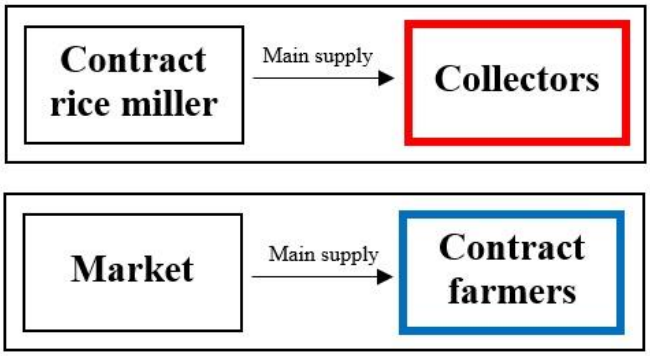
At present, rice farmers in Thailand still face many limitations in farming such as increased production cost, the weather, natural disaster, and degradation of natural resources (Office of Agricultural Economics, 2015c). From 2013 to 2015, their production cost was over the average market prices of paddy, resulting in a loss of revenue from rice production; for example, in 2015, 10.30 THB/kg of all costs and 10.25 THB/kg of paddy price (Office of Agricultural Economics, 2015b). The main cause of high production cost was a rise of input price, especially fertilizers and insecticides.

In 2015, the retail price of fertilizers ranged between 9-20 THB/kg (Office of Agricultural Economics, 2015d). Thai government has asked for cooperation with traders of fertilizer to reduce its price during the planting season. However, this is a short-term solution to help farmers (Suksutti, 2015). A farmer is still responsible for risk from increased expenditure of farming and natural disaster by himself or herself (Arayaphong, 2012). Therefore, farmers tried to seek for a good practice to reduce cost of rice planting, or sought for alternative rice cultivation such as Japonica rice varieties that had higher price and more yield than ordinary rice varieties to compensate an increased production cost (Office of Agricultural Economics, 2015f).

As has already been mentioned in Chapter 4, the characteristic of Japonica rice contract farming (JRCF) was a kind of production management contract. A contract rice mill would guarantee the purchase price of paddy, and provide extension staffs and agricultural inputs, especially seeds for growers through collectors who played a significant role in CF systems. Moreover, the rice mills had the policy for helping contract Japonica rice growers who affected by natural disasters. The owners of rice mills would not charge seed fee. They also prepare a new set of Japonica rice seed for their farmers.

Furthermore, contract growers, especially contract farmers could buy other inputs such as fertilizers and insecticides from any other suppliers in the adjacent market where their prices were cheaper than those which sponsoring rice mills would provide, as shown in Figure 5.1. The collector who also planted Japonica rice would mainly purchase fertilizers on credit from their particular rice mill. They stocked and sold such inputs to their farmers, and used for their Japonica rice farming.

Figure 5.1: Sources of fertilizers for Japonica rice growers



Source: Field survey on October, 2014

The CRI explained that the fertilizer usage between major and second seasons of Japonica rice cultivation were not different with the volume of fertilizer, but the fertilizing period of both seasons were different. In addition, fertilizing Japonica rice with both volume and period

of transplanting method differed from seed broadcasting method. As a result, the cost of both methods were unlike. The CRI examined Japonica rice production in paddy fields and found that the average income of transplanting was lower than that of the broadcasting method due to higher production costs. However, the CRI has recommended that the transplanting is the best method for this variety, which brings more yield than other methods. The earnings of farmers depended on yields of Japonica rice and prices of paddy (CRI, 2014; Warinrak, 2013). Japonica rice cultivation was not easy to take care, which found the problems regarding disease and insects. It still not resist the blast disease (Warinrak, 2013).

With regard to the CF system in agricultural commodities, many previous studies; for example, the findings of Singh (2005b), Minot (2007), Sriboonchitta and Wiboonpoongse (2008), Tongchure and Hoang (2013) and Wang et al. (2014), presented that average income of farmers increased under the CF systems. The contract agricultural companies provided a good production materials and techniques to contract farmers which could increase a quality of product and yield of farmers. However, many researches such as the studies of Kaewmaneechai (2001), Ayuwat and Phoumanivong (2013) and Ekasingh et al. (2014) showed that the CF system was a key cause of increased cost of agricultural production, because prices of inputs supplied by CF such as fertilizers, insecticides and seed were more expensive than the market price.

Therefore, it is difficult to decide whether agricultural production through the CF system is a good way and can improve the living standards of farmers. Japonica rice cultivation in the northern region was also produced through the CF systems, which hardly appeared any current research regarding the costs and earning of Japonica rice production through the CF systems. Therefore, it is interesting in considering the fact that the prevailing system of JRCF is a whether effective way to enhance the living standards of growers.

This study addressed three aspects. Firstly, the issue was to analyze the economic structure of Japonica rice growers by classifying data between collectors and contract farmers. Secondly, the point of study was to determine the factors that might have an effect on the

economic characteristics of growers. Thirdly, the aspect was to clarify whether Japonica rice can become an alternative crop of farmers in the North. This point would compare the economic characteristics of contract Japonica rice growers and non-contract glutinous rice farmers. Glutinous rice, especially RD6 is a kind of ordinary rice varieties that some farmers had cultivated before they decided to participate in the JRCF systems.

5.2 Methodology

This study was based on the primary data of 36 respondents who were growers of Japonica rice in the Wiang Pa Pao district of the Chiang Rai Province, including 30 contract farmers and 6 collectors. These growers contracted with particular rice mills based on an intermediary model. In selected areas, growers under each contracted rice mill cultivated Japonica rice using similar methods. This was a reason for interviewing only 36 respondents. They were selected by using purposive sampling. The data used in this study were gathered from a questionnaire survey and in-depth interviews at house of each collector. The data of this study were arranged and analyzed using descriptive (frequency, percentage, mean, and S.D.) and inference (cross-tabulation and Chi-square analysis) statistics.

The results and discussion are divided into three sections. The first section describes the economic structures of Japonica rice growers in 2014 during the major rice season (rainy season) from the end of July to October. The second part explores the factors that might have affected the economic characteristics of growers. The last section uses data from the survey, and secondary data from the Office of Agricultural Economics and the Rice Department to compare economic characteristics between contract Japonica rice growers and uncontracted glutinous rice farmers. The data used in the analysis of both grower groups were based on the transplanting methods. Moreover, data of glutinous rice producers represent the average value of the northern region.

5.3 Outline of the respondents

Thirty-six Japonica rice growers comprising 30 contract farmers and 6 collectors were selected as the respondents in this chapter. Table 5.1 presents the descriptive statistics of the respondents' demographic characteristics. Male growers accounted for 66.7% of them, and the proportion of female growers was 33.3%. In addition, 77.8% of the respondents including all collectors were older than 50 years of age. The majority of growers graduated from primary school, and 55.7% of them including five collectors had less than 10 years of experience cultivating Japonica rice. Some contract farmers had longer experience more than collectors.

Table 5.1: Socio-economic profile of Japonica rice growers

Contents			Japonica rice growers			
			Farmer (n=30)	Collector (n=6)	Total (n=36)	
			n	n	n	%
(1) Gender		Male	20	4	24	66.7
		Female	10	2	12	33.3
(2) Age	(year)	41-45	3	0	3	8.3
		46-50	5	0	5	13.9
		51-55	12	2	14	38.9
		56-60	4	2	6	16.7
		More than 60	6	2	8	22.2
(3) Educational level		Less than primary school	1	0	1	2.8
		Primary school	26	6	32	88.9
		High school	3	0	3	8.3
(4) Experience with Japonica rice cultivation	(year)	1-10	15	5	20	55.7
		11-20	13	1	14	38.9
		21-30	1	0	1	2.7
		More than 30	1	0	1	2.7
(5) Experience with contract rice mill	(mill)	1	15	5	20	55.7
		2	12	1	13	36.0
		3	3	0	3	8.3
(6) Japonica rice planted area	(% from total areas)	0-25	1	0	1	2.7
		26-50	3	1	4	11.1
		51-75	5	1	6	16.7
		76-100	21	4	25	69.5
(7) Visiting paddy field of rice mill' extension staffs	(time/ crop)	Never	3	0	3	8.3
		1	10	0	10	27.8
		2	14	5	19	52.8
		3	3	1	4	11.1

Source: Field survey on October, 2014

Over half of the respondents had never established business links with other rice mills. About 69.5% of them planted Japonica rice within 76-100% of all their agricultural planted areas. Moreover, 52.8% of them were visited paddy fields two times per crop by extension staff of rice mills who worked together with the collector of group. Only 8.3% of the total respondents were never visited from the extension staff of rice mills.

5.4 Results and Discussions

5.4.1 Economic structures of Japonica rice growers

This section focused on the variable costs of Japonica rice production through the CF systems. In fact, the growers cannot cultivate Japonica rice in their farmlands unless they execute contracts with rice mills. The expenses of Japonica rice farming consisted of the costs of major supplies such as seeds, fertilizers and insecticides, as well as fees of major labor related to the whole transplanting and harvesting sections.

Table 5.2 presents the results from analyzing costs and earnings of Japonica rice cultivation in during the end of July to October of 2014 (major rice crop). The results found that the average of total variable costs was 3,505.4 THB/rai (1 rai = 0.16 ha) (or 4.2 THB/kg), which were classified into the major input and labor costs as follows: 1,441.6 THB/rai or 41.1% of all costs, and 2,063.8 THB/rai or 58.9%, respectively. Therefore, the main cost of Japonica rice production was labor charges. These costs were analyzed from Japonica rice cultivation by transplanting method for which farmers had to employ use many workers.

The results also revealed that charge of fertilizer was higher than the expenses of seed and insecticide, composed of 966.9 THB/rai (1 rai = 0.16 ha) or 27.6% of all costs of major inputs, 300.0 THB/rai (8.6%) and 174.7 THB/rai (4.9%), in descending order. The high cost of fertilizer arose from a thorough taking care in Japonica rice field of growers. Moreover, to control a quality of Japonica rice seed, the growers had to use seeds distributed by their contract rice millers who bought seeds from the CRI. The growers could not store and

produce Japonica rice seeds by themselves. They paid 20 THB/kg for Japonica rice seed, which was used approximately 15 kg/rai for planting.

The expenses of the major labors included 1,265.2 THB/rai (1 rai = 0.16 ha) or 36.1% of the total labor costs for a whole planting part, and 798.6 THB/rai (22.8%) for harvesting section. Most of respondents who planted Japonica rice in a large land would employ labor to grow Japonica rice due to a shortage of workers, which wages ranged between 1,200-1,400 THB/rai. In small planted areas, some contract growers used their family labors to grow Japonica rice. With regard to preparation of planted areas, the representatives ploughed their lands by using a tractor. The majority of respondents hired a tractor and a harvester machine service that their collectors provided. The wages of a harvester machine were between 700-800 THB/rai, which depended on the nature of areas.

Table 5.2: Economic structures of Japonica rice growers in major rice crop of 2014

Contents			Japonica rice growers			
			Farmers (a) (n=30)	Collectors (b) (n=6)	Dif. (b) – (a)	Total (n=36)
Average production cost						
Major input		**(THB/rai)**	**1,373.0**	**1,784.9**	**+411.9**	**1,441.6**
Seed		(THB/rai)	300.0	300.0	0.0	300.0
Fertilizer		(THB/rai)	897.1	1,315.9	+418.8	966.9
Insecticide		(THB/rai)	175.9	169.0	-6.9	174.7
Major Labor		**(THB/rai)**	**2,063.2**	**2,066.7**	**+3.5**	**2,063.8**
Transplanting part		(THB/rai)	1,264.9	1,266.7	+1.8	1,265.2
Harvesting part		(THB/rai)	798.3	800.0	+1.7	798.6
Total variable cost		**(THB/rai)**	**3,436.2**	**3,851.6**	**+415.4**	**3,505.4**
Growers' economic structure						
Average price	(1)	(THB/kg)	9.3	9.0	-0.3	9.2
Average yield	(2)	(kg/rai)	827.8	825.0	-2.8	827.4
Average production costs	(3)	(THB/rai)	3,436.2	3,851.6	+415.4	3,505.4
Average income	(1)x(2)=(4)	(THB/rai)	7,698.5	7,425.0	-273.5	7,612.1
Earnings	(4)-(3)	(THB/rai)	4,262.3	3,573.4	-688.9	4,106.7
Cost efficiency ratio	(4)/(3)	per rai	2.24	1.93	-0.31	2.17

Note: 1 rai = 0.16 ha
Source: Field survey on October, 2014

In addition, the average yield of paddy in the study area was approximately 827.4 kg/rai (1 rai = 0.16 ha), which was more than the average paddy yield officially reported by the CRI of 750 kg/rai. The respondents received 9.2 THB/kg for average contract price of paddy. As a result, they obtained approximately 7,612.1 THB/rai of the average income. Their earning was 4,106.7 THB/rai. Moreover, the cost efficiency ratio (per rai), which is the proportion of respondents' income and production cost, was 2.17. That means that they expended 1 THB/rai for planting Japonica rice, then they received income back approximately 2.17 THB/rai.

Table 5.2 also shows the economic structures of Japonica rice growers, including contract farmers and collectors. They used inputs particularly fertilizers from different sources shown in Figure 5.1. Therefore, there were large differences in average variable costs between them. These costs were 3,436.2 THB/rai (1 rai = 0.16 ha) for contract farmers, comparing to 3,851.6 THB/rai for collectors. Cost of fertilizer in Japonica rice planting through the CF system was a significant factor in the difference between production costs of contract farmers and collectors as follows: 897.1 THB/rai (26.1% of all input costs) and 1,315.9 THB/rai (34.1%), respectively. The contract farmers could buy fertilizer from other suppliers (outside contract), depending on the market prices of fertilizers. However, the contract farmers who lacked capital could buy fertilizers from particular rice mills through their collectors on credit and repay the debt when they sold their paddy to the rice mill.

Meanwhile, the collectors used fertilizer supplied by contract rice millers who stored materials for their client-farmers. The price of fertilizer in the systems of JRCF was higher than the market price, being 5-15 THB/bag. As a result, the production costs incurred by collectors were higher than their contract farmers. This means that the high price of fertilizer in the CF systems influenced the cost of Japonica rice production. The findings of Ayuwat and Phoumanivong (2013) mentioned that price of fertilizer in sugarcane CF systems was expensive than market price, being 200 THB/bag, which affected the farmers' cost of production.

On averages of contract price of paddy and yield of Japonica rice, the contract farmers obtained 9.3 THB/kg and 827.8 Kg/rai (1 rai = 0.16 ha), respectively, which were slightly more than the collectors. Thus, the average income of the contract farmers was 7,698.5 THB/rai, while the collectors received 7,425.0 THB/rai. Some growers could increase paddy yields and receive high prices based on the price of 10 THB/kg for major rice season with less than 25% humidity and paddy yields of more than 900 kg/rai. These conditions were set by the contract rice mills.

Earnings of contract farmers and collectors were approximately 4,262 THB/rai (1 rai = 0.16 ha) and 3,573 THB/rai, respectively. The earnings of farmers were higher than those of the collectors due to lower production costs. Moreover, they had more the proportion of income and production cost (per rai) than the collectors (2.24 and 1.93, in descending order). Clearly, inputs particularly fertilizer provided by rice mills was an important factor in the different production cost and earning between collectors and contract farmers. In accordance with the study of Ayuwat and Phoumanivong (2013), the differing production costs led to difference in income for the farmers in the area.

5.4.2 Factors influencing the economic structure of Japonica rice growers

This section studied the factors affecting production costs and earnings of respondents. The total variable costs were classified into three groups: less than 3,000 THB/rai (1 rai = 0.16 ha), between 3,001-4,000 THB/rai, and more than 4,000 THB/rai. Moreover, the main factors included the extension service by staff of rice mills, growers' experience with Japonica rice planting, and Japonica rice planted areas of growers were analyzed the relation with such variable cost groups by the cross-tabulation and Chi-square analysis.

Table 5.3 revealed that only the extension services provided by the extension officers of rice mills resulted in increases of the total variable costs. The P-values of this measurement was 0.011. The service influenced the production costs incurred by growers, particularly the collectors. Extension officers of rice mills mostly visited random client-growers twice per

crop season. Only three representatives were never visited random by them. In fact, extension officers of rice mills provided free technical support related to the use of fertilizers.

In addition, growers who had ten years or less of experience with Japonica rice farming had higher production costs. Moreover, the respondents who cultivated Japonica rice within 76-100% of all their agricultural planted areas had production costs that varied, which might have depended on each farmer's management skills and ability to learn. However, the client-growers could improve their productions by adopting the skills and knowledge transferred by the extension officers of rice mills.

Table 5.3: Relation between each variable cost set and each factor group

Variables			**Total variable cost** (THB/rai) (Mean= 3,505.40, S.D.= 498.05)				**Mean**	**S.D.**
			Less than 3,001	**Between 3,001 – 4,000**	**More than 4,000**	**Total (n=36)**		
(1) Extension service by staff of rice mills	(time)	Never	1	1	1	3	1.67 *	0.79
		1	3	6	1	10		
		2	1	13	5	19		
		3	0	1	3	4		
		Total	**5**	**21**	**10**	**36**		
(2) Experience with Japonica rice planting	(year)	0-10	3	11	6	20	12.75	6.42
		11-20	2	7	4	13		
		More than 20	0	3	0	3		
		Total	**5**	**21**	**10**	**36**		
(3) Japonica rice planted area	(% from total areas)	Less than 26	0	0	1	1	85.36	22.46
		26-50	0	4	0	4		
		51-75	1	4	1	6		
		76-100	4	13	8	25		
		Total	**5**	**21**	**10**	**36**		

Note: *p<0.05
Source: Field survey on October, 2014

Besides the extension services from the officers affected the rising of total variable cost, the services also influenced the increases of the average paddy yield and income of representatives, as shown in Table 5.4. The P-values of these measurements were 0.012 and 0.014, respectively. If the respondents receive high contract price, increase of paddy yield will assist to raise more incomes of them. Farmers in another study indicated that

participating in CF systems could improve their farming practices which also increased their products (Man and Nawi, 2010). Moreover, the CF systems made farmers to learn new production technologies, which they could enhance their productivity in both quality and quantity to sell at high price (Ekasingh et al., 2014).

Table 5.4: Relation between extension services by staff of rice mills and average yield and income of growers

Contents	Extension service by staff of rice mills		P-value
	Mean	S.D.	
(1) Total variable cost	3,505.4	498.1	0.011
(2) Average yield	827.36	87.75	0.012
(3) Average income	7,656.53	1,118.66	0.014

Note: $p<0.05$
Source: Field survey on October, 2014

5.4.3 Economic characteristics of Japonica rice and glutinous rice growers

The last section of this chapter was to clarify whether Japonica rice can become an alternative crop of farmers in the North. Table 5.5 compares economic characteristics of Japonica rice and glutinous rice growers in 2014, based on cultivation with the transplanting method. Japonica rice was produced only through the CF systems, while glutinous rice was not produced through any CF system. Therefore, this section would compare with independent growers of glutinous rice. The reason for selecting glutinous rice especially RD6, because it is a kind of rice that most farmers had cultivated before they decided to participate in the systems of JRCF.

In 2014, the average total variable costs of glutinous rice farmers in the northern part was 4,015.3 THB/rai (1 rai = 0.16 ha) or 6.6 THB/kg by recoding of the Office of Agricultural Economics and Rice Department. It was higher than the average total variable costs of Japonica rice farming from field survey, at 509.9 THB/rai in difference. The glutinous rice

farmers paid more the major inputs, including seed, fertilizer and insecticide than Japonica rice growers. These charges amounted approximately to 1,650.3 THB/rai or 41.1% of all variable costs. The remainder (58.9%) was the costs of labor comprising the whole planting and harvesting parts, which both sides also were greater than growers of Japonica rice, being 301.2 THB/rai in difference.

Table 5.5: Economic characteristics of Japonica rice and glutinous rice growers

Contents		Glutinous rice [a] with non-CF (1)	Japonica rice [b] with CF (2)	Dif. (2) – (1)
Average production cost				
Major input	**(THB/rai)**	**1,650.3**	**1,441.6**	**-208.7**
Seed	(THB/rai)	345.3	300.0	-45.3
Fertilizer	(THB/rai)	1,108.2	966.9	-141.3
Insecticide	(THB/rai)	196.8	174.7	-22.1
Major Labor	**(THB/rai)**	**2,365.0**	**2,063.8**	**-301.2**
Transplanting part	(THB/rai)	1,449.5	1,265.2	-184.3
Harvesting part	(THB/rai)	915.5	798.6	-116.9
Total variable cost	**(THB/rai)**	**4,015.3**	**3,505.4**	**-509.9**
Growers' economic structure				
Average price	(THB/kg)	8.6	9.2	+0.6
Average yield	(kg/rai)	612.0	827.4	+215.4
Average production costs	(THB/rai)	4,015.3	3,505.4	-509.9
Average income	(THB/rai)	5,263.2	7,612.1	+2,348.9
Earnings	(THB/rai)	1,247.9	4,106.7	+2,858.8
Cost efficiency	-	1.31	2.17	+0.86

Source: [a] Data from the Office of Agricultural Economics (2014) and Rice Department (2014)
[b] Data from field survey (2014)

Based on data of the Office of Agricultural Economics and Rice Department, the average yields and prices of glutinous rice were approximately 612.0 kg/rai (1 rai = 0.16 ha) and 8.6 THB/kg, respectively. The average income of glutinous rice growers was 5,263.2 THB/rai, and their earning was 1,247.9 THB/rai. Moreover, their cost efficiency ratio (per rai) was 1.31. These data showed that the cultivation of Japonica rice were better than those of glutinous rice planting. The growers of Japonica rice earned approximately 2,860 THB/rai more than glutinous rice farmers did.

It can be summarized that Japonica rice cultivation with the CF systems were more cost efficient and realized higher sale price, as well as higher average yields than glutinous rice planting. A study of Sriboonchitta and Wiboonpoongse (2008) mentioned that more than 70% of northern farmers who participated in CF systems received and enjoyed higher household income than non-CF, especially in case of tomato. Similar findings were obtained by Tuteja and Chandra (2012) related to tomato CF systems in India, and Champika and Abeywickrama (2014) related to maize CF systems of Sri Lanka, which per hectare yield and earnings of contract farmers were more than those of non-contract farmers.

5.5 Conclusion

Although Japonica rice growers, particularly collectors had a higher production costs, they will continue to participate in the next crops because they still receive a lot of yield and earnings, as well as commission fee from their contract rice miller. The current study indicated that the systems of JRCF could help farmers realize a higher price and acquire better knowledge of cultivation practices and receive other support services from field officers of integrator rice mill, except fertilizer supply. These are the primary reasons why Japonica rice growers could produce high yields and derive more income.

Moreover, Japonica rice cultivation in the selected areas was more attractive because the growers had lower production costs and got higher income, compared to the results achieved by non-contract glutinous rice farmers in the same region. In addition, the average purchase price of Japonica rice paddy is higher than that of glutinous rice paddy. Therefore, Japonica rice cultivation through CF systems can increase income of growers, and Japonica rice was a good alternative rice for farmers in the North, especially Chiang Rai Province.

All aspects, including the Chapter 4, were the part of Japonica rice production. Of course, it is necessary to study on marketing part of Japonica rice. As has already been mentioned, the rice millers were the final buyers of paddy and the first sellers of milled Japonica rice. They were an important person for linking small farmers to demanding markets. Therefore, the

next chapter would analyze the marketing systems of THJR, especially in the domestic market.

Chapter 6 Marketing system analysis of Thailand's Japonica rice in the domestic market

The previous chapters studied the CF systems of Japonica rice and economic structures of growers including costs and earnings of its production. After harvesting Japonica rice, the contract farmers would sell paddy to particular rice mills only through their collectors. Then, they will mill and distribute it to markets. Consequently, the final party involved in paddy market of Japonica rice was the rice mills. This chapter will analyze the marketing system of Thailand's Japonica rice (THJR) in the domestic market.

6.1 Introduction

In Thailand, Indica rice is dominant in domestic consumption, which is the main staple food for Thai people. This means that the domestic market is a major market of Thai rice. Rice is also a dominant crop of Thailand's agricultural sector, and has long been a significant source of export earnings, especially jasmine rice. As of 2015, daily rice consumption per capita was 106 kg on average, which had declined significantly from 190 kg over the past decade. Such a sharp decrease reflects the changing lifestyle toward western style of people, particularly in the city and urban areas (United States Department of Agriculture Foreign Agricultural Service, 2016a). However, according to the statistical data of FAOSTAT (2013), the whole milled rice utilization in Thailand increased approximately 26.1% from 2003 to 2013.

Many intermediaries who involved in paddy process composed of local buyers or assemblers, cooperatives, farmer groups, central market and rice mills. With regard to the players in milled rice market comprised rice millers, commission agents, exporters, wholesalers and retailers (Ekasingh et al., 2007). Rice millers are an important player in the structures of paddy and milled rice markets (Isvilanonda, 2010; Titapiwatanakun, 2012).

In foreign market, at present, the major exporters in the world rice market include India, Thailand, Vietnam and Pakistan, in descending order. While Myanmar and Cambodia have

an increasing potential to produce more rice and may become bigger exporters in the future (International Rice Research Institute, 2015a). Therefore, Thai rice has faced intense competition in the world rice market. In 2015, export of Thai rice fell in volume and value by approximately 10.7% and 10.8% compared to 2014, respectively. Such a reduction arose from the decreasing world economic growth which led to the fall of purchasing power of foreign buyers. Moreover, high price of Thai rice was a disadvantage for trading in rice market (Office of Agricultural Economics, 2015a). The International Rice Research Institute (2015a) indicated that export price of Thai jasmine rice was more expensive than Vietnamese jasmine rice, being 400 USD per ton (1USD=36THB). In May of 2016, Thailand' s export prices for 5% grade white rice increased significantly to around 400 USD per ton, compared to the average export prices of 370 USD per ton in the first four months (Ministry of Commerce, 2016).

Structural changes have occurred in Thai rice production and marketing. For example, the factors including high cost of rice production, low price and yield of paddy have influenced farmers' income. As a result, some farmers changed from rice farming to alternative crops. Moreover, intense competition in the global rice market has made a great impact on rice exporter leadership of Thailand. These changes have deeply impacted the situations of Thai rice in rice production and marketing. Therefore, both private and government sectors have so far encouraged farmers to cultivate top-quality rice or alternative rice that meet the needs of particular target consumers in specialty rice market more. Moreover, farmers seek for planting alternative rice that has higher market price and yield than ordinary rice to increase their income.

At present, rice mills have played a powerful role in the specialty rice market (Isvilanonda, 2010; Seemanon et al., 2015). They would supply alternative rice like Japonica rice to the market. The majority of alternative rice is produced through the CF systems conducted by rice mills, though which the rice mills can control a high quality of rice and link farmers to markets (Warinrak, 2013; Seemanon et al., 2015). Consequently, rice mills have become the place of integrated services of rice trading (Makasiri et al., 2011).

Expanding specialty rice market such as Japonica rice has a good choice for rice farmers. Thailand has the potential to produce for domestic consumption and export THJR to foreign countries. The demand for Japonica rice in the domestic market is relatively high, considering Japanese restaurants have opened approximately 10-15% per year (Kasikorn Research Center, 2010; JRO, 2015). In 2015, the foreign countries, especially Singapore, China and the Philippines imported 1,100 tons of THJR. The total value of export was 1.1 million USD and exceeded the total volume exported in 2014 (ICT and the Customs Department, 2015). Therefore, Japonica rice is still a significant commodity in the market.

This chapter purposed to explore the marketing system of THJR that was produced in the North. Specific objectives were to investigate the distribution channel of milled THJR in the domestic market, to examine important roles of parties involved in this rice process, and to identify the marketing obstacles of THJR.

6.2 Methodology

Chiang Rai Province and Bangkok were selected as a study area of this research. Five rice mills (RM1-RM5) in Chiang Rai Province were selected as the representatives. Moreover, 4 distributors (DT1-DT4), 3 retailers (RL1-RL3), and 4 managers of Japanese restaurants (JPR1-JPR4) in Bangkok were also selected as the representatives for in-depth interviewing in this study. Structured questionnaires were conducted for collecting data. All respondents were selected by using the purposive sampling method. In addition, this research explored prices and brand names of packed Japonica rice at the shopping malls and fresh markets in Bangkok.

The respondents were questioned on parts of their profile, company information, and data that related to THJR. Descriptive statistics were employed to explain the outline of the respondents, the current distribution channel of milled THJR in the domestic market, important roles of parties involved in this rice process, and the marketing obstacles of THJR.

6.3 Results and Discussions

6.3.1 Outline of the respondents

Table 6.1 shows the profiles of the respondents, including 5 rice mills in Chiang Rai Province, 4 distributors, 3 retailers, and 4 Japanese restaurants in Bangkok. The majority of samples (62.5%) were undertaking family businesses. Male representatives accounted for 62.5% of the total, and the remainder was female. Their age was more than 30 years old (87.4%), and about 75.0% graduated from the bachelor level or more. The most respondents (68.8%) had experiences in their business more than 5 years.

The figures of Table 6.1 presents the amount of dealing in THJR by the respondents. Firstly, rice mills' production capacity of milled Japonica rice ranged between 1.4 to 15.1 tons/day. During one year of production (from 2014 to 2015), they still produced polish Japonica rice with an unchanged production amount; for example, RM1 produced approximately 5.5 tons a day of milled Japonica rice throughout the period of one year. Moreover, the largest Japonica rice mill has a plan to expand the volume of production from 3,000 tons in 2015 to 9,000 tons in 2016, in accordance with increasing demand from Japonica rice.

Secondly, distributors supplied Japonica rice in a range between 15-200 tons/month in the domestic market. They still repacked Japonica rice that purchased from rice mills with the same amount, compared to 2014. Next respondent was retailers who ordered approximately 50-100 kg/month of packed Japonica rice from distributors. During the period from 2014 to 2015, they continue to buy Japonica rice from their suppliers with the same volume. The last representative was owners or managers of Japanese restaurants who cooked and served approximately 200-400 kg/month of packed Japonica rice. They increased to cook with Japonica rice due to raising consumption of Japanese cuisine in the domestic market.

Table 6.1: Profiles of respondents

Contents		Frequency (n)				Total (%)
		Rice mills	Distributors	Retailers	Managers of Japanese restaurants	
(1) Position						
Owner		3	2	3	2	10 (62.5%)
Manager		2	2	0	2	6 (37.5%)
(2) Gender						
Male		4	2	2	2	10 (62.5%)
Female		1	2	1	2	6 (37.5%)
(3) Age	(year)					
Less than 30		1	0	0	1	2 (12.5%)
30 – 40		2	1	2	2	7 (43.7%)
More than 40		2	3	1	1	7 (43.7%)
(4) Education						
Lower than Bachelor		0	0	2	2	4 (25.0%)
Bachelor		4	4	1	1	10 (62.5%)
Master		1	0	0	1	2 (12.5%)
(5) Experiences	(year)					
Less than 5		1	2	0	2	5 (31.2%)
5 – 10		3	2	3	2	10 (62.5%)
More than 10		1	0	0	0	1 (6.3%)
Total		**5**	**4**	**3**	**4**	**16 (100%)**
(6) Data related to THJR volume						
Production capacity of milled Japonica rice	(ton/day)	1.4-15.1	-	-	-	-
Distribution of milled Japonica rice	(ton/month)	-	15-200	-	-	-
Ordering milled Japonica rice	(kg/month)	-	-	50-100	-	-
Cooking milled Japonica rice	(kg/month)	-	-	-	200-400	-

Source: Field survey on October, 2015

6.3.2 Domestic distribution channel of milled Japonica rice

The THJR market channel starts at the farm level. The contract farmers are a main paddy producer of Japonica rice. They sell paddy to contract rice mills through only their collectors based at a contract price. This is a part of paddy market. On the other hand, ordinary rice farmers sell their paddy to any independent rice mills through local traders, farmer's organizations or agricultural cooperatives and directly by farmers themselves (Srisompan, 2014). This channel takes longer stages than Japonica rice process. According to the results of Sahavacharin and Srinon (2016), the majority of ordinary paddy were gathered by

agricultural cooperatives (63.6% of farmers). As regards milled jasmine rice in their study, about 84.1% of its total volumes was consumed by the domestic market. The remainder was exported to other countries.

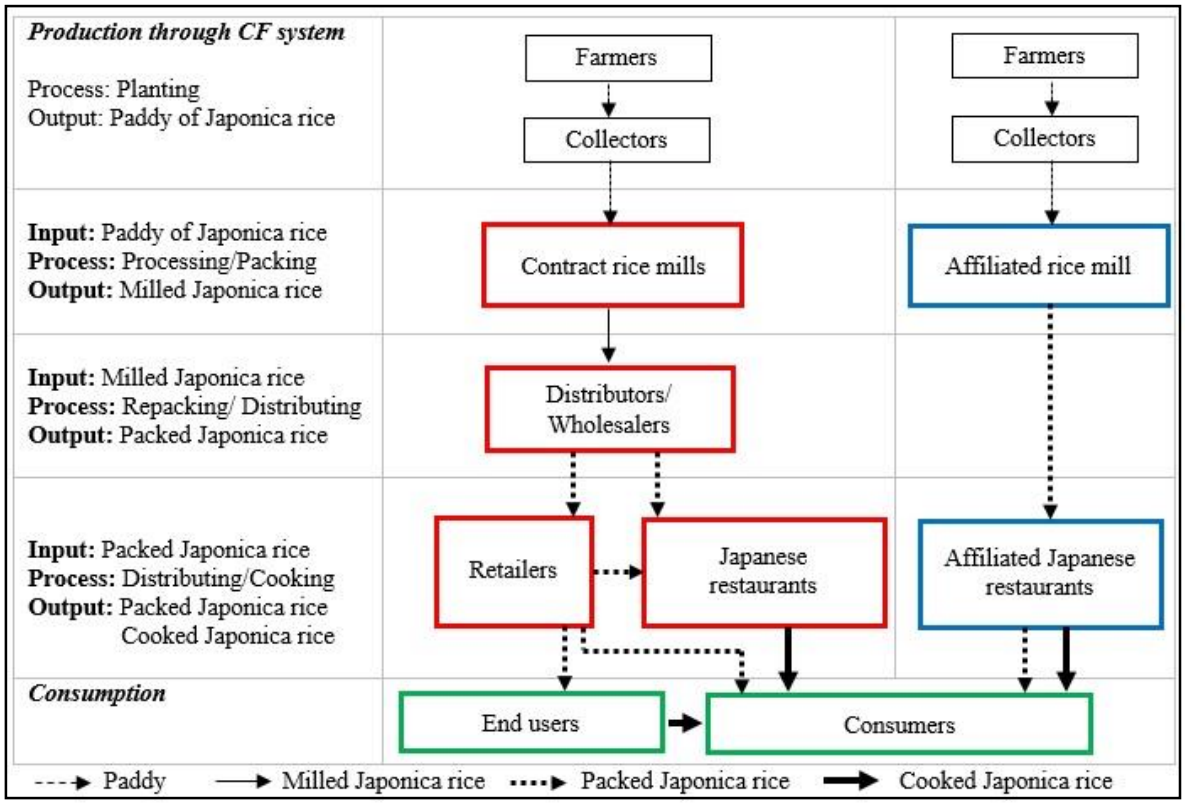
In part of milled Japonica rice, Figure 6.1 shows the distribution channel of milled THJR. The output from the milling process was polished Japonica rice, which was sold to the end users in the domestic market through a variety of distribution channels including distributors, retailers and Japanese restaurants. The rice millers traded directly with Japonica rice buyers or distributors like a business to business marketing (B2B), without rice brokers. The contract rice mills would polish Japonica rice according to the purchasing order of buyers. Meanwhile, the largest Japonica rice mill or affiliated rice mill that belong to Japanese food company mostly distributed Japonica rice (97%) to affiliated Japanese restaurants across the country. The remainder was packed at 2 kg/bag under the owned-brand, and sold them at the affiliated Japanese restaurants. This larger mill is fully integrated into the Japonica rice process.

The milled Japonica rice was mainly consumed by the domestic market. In 2014, about 0.3% of the total polished Japonica rice was exported to other countries (ICT and the Customs Department, 2015). The domestic Japanese restaurants were the main users of Japonica rice. The packed polished Japonica rice from a distributor (without brand name) was distributed directly to Japanese restaurants, being approximately 70.0% of the total milled Japonica rice. Another 30.0% directly went to the large retailers like shopping malls such as UFS, I, and TM, which the distributors repacked milled Japonica rice in 2 and 5 kg/bag under the distributors' brand name.

Moreover, some distributors directly sold Japonica rice (25 kg/bag) to small traditional retailers like a rice shop in the fresh market in Bangkok. Then, the retailers repacked in 1 kg/bag, or according to the purchasing order of customers, without the brand name on rice bags. From the field survey in Bangkok, the rice shops in fresh market have been in existence. However, the consumers can hardly buy milled Japonica rice in such a market. The survey

of Titapiwatanakun (2012) found that some traditional rice retailers still buy directly 100 kg/bag of ordinary rice from wholesalers or rice millers, then they repacked in 1-5 kg/bag.

Figure 6.1: Distribution channel of Thailand's milled Japonica rice in the domestic market



Source: Field survey on October, 2015

6.3.3 Important roles of parties involved in the process of milled Japonica rice

From the Figure 6.1, there were four major players in the process of milled THJR comprising rice millers, distributors, retailers and Japanese restaurants. The first player was rice millers who were the most significant member of the marketing system of THJR. They were an important player by influencing the rice market price. In this research, all millers bought paddy from contract farmers through their collectors, and then they milled and packed polished Japonica rice.

Based on the report of Satake Corporation, the process of Japonica rice milling is different from ordinary rice milling as follows: receiving/pre-cleaning, husking, width separating, milling, sorting, polishing, separating, blending and packing, respectively. While the process of long grain rice milling includes the parts of receiving/pre-cleaning, husking, milling, separating, blending, sorting, polishing and packing, respectively. Paddy of Japonica rice is harvested with no more than 25% humidity, and dried down to about 14-15% to store in rice mills. Trade of Japonica rice focuses on new-crop, so that millers have to trade milled Japonica rice within 6 months after harvested. On average, paddy of Japonica rice produces 40% of byproduct (bran, germ and husk) and 60% of white rice. The estimate of milling cost was 750 THB/ton or 0.75 THB/kg, including labor, materials, and electricity charges. They sold approximately 35 THB/kg of milled THJR to distributors.

Some rice mills in this research (RM1, RM4 and RM5) processed both Japonica rice and ordinary rice. They used the same of machines for milling both rices, but changed equipment when processed Japonica rice such as milling sieve due to the different size and shape of the both. With regard to packing, only two rice mills packed polished Japonica rice in 1-2 kg/bag under their brand name to distribute in the domestic market. Others sold rice to buyers with a 25 kg/bag without their brand name.

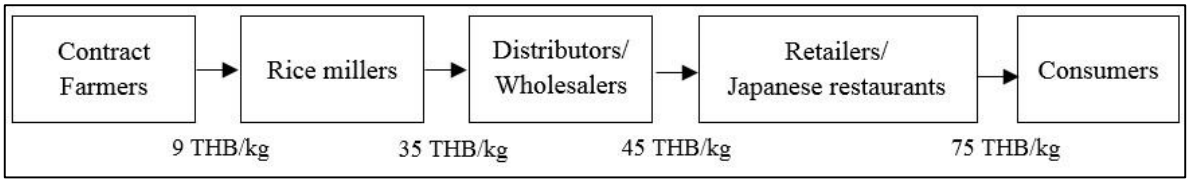
The second player was distributors. They bought relatively bigger volume (200 tons/month or less) and sold packed Japonica rice to many retailers and Japanese restaurants in small volume. The distributors ordered the volume of milled Japonica rice to rice millers, then they would mill according to the purchase order. This means that if demand of distributors would be lower, rice mills would reduce the volume of production. However, according to the retailers and the owners of Japanese restaurants mentioned, the selling and cooking Japonica rice are increasing in the domestic market; for example, from interviewed the respondents, Japanese restaurants increased an average number of cooking Japonica rice from 7 kg/day in 2014 to 12 kg/day in 2015. After distributors purchased milled Japonica rice from rice mills, they cleaned and repacked polished Japonica rice from 25 kg/bag to 2 and 5 kg/bag. They distributed to the retailers, especially in the shopping malls. While Japanese restaurants and

traditional retailers were distributed with 25 kg/bag. They sold approximately 45 THB/kg of packed Japonica rice to retailers and Japanese restaurants.

The last players included retailers and Japanese restaurants. They were situated at the terminal end of distribution channel. The retailers ordered approximately 100 kg/month from their distributors. The modern trade was a key player in the domestic market more than the traditional retailers. The wrapped Japonica rice in the shopping malls such as TM, TL, BC, I, UFS, and M were sold approximately 60-85 THB/kg. An average market price was 75 THB/kg, which was 2-3 folds higher than ordinary rice. On package, Japonica rice varieties was mainly indicated as Sasanishiki strain or DOA1. With regard to Koshihikari variety imported from Japan, its average price was approximately 245 THB/kg. It was 3-4 times higher than THJR. Japanese restaurants were the main users of Japonica rice in the domestic market. They purchased and cooked packed Japonica rice approximately 360 kg/month (for 80-120 seats) from their suppliers. One kilogram of milled Japonica rice can cook approximately 65 pieces of sushi with 15 g/piece. The main customers of them were 60% Thai people, 30% Japanese consumers and 10% others such as Chinese. A dinner was a main meal for their customers.

From various surveys and interviews, Japanese cuisine in many Japanese restaurants in Bangkok were a variety of price per dish. Based on the report of Positioningmag (2011), the prices of Japanese dish can classify into three groups; more than 400 THB/dish, 100-400 THB/dish, and less than 100 THB/dish, or can categorize as follows: the high-end, middle class and mass consumers, respectively. One respondent had used to cook Japanese cuisine with Japanese rice imported from Japan, but as of interview in 2015 he cooked and served with THJR to reduce cost. According to the study in this section, information regarding price and marketing margin can be summarized into the Figure 6.2. Marketing margin of Japonica rice, or the farm-to-retail price spread, was equivalent to 66 THB in which it arose from the difference in the retail selling price of packed Japonica rice and the price obtained by the contract farmers (75 THB/kg and 9 THB/kg, respectively). It presents payments for all assembling, processing, transporting, and retailing charges added to farm products.

Figure 6.2: Price of Japonica rice in each party involved



Source: Field survey on October, 2015

6.3.4 The marketing obstacles of Thailand's Japonica rice

Table 6.2 shows buyer attitudes towards marketing obstacles of THJR. The buyers were distributors, retailers and Japanese restaurants. Their attitudes were justified into three categories as follows; 0.00-0.33 means disagree, 0.34-0.66 implies not sure, and 0.67-1.00 signifies agree. The results show three problems of THJR marketing.

Firstly, imported Japonica rice from Vietnam was a main competitor against THJR in the domestic market. The mean score of this evaluation was 1.00. This is mainly because Vietnam's Japonica rice was slightly cheaper than Thailand's. As of survey in 2015, its average retail price was 70 THB/kg, compared to 75 THB/kg of THJR. Moreover, the distributors mentioned that some Japanese restaurants and small Japanese food shops cooked and served with Japonica rice imported from Vietnam to reduce cost of materials. However, the majority of respondents mentioned that the quality of domestically grown Japonica rice was better than another. Moreover, they indicated that the market price of THJR was suitable considering its quality. Mean score of their attitudes was 0.73. According to the report of VietnamNet (2015), presently, farmers in Vietnam can develop their Japonica rice planting because Japanese companies have visited there to transfer knowledge of Japonica rice production. Furthermore, the Vietnam Food Association (VFA) has considered to develop Japonica rice as a national rice brand like Vietnam jasmine rice, scented rice and specialty sticky rice, in order to expand the outlets of Japonica rice. At present, the demand for Japonica rice is relatively high in China market, which is adjacent to Vietnam. Probably, the

market of Vietnam's Japonica rice is expanding. Besides Vietnam jasmine rice, Japonica rice is also become lucrative for Vietnam's farmers and competitor of THJR in the market.

Secondly, prices of Japonica rice in the domestic market have fluctuated. Mean score of this measurement was 0.45. One important reason that influenced the uncertainty of price was the government policy, especially the Rice Pledging Scheme. Normally, rice mills set up higher purchase price of Japonica rice than the ordinary rice at 2 THB/kg. The buyers pointed out that the government should not intervene in the paddy market like the Scheme because it destroyed the market price mechanism. Moreover, such policy affected the Japonica rice cultivation because some Japonica rice growers moved to ordinary rice cultivation in order to participate in the Scheme. Titapiwatanakun (2012) mentioned that the government gave a high purchase price; for example, 15,300 THB/ton (510 USD/ton) for jasmine rice and 10,000 THB/ton (333 USD/ton) for normal rice. According to the study on the pledging policy of Chulaphan et al. (2012), changing domestic rice price in every level, including farm gate, wholesale, retail and export levels, obviously influenced export price. This means that the policy adversely impacted the export of Thai rice.

The last problem was a quality of milled THJR, especially yellow grain. Average score of this estimation was 0.64. Some respondents had such a problem with their trading partners like distributors with rice mills, and Japanese restaurants with distributors. Of course, this problem rarely happened, or only a small amount of milled Japonica rice was yellow in color. The respondents mentioned that they did not send that rice back to suppliers, they just complained to them. In domestic market, the buyers were confident the quality of milled Japonica rice from their suppliers.

Table 6.2: Buyers attitudes towards marketing obstacles of Thailand's Japonica rice

	Contents	Frequency (n)						Mean	Justified*
		Distributors (n=4)		Retailers (n=3)		Managers of Japanese restaurants (n=4)			
		Agree	Disagree	Agree	Disagree	Agree	Disagree		
1.	Milled Japonica rice from suppliers has a good quality such as round grain, clear grain no contamination	2	2	3	0	2	2	0.64	Agree
2.	THJR is an unique product. It can be produced only the upper north	4	0	3	0	4	0	1.00	Agree
3.	Imported Japonica rice, especially from Vietnam has affected THJR business	4	0	3	0	4	0	1.00	Agree
4.	Certain trading price of Japonica rice in market (last five years)	1	3	1	2	3	1	0.45	Not sure
5.	Suitable trading price, compared to quality of Japonica rice	3	1	2	1	3	1	0.73	Agree
6.	THJR can be sold with high price rather than Japonica rice imported from Vietnam	2	2	3	0	3	1	0.73	Agree
7.	Japonica rice is easily found in the domestic market, especially in shopping malls	4	0	3	0	4	0	1.00	Agree
8.	Japonica rice was sufficiently distributed for domestic consumption	4	0	3	0	4	0	1.00	Agree
9.	No problems with your suppliers of Japonica rice (a quality of rice)	2	2	3	0	2	2	0.64	Not sure
10.	Identifying that Japonica rice was produced in Thailand on packaging is important	4	0	3	0	4	0	1.00	Agree
11.	Campaign to consume THJR need be done by the Government	4	0	3	0	4	0	1.00	Agree
12.	Information about source of THJR cultivation must be disseminated by both private and government sectors	4	0	3	0	4	0	1.00	Agree

Note: * It was justified into three categorized: 0.00-0.33: Disagree, 0.34-0.66: Not sure, and 0.67-1.00: Agree
Source: Field survey on October, 2015

According to the figures in last three issues of table above (all mean scores were 1.00), the respondents agreed that the producing source and more consumption of THJR should be promoted by both private and government sectors. It was because THJR can be well

cultivated in only upper north, which referred to the particular planted area (mean score was 1.00), or is regarded as a unique product of the North. The consumers can access such information easily because Japonica rice is easily found in the domestic market, especially in general shopping malls. Mean score of attitudes was 1.00.

6.4 Conclusion

According to the results, the process of milled Japonica rice distribution would start from rice mills in selected research sites in the northern part, particularly in Chiang Rai Province. Then, they directly reached to the buyers namely distributors, through whom, Japonica rice was distributed to retailers, Japanese restaurants and consumers. Japanese restaurants were a last main user of Japonica rice. In this food chain, rice millers were the most significant player of the Japonica rice. They stood in between the markets of paddy and milled Japonica rice, which influenced the rice market price. Their main roles in this process were the processing and packing of milled Japonica rice to distribute to buyers according to the purchase orders. Next players were distributors who are located mainly in Bangkok. They purchased milled Japonica rice from rice mills, and then they repacked those rice to small bags in order to distribute to retailers and Japanese restaurants, which both players were a final party involved in this process.

Analysis on buyer attitudes towards marketing obstacles of THJR were consisted of three aspects. The first aspect was concerned about imported Japonica rice from Vietnam. It was a key problem for development of THJR business in the domestic market, because Vietnam's Japonica rice is cheaper than Thailand's. However, in the recent years, it has decreased sharply. In 2015, Thailand imported approximately 24 tons of Japonica rice from Vietnam which decreased from 192 tons in 2014 (ICT and the Customs Department, 2015). In addition, Thailand also imported Japanese rice form Japan, which its price was 3-4 times higher than THJR. The second aspect was an unstable market price of Japonica rice in market. The Rice Pledging Scheme of government was a main factor affecting price of Japonica rice. The last aspect was quality of milled THJR, especially yellow in color of grain. Moreover, the

producing area and more consumption of THJR should be promoted by private and government sectors. These issues would positively affect to THJR marketing.

Furthermore, study on the viewpoint of consumers is needed for THJR marketing. They are a final party involved in process of THJR distribution. The following chapter will analyze Thai consumer viewpoints towards Japonica rice from the North. It is natural that consumption behavior for Japanese cuisine should influence the Japonica rice consumption. Therefore, consumers' behavior and their preference for different Japonica rice choices, will be analyzed. In addition, their attitudes toward THJR consumption in the domestic market will be evaluated, too.

Chapter 7 The perspectives of Thai consumers towards Thailand's Japonica rice from the north

Thailand's milled Japonica rice was distributed to the domestic market by starting from rice mills. However, original Japanese rice from Japan and Japonica rice of Vietnam were imported to sell in the domestic market, too. Consumers were a final party involved in such process of Japonica rice distribution. Therefore, they have many choices for Japonica rice consumption. Nevertheless, domestically grown Japonica rice may be a good choice for their consumption. This chapter will study on Thai consumers' behavior towards Japanese cuisine consumption, their evaluation of Japonica rice preference, and their attitude towards THJR consumption in the domestic market. Few studies have been conducted to survey regarding THJR consumption.

7.1 Introduction

Currently, most THJR in the domestic market originated from the upper northern provinces, especially Chiang Rai Province. This shows a great potential to produce THJR (DOA1 and DOA2 varieties) for domestic consumption. These varieties were produced only through the CF systems that could control its quality and secure a certain necessary amount. In 2014, the total consumption of Japonica rice in the domestic market was approximately 36,110 tons (CRI, 2014; ICT and the Customs Department, 2015). Milled Japonica rice was mostly used as a main food ingredient for cooking in the Japanese restaurants such as sushi. In 2015, Japanese restaurants in Thailand counted 2,364, increasing approximately 12%, compared to 2014. More than 60% of them were located in Bangkok (JRO, 2015). Moreover, 80% were located in the shopping malls, which increased approximately 20% from 2009 to 2015 (Bangkok District Office, 2015). These figures indicate that the consumers can easily access Japanese cuisine if they intend to eat out at the restaurants.

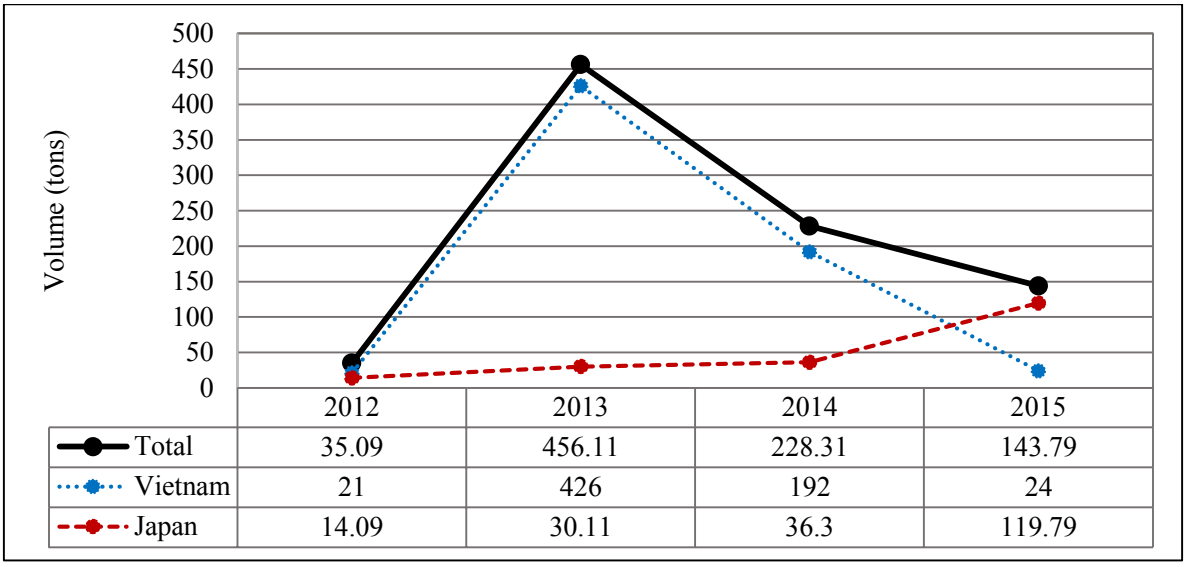
The reasons for increasing Japanese restaurants may be due to changing behavior and lifestyle of consumers such as more frequent eating out at restaurants and for realizing good

health. Thai consumers regard Japanese food as healthy food. These aspects can predict the trends of Japanese food consumption, including Japonica rice. In addition, changes of their income may lead to more consumption of Japanese food. Japanese cuisine consumers can be classified according to their spending preferences; more than 400 THB/dish, 100-400 THB/dish, and less than 100 THB/dish, or determining them as the high-end, middle class and mass consumers, respectively (Positioningmag, 2011). The consumers can easily access Japanese cuisine according to their price preferences.

Japanese food consumption has widely expanded in Thailand. The popularity of Japanese food is next to Thai foods. According to the survey of Kasikorn Research Center (2014), Thai consumers would consume Thai and Japanese foods, which accounted for 47% and 22% of them, respectively. The remainder (31%) included Chinese, Italian, Korean, and others foods. The market value of Japanese cuisine increases every year. In 2015, it was valued at 20 billion THB (1USD=36THB), which counted from chain Japanese restaurants that set their selling prices at low to medium levels (Marketeer, 2015). Considering the increases in the number of Japanese restaurants and market value of Japanese cuisine above, they reflect the increase of demand for THJR in the domestic market.

The attributes of Japonica rice affect the quality of Japanese dishes and preference of consumers. It is widely known that the owners of deluxe Japanese restaurants tend to cook Japanese cuisine with food ingredients from Japan, including imported Japanese rice to maintain an authentic original cuisine style and high quality of Japanese dishes. Figure 7.1 shows Japonica rice imports of Thailand. In 2015, Japan was the main supplier of Japanese rice with approximately 120 tons (264,624 USD), increasing from 36 tons in 2014. During the last four years, an increasing volume of Japanese rice from Japan indicated that the trend of Japanese rice consumption in the domestic market has continuously increased. The market price of imported Japanese rice is 3-4 times higher than THJR. Moreover, Thailand also imported approximately 24 tons of Japonica rice from Vietnam. The total volume of imported rice also decreased from 228 tons in 2014 to 143 tons in 2015 (ICT and the Customs Department, 2015).

Figure 7.1: Import of Japonica rice



	2012	2013	2014	2015
Total	35.09	456.11	228.31	143.79
Vietnam	21	426	192	24
Japan	14.09	30.11	36.3	119.79

Source: ICT and the Customs Department (2015)

Indeed, the perception of Thai consumers was still incorrect on Japonica rice. They have continued to understand that Thailand cannot cultivate Japonica rice with good quality. Although Japonica rice in the domestic market mostly originated from the North, they have mistaken that Japonica rice in Japanese restaurants imported from only foreign countries, especially Japan. Such misunderstanding resulted mainly from the name of 'Japonica rice'. Thai people call Japonica rice as "Khao Yi-poon"; "Yi-poon" means Japan.

The behavior and lifestyle of Thai consumers have changed, and their perception are still incorrect on Japonica rice. The objectives of this chapter addressed three aspects. Firstly, it was to investigate consumer behaviors towards Japanese cuisine consumption. This aspect estimates the trend of Japanese cuisine consumptions, which influences Japonica rice consumption. Secondly, it was to evaluate the consumers' preference for different Japonica rice choices, including Japanese rice from Japan, Japonica rice from Thailand and Vietnam. This point indicates whether THJR is comparable attributes to Japanese rice from Japan, and is similar to Vietnam's Japonica rice. Finally, the aim was to evaluate their attitudes toward

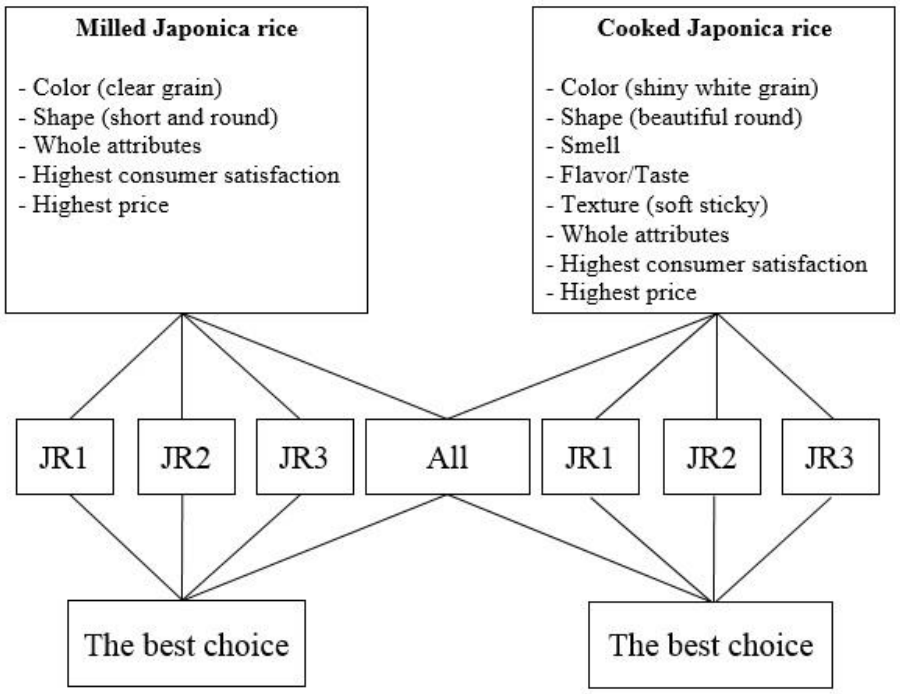
Japonica rice consumption in the domestic market. This issue refers to the recognition of consumers towards THJR consumption.

7.2 Methodology

Bangkok was selected as a study area in this research, because food businesses including chain restaurants are growing and there are more competitions. Japanese restaurants are also widely extended and more competed there. This study was based on the primary data from 385 Thai consumers in Bangkok, all of whom were selected using the purposive sampling method. They were selected the respondents based on three aspects. Firstly, they consumed Japanese cuisine for last five years continuously. Secondly, they preferred to eat Japanese cuisine next to Thai food. Finally, they ordered Japonica rice as an ingredient of dish. The data used in this study were gathered from a questionnaire survey. Descriptive statistics was employed to explain the information on background of respondents, and their behaviors on Japanese cuisine consumption, the respondents' preference for different Japonica rice choices, and their attitudes towards THJR consumption.

Evaluation of Japonica rice preference had been designed as follows: JR1 was a representative of Japanese rice from Japan, which was bought from the shopping mall in Thailand. JR2 was imported Japonica rice from Vietnam, which was purchased from an importing company. JR3 represented THJR, which was taken from the biggest Japonica rice mill located in Chiang Rai Province. The evaluation would compare between JR1, JR2 and JR3, based on the attributes as shown in Figure 7.2. Moreover, these Japonica rice were also evaluated the highest sale price and consumer satisfactions from answers of respondents. The preference evaluation for different Japonica rice choices would divide the representatives into small groups. They had to select only the best choice.

Figure 7.2: Preference evaluation of respondents for different Japonica rice choices



Source: Field survey on October, 2015

7.3 Results and Discussions

7.3.1 Socio-economic profile of respondents

In this chapter, 385 Thai consumers were selected as respondents. Table 7.1 presents the socio-economic profile of them. Female respondents accounted for 66.5% of the total, and the remainder was male. Their average age was 28 years old. About 81.6 % of them were single, and 75.3% graduated from the bachelor level. 72.7% of the total representatives were salaried employees. Moreover, 87.2% of them had more than three members in their family. Those respondents having monthly income of over 15,000 THB accounted for 66.2% of the total. In 2013, the average monthly income in Bangkok was approximately 16,400 THB per capita (National Statistical Office, 2013b).

Table 7.1: Socio-economic profile of 385 respondents

Contents			Respondents (n=385)	
			n	%
(1) Gender		Male	129	33.5
		Female	256	66.5
(2) Age	(year)	Less than 21	75	19.5
		21-25	78	20.3
		26-30	99	25.7
		31-35	71	18.4
		36-40	35	9.1
		More than 40	27	7.0
(3) Marital status		Single	314	81.6
		Married	62	16.1
		Widower/Widow	9	2.3
(4) Education level		Less than Bachelor	12	3.1
		Bachelor	290	75.3
		Master	83	21.6
(5) Occupation		Personal business	3	0.8
		Salaried employee	280	72.7
		Student	102	26.5
(6) Household-size	(person)	Less than 3	49	12.7
		3-4	225	58.4
		More than 4	111	28.9
(7) Monthly income	(THB)	Less than 15,001	130	33.8
		15,001-30,000	196	50.9
		30,001-45,000	33	8.6
		More than 45,000	26	6.7

Source: Field survey on October, 2015

7.3.2 Respondents' consumption behavior for Japanese cuisine

Table 7.2 presents the respondents' consumption behavior for Japanese cuisine. About 90% of them preferred more Japanese cuisine consumption at Japanese restaurants than home cooking. Although they can cook Japanese food at their home, consumption at Japanese restaurants is a better way because they did not have time enough to cook by themselves. The survey in 2014 of Kasikorn Research Center found that even if the price of food was higher,

51% of all representatives in Bangkok required to consume food at the restaurants in order to meet with their family and relative, especially in a special holiday.

Table 7.2: Respondents' consumption behaviors for Japanese cuisine (n=385)

Contents		Respondents	
		n	%
(1) Location of Japanese cuisine consumption	Eating out at Japanese restaurants (Every time)	346	89.9
	Sometime cooking at my home	39	10.1
(2) Meal of Japanese cuisine consumption	Dinner	216	56.1
	Lunch	169	43.9
(3) Location and name of Japanese restaurants to consume	Inside the shopping mall (three main sequences)	352	91.4
	- FJ	158	41.0
	- OS	51	13.2
	- SS	39	10.1
	- Others	104	27.1
	Outside the shopping mall (stand-alone)	33	8.6
(4) Frequency of Japanese cuisine consumption	Once a month	281	73.0
	Twice a month	52	13.5
	Thrice a month	52	13.5
(5) People who influenced Japanese cuisine consumption	Friend	176	45.7
	Myself	117	30.4
	Family	74	19.2
	Spouse	18	4.7
(6) Trend of Japanese cuisine consumption	Increased	174	45.2
	Same	144	37.4
	Decreased	67	17.4
(7) Factors influencing the selection of Japanese restaurants	Location	100	26.0
	Price	40	10.4
	Taste	129	33.5
	Brand image	20	5.3
	Quality of materials (fresh)	41	10.6
	Menu (various)	37	9.6
	Atmosphere	9	2.3
	Advertisement	9	2.3

Source: Field survey on October, 2015

The majority of the respondents had a dinner with their friends at Japanese restaurants. During the last three months, more than 70% of them visited the Japanese restaurants once a

month, which showed a higher percentage than the study of Thiangtam (2012), at 42% of all samples in Bangkok. The respondents patronized the following popular restaurant chains inside the shopping malls: FJ, OS, and SS restaurants, being 41.0%, 13.2%, and 10.1%, respectively. They chose to patronize such restaurant chains more than deluxe Japanese restaurants, because the greater number of them were salaried employees (72.7%) and had monthly incomes 30,000 THB or less (84.7%). These factors could affect their restaurant choices and the frequency of Japanese cuisine consumption.

The respondents were most satisfied with the FJ restaurant because of a good flavor of food. According to the study of Thiangtam (2012), the FJ restaurants inside the shopping malls were the most favorite of all samples in Bangkok due to a good taste and a reasonable price, at 45.1% and 24.8%, respectively. Moreover, FJ restaurants have its own large Japonica rice mill, which is located in Chiang Rai Province. It has produced and distributed Japonica rice across the country. The findings revealed that 45.2% of them showed increasing Japanese cuisine consumption during the last five years. In addition, 37.4% of them remained to consume Japanese cuisine in the same frequency. These findings implied that Japanese cuisine businesses, including supply of Japonica rice in the domestic market would still grow further.

The most concerns of respondents for selecting Japanese restaurants were flavor, location of Japanese restaurants, quality of materials (fresh), and price of Japanese dish, accounting for 33.5%, 26.0%, 10.6%, and 10.4% of them, respectively. Thiangtam (2012) and Kasikorn Research Center (2014) also found that flavor of the food was the most significant factor that influenced respondents' selection of Japanese restaurants. Therefore, the quality assurance of food ingredients, including Japonica rice is essential for the restaurants.

7.3.3 Respondents' preference for different Japonica rice choices

The preferences of respondents for the best Japonica rice choice were determined by asking them to choose from JR1 (Japanese rice from Japan), JR2 (Japonica rice from Vietnam) and

JR3 (Japonica rice of Thailand), and are presented in Table 7.3 and Figure 7.3. The respondents were not informed the source of such Japonica rice choices before they evaluated. The results indicated that JR3 was chosen as second best in all aspects, followed by JR1. The outstanding attributes of JR3 that ranked close to JR1 included smell, flavor, soft sticky texture, which accounted for 31.4%, 32.7%, and 31.2%, respectively. Musa et al. (2011) indicated that except the flavor of cooked rice, the samples liked rice that could be well-cooked and had a good feature with fine aroma.

The overall preferences of samples for JR1 and JR3 choices were 50.4% and 36.4% of them, respectively, while 13.2% preferred the overall attributes of JR2. Clearly, the respondents preferred all attributes of JR1 than the other choices, especially shape and color of grain. However, 17.7% of them indicated that the color of all cooked Japonica rice grain types were indistinguishable. The study of Azabagaoglu and Gaytancioglu (2009) pointed out that imported rice attributes were significantly different and better than domestic rice varieties in terms of good cooking, palatability and cleanliness.

In fact, JR1 is an original Japanese rice variety from Japan which have been subjected to more “favorable” factors such as quality of seeds, climate, habits of farmers, and so on. The highest price evaluation also agreed with the real market prices, which were JR1, JR3, and JR2, in descending order. As of the survey, the real market prices of JR1, JR2 and JR3 were 245 THB/kg, 70 THB/kg and 75 THB/kg, respectively. Moreover, the evaluation regarding highest consumer satisfactions found that they assessed JR1, JR3, and JR2, in descending order.

Based on the similar attributes especially smell, flavor, and soft sticky texture of JR1 and JR3, JR3 had an advantage over JR1 in the domestic market due to a cheaper price of JR3. The finding of Musa et al. (2011) was that the majority of respondents (70%) would buy local rice in the retail outlets because of a cheap price of rice. Moreover, if domestic rice price is cheaper than imported rice and its attributes are similar to imported rice, consumers will prefer more domestic rice to imported rice (Azabagaoglu and Gaytancioglu, 2009).

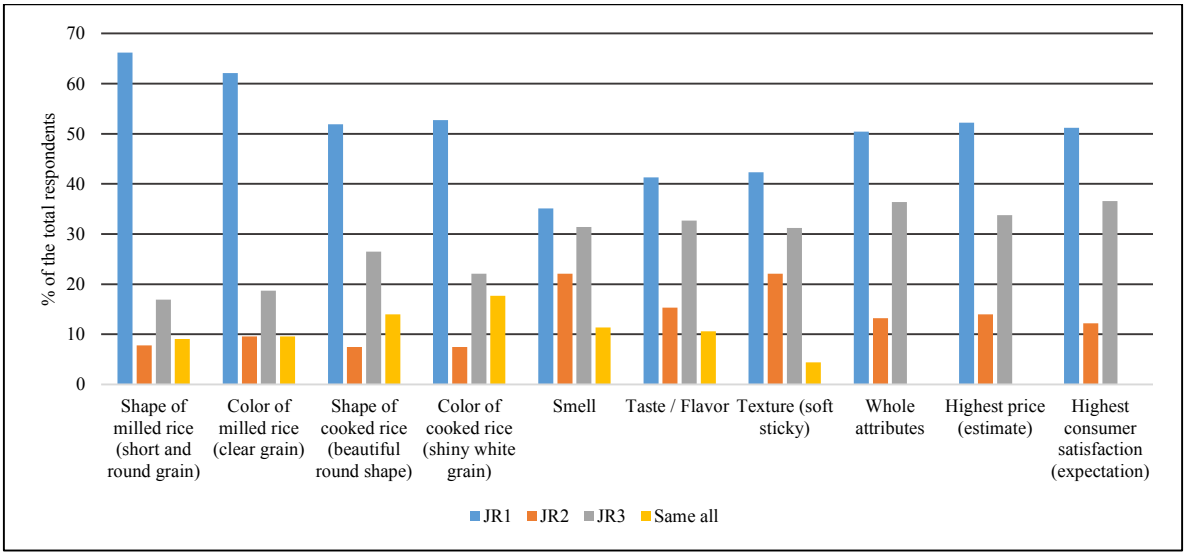
Furthermore, 22.1% of samples preferred JR2 attributes, especially soft sticky texture and smell. These aspects were not different when compared to JR3, accounted for 9.1% and 9.3% difference, respectively. Meanwhile, their preferences for milled JR2's shape and color features were close to those of JR3. However, they liked the shape and color of cooked JR3 better than JR2.

Table 7.3: Respondents' preference in each attribute of three Japonica rice choices

Attributes	Preference (Selecting the best choice)							
	JR1		JR2		JR3		All choices	
	n	%	n	%	n	%	n	%
1. Milled Japonica rice								
(1) Shape (short and round grain)	255	66.2	30	7.8	65	16.9	35	9.1
(2) Color (clear grain)	239	62.1	37	9.6	72	18.7	37	9.6
2. Cooked Japonica rice								
(1) Shape (beautiful round)	200	51.9	23	7.5	102	26.5	54	14.0
(2) Color (shiny white)	203	52.7	29	7.5	85	22.1	68	17.7
(3) Smell	135	35.1	85	22.1	121	31.4	44	11.4
(4) Taste/Flavor	159	41.3	59	15.3	126	32.7	41	10.6
(5) Texture (soft sticky)	163	42.3	85	22.1	120	31.2	17	4.4
3. Overall preferences	194	50.4	51	13.2	140	36.4	0	0
4. Highest sale price (expectation)	201	52.2	54	14.0	130	33.8	0	0
5. Highest consumer satisfactions (expectation)	197	51.2	47	12.2	141	36.6	0	0

Source: Field survey on October, 2015

Figure 7.3: Respondents' preference of different Japonica rice choices



Source: Field survey on October, 2015

7.3.4 Respondents' attitude towards Thailand's Japonica rice consumption

The mean scores of respondents' attitude towards THJR consumption are shown in Table 7.4. Before preference evaluation, the respondents disagreed that the north of Thailand can cultivate Japonica rice very well. Mean score of this measurement was 0.22. The majority of respondents (80%) did not know that Japonica rice was cultivated in Thailand. As reported of Jaroenwanit and Kantatasiri (2014), only 56.8% of all samples knew that organic jasmine rice was produced from Thung Kula Rong Hai areas in the northeast Thailand. The remainder was the respondents who did not know the producing areas of such rice, which included young and single respondents, as well as respondents with low income and a high school level or lower.

Moreover, they were not sure that Japanese restaurants in the domestic market cook and serve Japanese dishes using Japonica rice of Thailand, because they cannot distinguish between domestic and imported Japonica rice. Average score of this estimation was 0.45. In addition, they disagreed that THJR attributes are similar to the original Japanese rice imported from

Japan because of different quality of Japonica varieties. The mean score of this evaluation was 0.27. According to the finding of Azabagaoglu and Gaytancioglu (2009), the imported rice (US Calrose) was the best rice for participants because it was clean and shiny, and it had the standard length of the grains and easy-to-cook more than domestic rice varieties.

After the evaluation was finished, sources of the different Japonica rice choices were revealed to respondents. At that time, the representatives knew that Thailand, especially in the north could cultivate Japonica rice. They agreed that the northern part had a great potential to produce Japonica rice for domestic consumption, which was comparable attributes to Japanese rice imported from Japan. This assessment score was 0.92. Moreover, they agreed that the Japanese restaurants could cook and serve Japanese dishes using THJR, which score was 0.87. Its taste was comparable attribute to imported Japanese rice from Japan. Moreover, taste of food was the most important factor affecting the representatives' Japanese restaurants choosing. Domestically grown Japonica rice would be a good choice for the consumers and owners of Japanese restaurants. Some of them further explained that they would consume domestically grown Japonica rice to support the farmers in the country.

In addition, the respondents agreed that the attributes of THJR had close to those of imported Japanese rice from Japan, especially taste/flavor, smell, and soft sticky texture when cooking, which score of this evaluation was 0.63. These similar attributes imply the good image of THJR and reflect on the quality of Japonica rice seed of the CRI. All attitudes of respondents after preference evaluation were higher than before preference evaluation. Therefore, their attitude towards THJR consumption in the domestic market was positive. This estimates that they tended to consume domestically grown Japonica rice and would recommend it to other people.

Table 7.4: Respondents' attitudes towards Thailand's Japonica rice consumption (n=385)

Attitude	Before preference evaluation				After preference evaluation			
	Disagree (0)	Agree (1)	Mean	Justified*	Disagree (0)	Agree (1)	Mean	Justified*
(1) The north has a great potential to produce Japonica rice for domestic consumption	302 (78.4%)	83 (21.6%)	0.22	Disagree	33 (8.6%)	352 (91.4%)	0.92	Agree
(2) Japanese restaurants can cook and serve Japanese dishes using THJR	210 (54.5%)	175 (45.5%)	0.45	Not sure	51 (13.2%)	334 (86.8%)	0.87	Agree
(3) THJR's attributes are not quite different from Japanese rice from Japan	281 (73.0%)	104 (27.0%)	0.27	Disagree	142 (36.9%)	243 (63.1%)	0.63	Agree

Note: * It was justified into three categorized: 0.00-0.33: Disagree, 0.34-0.66: Not sure, and 0.67-1.00: Agree
Source: Field survey on October, 2015

7.4 Conclusion

Respondents in Bangkok who were mostly a salaried employee and had monthly income 30,000 THB or less, enjoyed Japanese cuisine consumption at Japanese restaurants. Their consumption was increasing when compared to the frequency of consumption in the past. Such behavior causes a sharp increase of demand for Japonica rice as well. Friends influenced their Japanese cuisine consumption. Moreover, the Japanese restaurants chains in the shopping malls were the main places patronized by them. These restaurants mostly cooked and served Japanese cuisine using THJR. The important factors for choosing Japanese restaurants by respondents were flavor, location, quality of materials (fresh) and price, in descending order. Selecting good quality food ingredients, including Japonica rice, by the owners of Japanese restaurants can improve the good taste of Japanese dishes as well.

According to the evaluation of respondents' preference for different Japonica rice choices, the results found that their first preference was Japanese rice imported from Japan (JR1). THJR (JR3) that was produced through the CF systems in the north was chosen as the second best in all attributes. JR3 had many good attributes that were comparable to the original Japanese rice varieties from Japan in terms of smell, flavor and soft sticky texture. Moreover, JR3 market price was cheaper than JR1, which was an opportunity for JR3 in the domestic market. However, Japonica rice imported from Vietnam (JR2) was a competitor product for JR3 in the domestic market because its attributes especially smell and soft sticky texture were comparable to JR3, and market price of JR2 is lower. Nevertheless, the import of JR2 is decreasing at present.

In addition, according to attitude evaluation of the respondents towards THJR consumption was generally positive due to their reliance on its superior quality. They indicated that Japonica rice of Thailand can be a good choice for cooking and serving in the domestic market.

Chapter 8 Conclusions and recommendations

This dissertation investigated the economic characteristics of Thailand's Japonica rice (THJR) production and marketing, in order to answer the main research question; "What are the actual benefits for contract farmers from the current production and marketing of THJR?" This final chapter is to provide answer this question, based on the findings of the studies presented in this dissertation. The contents of conclusion will explain in accordance with four specific questions and four particular objectives of this research.

8.1 Conclusion

8.1.1 Thailand's Japonica rice production through contract farming systems

The specific question of this section was "What are the economic characteristics of currently prevailing contract farming systems of Japonica rice in the north of Thailand?" The particular objective was to explore the economic characteristics of THJR production through CF systems. Chapter 4 described the results of this section.

Some farmers in the northern provinces, especially Chiang Rai Province have selected Japonica rice as an alternative rice to plant in farmlands, in order to increase their income. However, their income is depended on the management of the CF system conducted by particular rice mill, since Japonica rice was produced through only the CF systems. The study on characteristics of currently prevailing CF systems of Japonica rice found that the parties involved in such systems consisted of contract farmers, collectors, rice mills and the CRI (state agency). Rice mills in study area (RM1 and RM2) would provide extension services, financial support and inputs including Japonica rice seeds, fertilizers and insecticides, with contract farmers and collectors. The CRI was a main producer and supplier of Japonica rice seeds. At present, shortage of seeds with good quality is still an obstacle for the Japonica rice production in Thailand.

Rice mills modified an intermediary model to use in their business management. The collectors in both rice mills were main players in CF systems. They stood in between a particular rice mill and contract farmers. They acted as a local coordinator and consultant for their contract farmers, which received a commission and transportation fees from their contract rice mill. Each rice mill had a different management policy in such charges. Moreover, rice mills adopted distinct management policy on signing a contract. The operation of RM1 was based on a written contract with his collectors and farmers in each group to make a confidence among them. On the other hand, the management of RM2 was based on a verbal contract because the owner of RM2 had more experience on Japonica rice contract farming (JRCF) and had more familiarity with his collectors and contract farmers.

Moreover, each rice mill set up a different secured purchase price based on the quality of paddy and rice season. A strategy of pricing, especially in RM1 could attract farmers to participate in this production system. Normally, they decided a higher purchase price of Japonica rice than that of ordinary rice at 2 THB/kg. This pricing policy reflected market prices of Japonica rice. From viewpoints of growers, JRCF had the advantages, especially a high contract price, yield of paddy (600-1,000 kg/rai), and assured market for their paddy. However, they found some problems in JRCF, especially in RM2. They mentioned that the owner of RM2 delayed payment and reduced a purchase price which did not follow an agreement. These aspects would influence the farmers' participation in next JRCF.

8.1.2 Costs and earnings of Japonica rice growers

The question of this aspect was "How are the economic structures of Japonica rice farming? Do the prevailing CF systems enhance income of growers in the North?" The objective was to analyze costs and earnings of Japonica rice growers in selected research sites in the northern provinces, particularly in Chiang Rai Province. The details of this result were included in Chapter 5.

According to the systems of JRCF, a rice mill would provide extension services and agricultural inputs for contract farmers through their collectors. In fact, the contract farmers can buy inputs, especially fertilizers and insecticides from any other suppliers who sell cheaper price than particular rice mill. On the other hand, the collector who also planted Japonica rice would mostly purchase fertilizers on credit from their rice mill. They stocked and sold such inputs to their farmers, and used for their Japonica rice farming. The study found that the average of total variable costs by transplanting method in major rice season included the major input cost (41.1%) and the charge of labors (58.9%). The labor cost composed of the process fees of planting (36.1%) and harvesting (22.8%). A tractor and a harvester machine were mostly provided by collectors.

The main cost of major input was fertilizer. Its expense (27.6%) was higher than the charges of seed (8.6%) and insecticide (4.9%). Such a high cost of fertilizer was derived from a thorough taking care in Japonica rice fields of growers. As a result, the collectors who used fertilizers from particular rice mill had higher total production costs than contract farmers. This indicates that the high price of fertilizer in CF systems influenced the cost of Japonica rice production. However, the growers gained better knowledge in cultivation practices and other support services, except fertilizer supply from extension officers of rice mills. These services resulted in growers could produce Japonica rice with high yield of paddy, which was a positive factor affecting earning of growers. Moreover, JRCF had a lower production cost and higher earning, compared to non-contract glutinous rice farming in the same region. The average purchase price and yield of Japonica rice paddy was higher than that of glutinous rice paddy. Therefore, the prevailing systems of JRCF enhance earning of growers in Chiang Rai Province.

8.1.3 The marketing system of Thailand's Japonica rice

The research question under this study was "What is the current marketing system of THJR in the domestic market?" The objective of this research was to examine its current marketing system. The Chapter 6 presented the content details of this purpose.

According to the study on the current marketing system of THJR in the domestic market, rice millers were the final buyers of paddy and the first sellers of milled Japonica rice. They were the most important player for connecting small farmers to demanding markets, particularly in a specialty rice market. Moreover, they had an important role affecting the market price of Japonica rice. The distribution channel of milled THJR involved with four parties as follows: rice mills, distributors, retailers and Japanese restaurants. During the period from 2014 to 2015, the buyers (distributors, retailers and Japanese restaurants) continued to purchase milled THJR from their suppliers with the same volume. Four rice mills in Chiang Rai Province produced and sold milled Japonica rice directly to the distributors according to the purchasing order (200 tons/month or less). After that, distributors who are located mostly in Bangkok would clean and repack the polished Japonica rice to retailers (30%) and Japanese restaurants (70%). Therefore, the main users of such rice were Japanese restaurants (360 kg/month or less). With regard to the largest Japonica rice mill in study area, the polished Japonica rice was chiefly distributed to Japanese restaurants branches across the country (97%).

From viewpoints of buyers towards the marketing obstacles of THJR, the results found three important aspects. Firstly, it was imported Japonica rice form Vietnam because of a cheaper price. Although import of such Japonica rice is decreasing, it is still as a key rival of THJR. Secondly, it was an unsteady market price of Japonica rice in market. The respondents mentioned that the Rice Pledging Scheme was a most important factor influencing price of Japonica rice. A higher purchase price of ordinary paddy under the scheme had a further impact on Japonica rice production cost of rice mills, which also influenced the price of milled Japonica rice in market. Generally, paddy price of Japonica rice is set up by rice mills, which has a 2 THB/kg higher than price of ordinary rice. Thirdly, a quality of milled THJR, especially yellow grain was a problem in market, however, this aspect occurred in a small volume.

8.1.4 Thai consumer perspectives towards Thailand's Japonica rice

The question of this topic was "Are the attitudes of Thai consumers toward THJR consumption moving in a positive direction?" The objective was to evaluate the perspectives of Thai consumers towards THJR consumption. The results of this purpose were presented in Chapter 7.

The consumers were a final party involved in the process of Japonica rice distribution in domestic market, which their behavior for Japanese cuisine consumption should influence the Japonica rice consumption. The results of this study found that the majority of respondents in Bangkok liked to consume Japanese cuisine at Japanese restaurants. About 73% of the total respondents visited Japanese restaurants once a month. During the last five years, 45.2% of the respondents increased to consume Japanese cuisine at the restaurants. About 37.4% remained to eat such cuisine in the same frequency. This indicates an increasing demand for Japanese cuisine, including Japonica rice, would remain to grow in the domestic market.

Moreover, this research evaluated respondents' preference for different Japonica rice choices and their attitudes toward THJR consumption. The results presented that they preferred JR3 (THJR) as the second best in all aspects, followed by JR1 (Japanese rice imported from Japan). The outstanding attributes of JR3 comprising flavor, smell and soft sticky texture were similar to the original Japanese rice from Japan. The retail price of JR3 during the survey was cheaper than JR1, with an advantage over JR1 in the domestic market. The attributes including soft sticky texture and smell of JR2 (Japonica rice imported from Vietnam) were not much different when compared to JR3. However, JR2 market price was really cheaper than JR3, which was an opportunity for JR2 in the domestic market. In evaluation of their attitudes toward THJR consumption, they had a positive perspective due to its reliable quality. They indicated that THJR that was produced through CF systems can be a good choice for domestic consumption.

8.1.5 The benefits from production and marketing of Thailand's Japonica rice for farmers

The main research question of this dissertation was "What are the actual benefits for contract farmers from the current production and marketing of THJR?" The purpose was to investigate the farmers' benefit from current production and marketing of THJR. According to the findings of Chapter 4 to 7, farmers in the selected areas received the actual benefits from current THJR production and marketing. In part of Japonica rice production through CF systems, they obtained a high contract price and yield of paddy, thereby increasing their income. Moreover, the system had an assured market for paddy of contract farmers because a particular rice mill would buy the total paddy. The contracts in this study were categorized into the production management contract. Contract farmers got an extension service, technical knowledge, agricultural inputs and financial support provided by their rice mill. The management within the system of JRCF was quite flexible. The contract farmers did not need to buy fertilizers provided by their rice mill. They could purchase inputs from other suppliers who sold with a cheaper market price. If the farmers bought fertilizers from the particular rice mill like the collectors, they would have higher production costs influencing their income. Consequently, farmers could reduce slightly production cost by purchasing inputs, especially fertilizers from outside the contract.

The current study indicated that the better knowledge of cultivation practices and other support services from extension officers of contract rice mill, except fertilizer supply would help contract farmers produce Japonica rice with a high yield. Considering other rice cultivation in the same area such as non-contract glutinous rice (RD6), Japonica rice farmers had lower production costs and got higher income. This means that selecting Japonica rice cultivation make more benefit for farmers, especially in Chiang Rai Province. From in-depth interviewing, the buyers, including distributors, retailers and Japanese restaurants continued to purchase milled THJR from their suppliers with the same amount. Some rice mills would increase the volume of production in accordance with the increasing demands of Japonica rice. These aspects imply that domestic consumption of Japonica rice still grow continuously. Thai consumers who were the respondents of this research are increasing to consume

Japanese cuisine, which causes a sharp increase of demand for Japonica rice as well. Furthermore, their attitude toward THJR consumption was generally positive. They indicated that THJR can be a good alternative rice for domestic consumption. These viewpoints have a positive impact on Japonica rice farming of farmers. If the market still need THJR, the farmers can receive more income from JRCF.

8.2 Recommendation

According to these conclusions, this dissertation will give some recommendations for the future THJR production and marketing as follows. These recommendations below strongly targeted for Thai government, especially the CRI and Department of Agriculture because they highly involve with Japonica rice production.

8.2.1 Improving and developing a quality of Thailand's Japonica rice seed

Under a CF system, the CRI is a main producer of Japonica rice seed for contract rice mills. Although THJR, including DOA1 and DOA2 resist to hot weather and are stronger than other Japonica rice varieties in the seed storage room of the CRI, they are still susceptible to blast disease, especially in condition of high humidity. Therefore, the CRI should improve and develop a quality of Japonica rice seed continuously, in order to be more suitable for the environment in the northern region and more resist to such disease.

8.2.2 Promoting Japonica rice cultivation through the GAP system

Since 2014, the government, especially the CRI and Department of Agriculture have encouraged contract farmers to plant Japonica rice through systems of Good Agricultural Practice (GAP). The statistical data on the number of contract farmers who joined the GAP system are still unclear. During the survey, some contract farmers did not participate in this system. Therefore, the government should encourage farmers cultivate Japonica rice through GAP systems more and more, in order to raise the standards of production, and to expand

exports to foreign countries. Moreover, the rice mills should produce milled Japonica rice by adapting the Good Manufacturing Practice (GMP) to guarantee the food safety for consumers.

8.2.3 Collecting statistical data on Japonica rice production for providing actual information

Japonica rice production through the CF systems by rice mills have conducted more than 30 years. No statistical data show the numbers of planted areas, contract farmers, volume of production, yield of paddy, and so on. Many state agencies, especially the CRI and Department of Agriculture in Chiang Rai Province require many statistical data on Japonica rice production from rice mills. Therefore, they should combine such data together, in order to collect as agricultural statistics, and to provide actual information in Japonica rice production for using in future studies.

8.2.4 Promoting the use of fertilizers in an appropriate amount

The findings indicated that high price of fertilizer in the systems of JRCF influenced production cost of farmers, resulting in reduced income. Their production cost could decrease slightly if they purchased fertilizers from other suppliers who gave a price cheaper than the CF system. However, in fact, they used it with an inappropriate amounts; as a results, their production cost increased. They should be more promoted the use of fertilizers in an appropriate amount by following the CRI's guidelines and extension officers of contract rice mills to reduce production cost.

8.2.5 Promoting the producing source of Thailand's Japonica rice

According to the interviewing in Thai consumers, the majority of respondents did not know the producing areas of Japonica rice in Thailand. Therefore, the government and private sectors should promote such aspect, including a quality of THJR, in order to show a great

potential of THJR production for consumption in the domestic market, and to reduce the use of Japonica rice imported from other countries.

8.2.6 Improving a management in contract farming system of rice mill

According to the results, rice mills especially RM2 delayed payment due to the lack of liquidity, and reduced a contract price. He did not in follow an agreement. These aspects would influence Japonica rice farming of farmers in next crop. Consequently, he should improve a management in system of JRCF, which may prepare reserve money for use in case of emergency. Moreover, he should purchase paddy from contract farmers by following a contract price, in order to guarantee income of farmers.

8.2.7 Forming a group of Japonica rice farmers without contract with rice mills

There was much difference between retail price in the markets and paddy price that contract farmers received. This aspect may lead to forming a group of Japonica rice farmers to sell directly to consumers or Japanese restaurants, or selling via e-commerce system, or opening the farmer shop, without contract with rice mills. The possibility of forming such a group may be based on the principle of cooperative for strengthening the negotiation power in the market. The government may help farmers in terms of investment in a small rice mill and transfer of knowledge regarding a management within group, as well as finding a marketing channel for milled Japonica rice. The government should do these aspects more than financial subsidy that is only a short-term solution.

References

[1] Abbeam, G.D., Armed, M. and Baidoo, F. 2014. Determinants of consumer preferences for local rice in Tamale Metropolis, Ghana. International Journal of Education and Social Science, 1(2), 114-122.

[2] Akbar, S. and James, P.TJ. 2014. Consumers' attitude towards online shopping: Factors influencing employees of crazy domains to shop online. Journal of Management and Marketing Research, 14(1), 1-11.

[3] Alfred, S.D.Y. and Adekayode, A.B. 2014. Consumers' attitude towards local rice production and consumption in Ondo State, Nigeria. Journal of Agricultural Extension and Rural Development, 6(7), 242-248.

[4] Anang, B.T., Adjetey, S.N.A. and Abiriwe, S.A. 2011. Consumer preferences for rice quality characteristics and the effects on price in the Tamale Metropolis, Northern Region, Ghana. International Journal of AgriScience, 1(2): 67-74.

[5] Arayaphong, S. 2012. Cost-benefit analysis of different rice cropping systems in Thailand. Uppsala University, Uppsala.

[6] Arunmas, P. 2016. Rice exporters pessimistic about market prospects. Online: http://www.bangkokpost.com/archive/rice-exporters-pessimistic-about-market-prospects/842220 (accessed May, 2016).

[7] Aygen, F.G. 2012. Attitudes and Behavior of Turkish Consumers With Respect to Organic Foods. International Journal of Business and Social Science, 3(18), 262-273.

[8] Ayuwat, D. and Phoumanivong, S. 2013. The impacts of contract farming on rural farm households, Lao PDR. Proceedings of ISS & MLB, Nagoya, Japan, 937-950.

[9] Azabagaoglu, M.O. and Gaytancioglu, O. 2009. Analyzing consumer preference to different rice varieties in Turkey. Agricultura Tropica et Subtropica, 42(3), 118-125.

[10] Bangkok District Office. 2015. The number of the shopping malls in Bangkok. Online: http://203.155.220.230/bmainfo/esp/social/social_9.htm (accessed December, 2015).

[11] Basha, M.B., Mason, C., Shamsudin, M.F., Hussain, H.I. and Salem, M.A. 2015. Consumers attitude towards organic food. Procedia Economics and Finance, 31(2015), 444-452.

[12] Bijman, J. 2008. Contract farming in developing countries: an overview. Online: https://www.wageningenur.nl/upload_mm/5/c/b/79333121-6f4b-4f86-9e8e-0a1782e784d6_ReviewContractFarming.pdf (accessed August, 2016).

[13] Chainuvati, C. and Athipanan, W. 2001. Crop diversification in Thailand. FAO. 182 pp.

[14] Chamberlain, A.J., Kelley, K.M. and Hyde, J. 2013. Comparing consumer preferences for locally grown and certified organic produce in the Mid-Atlantic Region of the United States. Journal of HortTechnology, 23(1), 74-81.

[15] Champika, P.A.J. and Abeywickrama, L.M. 2014. An evaluation of maize contract farming system in Sri Lanka: Adoption, problems and future prospects. Tropical Agricultural Research, 26(1), 62-73.

[16] Chiang Rai Governor Office. 2016. The conclusion of Chiang Rai province situation. Online: http://www.chiangrai.net/cpwp/?wpfb_dl=158 (accessed August, 2016).

[17] Chiang Rai Province Statistical Office. 2013. Agricultural census of Chiang Rai province in 2013. Online: http://chiangrai.old.nso.go.th/nso/project/search/result_by_department.jsp (accessed August, 2016).

[18] Chiang Rai Rice Research Center. 2014. Research and development of Japonica rice in Thailand.

[19] Chouichom, S. 2011. Adoption of organic rice farming in northeast Thailand: A case study on farmers' opinions, attitudes and practices. Doctoral thesis, Department of Bioresource Science, Graduate School of Biosphere Science, Hiroshima University, Japan. 159 pp.

[20] Chulaphan, W., Chen, S., Jatuporn, C. and Jierwiriyapant, P. 2012 Causal impact price transmission of the rice markets in Thailand. Proceedings of the 2nd IASTED Asian Conference on Modelling, Identification and Control (AsiaMIC 2012), Thailand.

[21] Department of Business Development. 2015. The business of restaurants in June 2015. Online: http://www.dbd.go.th/download/document_file/Statisic/2558/T26_201506.pdf (accessed January, 2016).

[22] Department of Foreign Trade. 2015. Thailand's rice industry in 2015-2016. Online: http://www.dft.go.th/LinkClick.aspx?fileticket=p6iLTgSSD_4%3D&tabid=401 (accessed October, 2015).

[23] Department of Industry Promotion. 2009. Study on the possibility of making rice silos in Thailand. Bangkok, 104 pp.

[24] Department of Tourism. 2015. International tourist arrivals to Thailand by nationality in 2015. Online: http://newdot2.samartmultimedia.com/home/details/11/221/24246 (accessed August, 2016).

[25] Eaton, C. and Shepherd, A.W. 2001. Contract farming: Partnerships for growth. FAO Agricultural Services Bulletin No. 145, Food and Agriculture Organization, Italy. 182 pp.

[26] Ekasingh, B., Sungkapitux, C., Kitchaicharoen, J. and Suebpongsang, P. 2007. Competitive commercial agriculture in the Northeast of Thailand. Chiang Mai University. 181 pp.

[27] Ekasingh, B., Kitchaicharoen, J. and Suebpongsung, P. 2014. Return, risk and the effect on economic and social of farmer in contract farming system. Chiang Mai University, 128 pp.

[28] FAO. 2012. Guiding principles for responsible contract farming operations. Online: http://www.fao.org/docrep/016/i2858e/i2858e.pdf (accessed December, 2014).

[29] FAO. 2013. Contract farming for inclusive market access. Rome, 227 pp.

[30] FAOSTAT. 2013. Statistic Division of the FAO, Food Balance Sheets for Rice (Milled Equivalent) in Thailand. Online: http://faostat3.fao.org/download/FB/FBS/E (accessed July, 2016).

[31] Farah, A.A., Zainalabidin, M. and Ismail, A.L. 2011. The influence of socio-demographic factors and product attributes on attitudes towards purchasing special rice among Malaysian consumers. International Food Research Journal, 18(3), 1135-1142.

[32] Feldmann, C. and Hamm, U. 2015. Consumers' perceptions and preferences for local food: A review. Journal of Food Quality and Preference, 40(2015), 152-164.

[33] Ghose, S. and Lowengart, O. 2013. Consumer choice and preference for brand categories. Journal of Marketing Analytics, 1(1), 3-17.

[34] Goss, J., Burch, D. and Rickson, R.E. 2000. Agri-food restructuring and third world transnationals: Thailand, the CP Group and the global shrimp industry. World Development, 28(3), 513-530.

[35] Government Public Relations Department. 2015. Thai rice policies and strategies. Online: http://thailand.prd.go.th/ewt_news.php?nid=1764&filename=index (accessed July, 2016).

[36] Homjumjung, W. and Sriwaranun, Y. 2015. Technology implementation to reduce rice production cost. Journal of Khon Kaen Agriculture, 43(1), 744-748.

[37] Ibitoye, O.O., Nawi, N.M., Man, N. and Kamarulzaman, N.H. 2014. Factors influencing consumers' purchasing behavior towards organic rice in Malaysia. World Applied Sciences Journal, 32(4), 611-617.

[38] Information and Communication Technology Center with cooperation of the Customs Department. 2015. Export and import of Thailand's white non glutinous rice of Japonica rice 100 %. Online: http://www2.ops3.moc.go.th/ (accessed November, 2015).

[39] International Rice Research Institute. 2015a. Trends in global rice trade. Online: http://irri.org/rice-today/trends-in-global-rice-trade (accessed October, 2016).

[40] International Rice Research Institute. 2015b. The changing rice production in ASEAN Countries. Online: http://www.thairice.org/doc_dl/meeting-2558/rice-production-eng.pdf (accessed May, 2016).

[41] Isvilanonda, S. 2010. Thai rice: Structural changes of rice production and marketing channel. Knowledge Network Institute of Thailand. 103 pp.

[42] Itharattana, K. 1999. Effects of trade liberalization on agriculture in Thailand: Commodity aspects. Working paper 49, The CGPRT Centre, 118 pp.

[43] Jaroenwanit, P. and Kantatasiri, P. 2014. Consumer perception and attitude study for market development of Hommali organic rice products from Thung Kula, Thailand. Greater Mekong Sub region Academic and Research Network International Journal, 8(2014), 89-96.

[44] Jierwiriyapant, P., Liangphansakul, O. and Chulaphun, W. 2012. Structure and conduct of the purple rice market in northern Thailand. International Journal of Environmental and Rural Development, 3(2), 146-149.

[45] Jisana, T.K. 2014. Consumer behaviour models: An overview. Sai Om Journal of Commerce & Management, 1(5), 34-43.

[46] Jones, J.M. and Sheats, D.B. 2016. Consumer trends in grain consumption. Online: http://scitechconnect.elsevier.com/wp-content/uploads/2015/12/Consumer-Trends-in-Grain-Consumption-1.pdf (accessed July, 2016).

[47] JRO. 2015. Japanese foods market trend finding 2015 in Thailand. Online: http://jronet.org.e.rl.hp.transer.com/topics/2015/thailand-data/ (accessed January, 2016).

[48] Kaewmaneechai, K. 2001. An analysis of cost-benefit and risk of asparagus production comparing between toxic-free productions under contract farming system versus traditional production in Nakhon Pathom Province. Master's thesis in agricultural economics, Kasetsart University, Bangkok, Thailand.

[49] Kasikorn Research Center. 2010. Japanese restaurant. Online: https://www.kasikornresearch.com/th/KEconAnalysis/Pages/ViewSummary.aspx?docid=30263 (accessed Dec, 2014).

[50] Kasikorn Research Center. 2014. The competition of restaurant in domestic market. Online: http://www.thaichamber.org/userfiles/file/ (accessed December, 2015).

[51] Katchawattana, P. 2015. Let's be a farmer and let's cultivate rice. Amarin Printing & Publishing. Bangkok. 78 pp.

[52] Kaur, P. 2014. Contract farming of potatoes: A case study of PEPSICO Plant. International Journal of Scientific and Research Publications, 4(6), 1-5.

[53] Klakhai, M. 2012. Marketing agreements: Concepts, principles and practices. Online: http://www.edoae.doae.go.th/article%20191012%201.pdf (accessed September, 2014).

[54] Kongsom, W. and Kongsom, C. 2016. Consumer behavior and knowledge on organic products in Thailand. World Academy of Science, Engineering and Technology, International Science Index, Agricultural and Biosystems Engineering, 3(8), 1102.

[55] Kotler, P. and Armstrong, G. 2012. Principle of marketing. 14th edition, English, Upper Saddle, River, N.J: Prentice Hall.

[56] Kulreangsub, N. 2015. Organic rice in Chiang Rai province for improving farmers' wealth. Journal of Agricultural Economics, 61(701), 6-8.

[57] Kunthongjan, S. 2013. Cost and benet analysis of cabbage production of Lao farmers under Thai-Laos contract farming. Journal of Business, 36(140), 56-70.

[58] Laosunthara, C., Puddhanon, P., Peng-ont, D., Rungkawat, N. and Krajangchom, S. 2015. Organic Rice Growing Potentials in Chiang Rai Province. Online: http://icehm.org/upload/4096ED0315053.pdf (accessed August, 2016).

[59] Limnirankul, B., Yibmantasiri, P., Maungsuk, C. and Kramol, P. 2006. Contract farming with opportunity to develop agriculture of small-scale farmers. Online: http://www.mcc.cmu.ac.th/research/MCCannualSeminar2006/link/pdf/13_ MCC2006.pdf. (accessed September, 2014).

[60] Limsombunchai, V. and Kao-ian, S. 2010. Baby corn production under a contract farming system. Kasetsart journal, 31(3), 472-478.

[61] Maneechansook, C. 2011. Value chain of rice exported from Thailand to Sweden. Master's thesis in Business Administration. School of Business and Informatics. University of Boras. Boras. 43 pp.

[62] Makasiri, C., Bumrungthai, N., Santaweesuk, K. and Pahuyut, D. 2011. A review of rice market structure in Thailand. The Thailand Research Fund. 246 pp.

[63] Man, N. and Nawi, N.M. 2010. The participation of Malaysian fresh fruit and vegetable farmers in contract farming. American Journal of Agricultural and Biological Sciences, 5(3), 321-330.

[64] Marketeer. 2015. The market of Japanese restaurants. Online: http://marketeer.co.th/archives/62608 (accessed April, 2015).

[65] McMichael, P. 2009. A food regime analysis of the 'world food crisis'. Agriculture and Human Values, 26(4), 281–295.

[66] Mighell, R.L. and Jones L.A. 1963. Vertical coordination in agriculture. AER-19, USDA, Washington.

[67] Ministry of Commerce. 2016. Price of rice in May 2016. Online: http://www.moc.go.th/index.php/rice-service-all/category/category-product007.html (accessed October, 2016).

[68] Minot, N. 2007. Contract farming in developing countries: Patterns, impact, and policy implications. Case study #6-3 of the program: Food policy for developing countries- The role of government in the global food system. Cornell University, Ithaca, New York.

[69] Musa, M., Othman, N. and Fatah, F.A. 2011. Determinants of consumers purchasing behavior for rice in Malaysia. American International Journal of Contemporary Research, 1(3), 159-167.

[70] Muthayya, S., Sugimoto, J.D., Montgomery, S. and Maberly, G.F. 2014. An overview of global rice production, supply, trade and consumption. Annals of the New York Academy of Sciences, 1324(1), 7-14.

[71] National Statistical Office. 2013a. 2013 Agricultural census whole kingdom. Ministry of Information and Communication Technology. 187 pp.

[72] National Statistic Office. 2013b. Average monthly income and expenditure per household by region and province: 1996-2014. Online: http://service.nso.go.th/nso/nsopublish/themes/population.html (accessed August, 2016).

[73] Nielsen, T.K. 2004. Paddy cultivation. Online: http://www.kellnielsen.dk/download/Paddy.pdf (accessed July, 2016).

[74] Office of Agricultural Economics. 2013. Background of Agricultural Economics 2013. Ministry of Agriculture and Cooperative.

[75] Office of Agricultural Economics. 2014a. Agricultural Statistics of Thailand 2014. Ministry of Agriculture and Cooperative.

[76] Office of Agricultural Economics. 2014b. Background of Agricultural Economics 2014. Ministry of Agriculture and Cooperative.

[77] Office of Agricultural Economics. 2014c. Average cost of rice production in major and second rice crops in 2014. Ministry of Agriculture and Cooperative.

[78] Office of Agricultural Economics. 2014d. Agricultural Economic Outlook in 2014 and trend in 2015. Ministry of Agriculture and Cooperative.

[79] Office of Agricultural Economics. 2015a. Agricultural Statistics of Thailand 2015. Ministry of Agriculture and Cooperative.

[80] Office of Agricultural Economics. 2015b. Background of Agricultural Economics 2015. Ministry of Agriculture and Cooperative.

[81] Office of Agricultural Economics. 2015c. Road map for improving the production structure. Journal of Agricultural Economics, 61(704), 2-3.

[82] Office of Agricultural Economics. 2015d. The retail price of fertilizer. Online: http://www.oae.go.th/economicdata/retailpes.html (accessed August, 2016).

[83] Office of Agricultural Economics. 2015e. Japonica rice production to increase income of farmers. Online: http://www.oae.go.th/ewt_news.php?nid=19398&filename=news (accessed September, 2016).

[84] Office of Agricultural Economics. 2015f. Chiang Rai Province is the source of rice and water of the upper north. Journal of Agricultural Economics, 61(700), 4-5.

[85] Palidta, C. 2014. Analyzing cost and income of crops under the contract farming system: A case study of small farmers in Wiang Pa Pao district, Chiang Rai province, Thailand. Chiang Mai University, 87 pp.

[86] Pansin, K. and Khamkaew, T. 2012. Report on contract farming in Thailand. Online: http://wiego.org/sites/wiego.org/files/publications/files/T04.pdf. (accessed December, 2014).

[87] Perner, L. 2010. Consumer behavior: the psychology of marketing. Online: https://www.linkedin.com/pulse/understanding-consumer-attitudes-gregory-dean (accessed July, 2016).

[88] Peterson, H.C., Wysocki, A. and Harsh, S.B. 2001. Strategic choice along the vertical coordination continuum. International Food and Agribusiness Management Review, 4(2001), 149-166.

[89] Peterson, H.H. and Yoshida, K. 2004. Quality perceptions and willingness-to-pay for imported rice in Japan. Journal of Agricultural and Applied Economics, 36(1), 123-141.

[90] Positioningmag. 2011. Key success of Japanese foods. Online: http://www.positioningmag.com/content/key-success (accessed December, 2015).

[91] Prowse, M. 2012. Contract farming in developing countries: A review, Research Department, AFD, France.

[92] Putsyainunt, B., Yongvanit, S. and Kunurat, P. 2014. Agricultural contract farming with social and community economy adaptation: A case study-Hin Tang Village Moo 7 Non Khong Sub District, Ban Phang District, KhonKaen Province. Asian Social Science, 10(8), 20-29.

[93] Rice Department. 2013a. Zoning of rice cultivation. Online: http://www.thairice.org/doc_dl/doc-zoning/kingkraw.pdf (accessed May, 2016).

[94] Rice Department. 2013b. Reducing the cost of rice production. Rice Product Development Division. 39 pp.

[95] Rice Department. 2014a. Rice groups in the niche market. Online: http://www.ricethailand.go.th/home/index.php?option=com_content&view=article&id=2999:-18-57&catid=139:2014-12-03-10-15-15 (accessed May, 2016).

[96] Rice Department. 2014b. The Third Thai Rice Strategic Plan (2015-2019). Online: http://www.ricethailand.go.th/home/images/pdf/brps/412578.pdf (accessed July, 2016).

[97] Rice Department. 2014c. Rice production standards to consumers. Online: http://www.ricethailand.go.th/home/index.php?option=com_content&view=article&id=1734:2014-07-09-03-35-04&catid=14:2012-01-31-06-16-00 (accessed August, 2016).

[98] Ruammek, P. 2014. The business model and critical success factors of contract farming in Thailand: A case study of swine contract farming. Journal of Business Administration, 37(141), 48-71.

[99] Ruensuk, N. and Binahamad, S. 2014. Comparing rice cropping system between 2 crops/year and 3 crops/year in irrigated area. Proceeding of rice research conference 2013: Rice research center groups in central, eastern and western regions, Pathum Thani (Thailand), 128-139.

[100] Sahavacharin, N. and Srinon, R. 2016. The influence of price transmission on Thai Hom Mali rice supply chain. Proceedings of the International MultiConference of Engineers and Computer Scientists, Hong Kong.

[101] Sajjad, M., Khan, M., Khan, D., Mulk, S. and Nazir, M. 2008. An investigation into marketing channels and margin of rice in district Malakand. Sarhad Journal of Agriculture, 24(3), 479-484.

[102] Sansong, P. 2012. Analysis of cost and returns on investment of rice farms of farmers in Nakhonsawan Province 2012. Paper presented at the Phayao Research Conference 2014, Phayao University. Thailand. 23-24 January. 906-912 pp.

[103] Satake Corporation. n.d. Rice processing system. Japan.

[104] Seemanon, K., Sanguanwongse, V., Titapiwatanakun, B., Sirisupluxana, P., Kikuchi, P., and Yamao, M. 2015. Preparing agricultural product marketing for the new AEC market: A case study for improving the Marketing Organization for Farmers in Chiang Rai Province, Thailand. Journal of Agricultural Extension and Rural Development, 7(4), 105-113.

[105] Silva, J.L., Samah, B.A., Uli, J. and Shaffril, H.A.M. 2011. Towards developing a framework on acceptance of sustainable agriculture among contract farming entrepreneurs. African Journal of Business Management, 5(20), 8110-8116.

[106] Simmons, P., Winters, P. and Patrick, I. 2005. An analysis of contract farming in East Java, Bali, and Lombok, Indonesia. Agricultural Economics, 33(3), 513-525.

[107] Singh, S. 2005a. Role of the state in contract farming in Thailand: Experience and lessons. ASEAN Economic Bulletin, 22(2), 217228.

[108] Singh, S. 2005b. Contract farming for agricultural development: Review of theory and practice with special reference to India. The Centre for Trade and Development (Centad), India.

[109] Sittisak, P., Chumthong, P. and Rungkawat, N. 2014. The farmers' production and marketing of Sang Yod rice in Phattalung province. Journal of Khon Kaen Agriculture, 42(1), 493-498.

[110] Songsrirod, N. 2007. Technical efficiency and the determinants of technical inefficiency on convention and certified organic Jasmine rice farms in Yasothon province. Bangkok. Doctor of Philosophy Thesis, Kasetsart University.

[111] Sriboonchitta, S. and Wiboonpoongse, A. 2005. Analysis of contract farming in Thailand. Journal of Chiang Mai University, 4(3), 361-385.

[112] Sriboonchitta, S. and Wiboonpoongse, A. 2008. Overview of contract farming in Thailand: Lessons learned. ADBI, Discussion Paper No.112, Tokyo: Asian Development Bank Institute.

[113] Sricham, J., Kuhaswonvetch, S. and Rojniruttikul, N. 2014. Purchasing behavior of organic rice of consumers in Bangkok metropolitan area. Proceeding of Annual Tokyo Business Research Conference, 15-16 December 2014, Waseda University, Tokyo, Japan,

[114] Srisompun, O. 2014. Production structure and marketing of Thai Jasmine rice. Thailand Research Fund and Knowledge Network Institute of Thailand, Bangkok, 177 pp.

[115] Strategy and Evaluation Department. 2014. Statistics of Bangkok in 2014. Bangkok, 320 pp.

[116] Suchato, R. 2013. Analyzing Thai rice supply chain: A case study of packed Jasmine rice. E-newsletter: Agricultural policy research, 1(1), 2-6.

[117] Suksutti, S. 2015. The reducing of rice production cost of Thai government. Journal of Agricultural Economics, 61(704), 4-6.

[118] Supakornchuwong, C. and Suwannaporn, P. 2012. Attitudes towards rice compared with potatoes and pasta among British, French, Dutch and Belgian consumers. Journal of Sensory Studies, 27(2), 71-77.

[119] Suwannaporn, P. and Linnemann, A. 2008. Consumer preferences and buying criteria in rice: A study to identify market strategy for Thailand Jasmine rice export. Journal of Food Products Marketing, 14(4), 33-53.

[120] Thailand Development Research Institute. 2010. Guidelines on supply chain management and logistics of agricultural products. The Office of the National Economic and Social Development Board, Bangkok.

[121] Thai Meteorological Department. 2016. Climate of Chiang Rai province. Online: http://www.tmd.go.th/province.php?StationNumber=48303 (accessed August, 2016).

[122] The Rice Trader of International Commodity Institute. 2015. The changing world rice demand and rice markets. Online: http://www.thairice.org/doc_dl/meeting-2558/rice-demand-eng.pdf (accessed May, 2016).

[123] Thiangtam, S. 2012. J-food: the popularity and attitudes toward the Japanese restaurants in Thailand. Online: http://marketeer.co.th/2014/10/marketeer-research-j-food (accessed December, 2015).

[124] Thoucharee, S. and Pitakaso, R. 2012. Logistics and supply chain management of rice in the northeastern area of Thailand. Khon Kaen University Research Journal, 17(1), 125-141.

[125] Titapiwatanakun, B. 2012. The rice situation in Thailand. Technical assistance consultant's report. Asian Development Bank.

[126] Tomlins, K.I., Manful, J.T., Larwer, P. and Hammond, L. 2005. Urban consumer preferences and sensory evaluation of locally produced and imported rice in West Africa. Food Quality and Preference, 16 (1), 79–89.

[127] Tongchure, S. and Hoang, N. 2013. Cassava smallholders' participation in contract farming in Nakhon Ratchasrima Province, Thailand. Journal of Social and Development Sciences, 4(7), 332-338.

[128] Tuteja, U. and Chandra, S. 2012. Impact of emerging marketing channels in agricultural marketing: Benefits to producer, seller and marketing costs and margins of agricultural commodities in Haryana. Online: http://www.du.ac.in/du/uploads/Academics/centres_institutes/Agricultural_Eco/14.2012-Marketi%20channels%20Haryana%20Usha%20Tuteja.pdf (accessed August, 2016).

[129] United States Department of Agriculture Foreign Agricultural Service. 2004. Thailand grain and feed: THJR situation 2004. Online: http://apps.fas.usda.gov/gainfiles/200401/146105226.pdf (accessed July, 2016).

[130] United States Department of Agriculture Foreign Agricultural Service. 2016a. Thailand grain and feed annual 2016. Online: http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Grain%20and%20Feed%20Annual_Bangkok_Thailand_3-18-2016.pdf (accessed October, 2016).

[131] United States Department of Agriculture Foreign Agricultural Service. 2016b. Food consumption and demand. Online: http://www.ers.usda.gov/topics/food-choices-health/food-consumption-demand.aspx (accessed July, 2016).

[132] Vasantiwong, K., Imsil, A., Imsil, R. and Siritunkit, P. 2011. Hazards Analysis and Critical Control Points in milled rice production. The Journal of KMUTNB, 21(1), 138-147.

[133] VietnamNet, 2015. Japonica rice considered for national brand development. Online: http://english.vietnamnet.vn/fms/business/145229/japonica-rice-considered-for-national-brand-development.html (accessed July, 2016).

[134] Waiyawuththanapoom, P., Waiyawuththanapoom, W. and Tirastittam, P. 2015. Social media as a distribution channel for Thailand's rice berry product. International Journal of Social, Behavioral, Economic, Business and Industrial Engineering, 9(3), 904-907.

[135] Wang, H.H., Wang, Y. and Delgado, M.S. 2014. The transition to modern agriculture: Contract farming in developing economies. American Journal of Agricultural Economics, 96(5), 1257-1271.

[136] Warinrak, B. 2013. Japonica rice production technology in Thailand. Chiang Rai Rice Research Center. 71 pp.

[137] Wasantiwong, K. 2003. Study of efficiency of medium scale rice mill plant for system design. Master thesis, Kasetsart University, 151 pp.

[138] Will, M. 2013. Contract farming handbook: A practical guide for linking small-scale producers and buyers through business model innovation. Federal Ministry for Economic Cooperation and Development (BMZ), Division for rural development and global food security, 115 pp.

[139] Xie, S. and Napasintuwong, O. 2014. Review of rice policies in China, Thailand and Vietnam. Agricultural and Resource Economics Working Paper No.2557/1. Department of Agricultural and Resource Economics, Faculty of Economic, Kasetsart University, Bangkok.

[140] Zhang, D. 2013. The revival of vertical integration: Strategic choice and performance influences. Journal of Management and Strategy, 4(1), 1-14.

Appendix

Appendix 1: The first survey (Chiang Rai Province on October, 2014)

Appendix 1.1 : Structured questionnaire for rice mills

Appendix 1.2 : Structured questionnaire for Japonica rice farmers

Appendix 1.3 : Structured questionnaire for Japonica rice collectors

Appendix 1.4 : Pictures of the first survey

Appendix 2: The second survey (Chiang Rai Province and Bangkok on October, 2015)

Appendix 2.1 : Structured questionnaire for rice mills

Appendix 2.2 : Structured questionnaire for Japanese restaurants

Appendix 2.3 : Structured questionnaire for companies (Distributors/Retailers)

Appendix 2.4 : Structured questionnaire for Thai consumers

Appendix 2.5 : Pictures of the second survey

Appendix 1: The first survey (Chiang Rai Province on October, 2014)

Appendix 1.1 : Structured questionnaire for rice mills

Appendix 1.2 : Structured questionnaire for Japonica rice farmers

Appendix 1.3 : Structured questionnaire for Japonica rice collectors

Appendix 1.4 : Pictures of the first survey

Appendix 1.1 : Structured questionnaire for rice mills

Questionnaire

Part I: Basic information of organization

1. Name of organization…….……...……

2. Address…….……...…..……

3. Business operations, since year……., (about……..years)

4. You produce other products beyond Japonica rice
   ( ) Yes, such as …….……...……
   ( ) No, only Japonica rice

5. At present, you produce other products from Japonica rice (choose more than one choice)
   ( ) Packed rice under your brand, trade name ……...…..…….
   ( ) Packed rice under buyers'brand, trade name …….…….
   ( ) Beauty products from rice bran
   ( ) Supplement products from rice bran
   ( ) Other, (please specify)……..……..……..

Part II: Basic information of the respondent

1. Sex ( ) Male ( ) Female

2. Age ……. years

3. Education ( ) Elementary education ( ) Secondary education
   ( ) Bachelor ( ) Other, (please specify)……..……..…

Part III: Japonica rice production

1. Japonica rice production about……..ton/year

2. Number of contract farmers ……persons, Japonica rice planted areas……...….rai

3. You produce Japonica rice through collectors
   ( ) Yes, number of collectors……..persons ( ) commission fee…..... THB/kg
   ( ) No, I directly contract with farmers

4. You need to produce Japonica rice only through collectors
   ( ) Yes, because……...……..
   ( ) No need, because…….……...…..……..

5. The model of JRCF (for researchers)

6. The system of JRCF

Problem……..……..…….……..……

Solution……..……..…….……..……

7. Supporting contract farmers on Japonica rice production

Contents	Providing	
	Yes	No
(7.1) Technical information	( )	( )
(7.2) Technology for Japonica rice cultivation and harvesting Fee……THB	( )	( )
(7.3) Inputs ( ) seeds ……....THB ( ) rice sprouts …....THB ( ) fertilizers …….THB ( ) insecticides…….THB	( )	( )
(7.4) Finance/credit	( )	( )
(7.5) Extension staffs ……..times/crop	( )	( )
(7.6) Facilities such as vehicles for transporting paddy Fee……THB	( )	( )
(7.7) Others……. …….	( ) ( )	( ) ( )

8. The process of Japonica rice production through CF (from start to finish)

……

……

……

……

9. The details in agreement of JRCF

( ) Specify by yourself ( ) Specify by particular rice mill ( ) Both

Contents…….…….....

…….

10. Problems of Japonica rice production

……

……

11. You have to check the quality of paddy before harvesting

( ) Yes, how ……...……

( ) No need

12. What do you want the government plays a role in Japonica rice production? (choose more than one choice)

( ) Establishment of a central agency as a consultant
( ) Supporting academic information such as knowledge of production technology
( ) Linking to coordinate between farmers and private sector
( ) Legislation to solve the problems in case of a contract violation
( ) Monitoring and evaluation
( ) Others, (please specify)……..……..…

13. Suggestions

……

……

<u>Part IV</u>: Japonica rice marketing

1. Purchase price of paddy……THB/kg

2. Selling price of milled Japonica rice ……..THB/kg

3. You have to distribute milled Japonica rice through brokers

( ) Yes
( ) No, I directly distribute to the buyers (answer 4)

4. You have to directly distribute Japonica rice to..

( ) Domestic market ……..% of the total milled Japonica rice
( ) Export to foreign markets
Country……. about ……% of all
( ) Both in the same proportion

5. The process of Japonica rice marketing

……

……

……

6. You have a contract with buyers ( ) Yes ( ) No

7. The details in agreement between you and buyers (if have)

( ) Specify by yourself ( ) Specify by buyers ( ) Both
Contents…….…….....

…….

8. Problems of Japonica rice marketing

……

……

……

9. What do you want the government plays a role in Japonica rice market?

……

……

……

……

10. Suggestions

……

……

……

Appendix 1.2 : Structured questionnaire for Japonica rice farmers

Questionnaire

Part I: Basic information of the respondent

1. Sex ( ) Male ( ) Female
2. Age ……. years
3. Education ( ) Less than Elementary education ( ) Elementary education
   ( ) Secondary education ( ) Bachelor ( ) Others, (please specify).……..…
4. Marital status ( ) Single ( ) Married ( ) Widow
5. Household members…….persons (including you)
6. Experience on Japonica rice planting.....years
   Contract with rice mills ……mills
   At present, you contract with rice mill, name……..……..
   You participate in JRCF with this rice mill…….years

Part II: Japonica rice production

1. The total number of your farmland……..…rai Japonica rice planted areas……..…rai
2. You plant Japonica rice varieties ( ) DOA1 ( ) DOA2 ( ) Both
3. You cultivate Japonica rice ( ) Major rice season ( ) Second rice season ( ) Both
4. Number of household labor to cultivate Japonica rice ……persons (including you)
5. Land holdings of Japonica rice cultivation ( ) Owner ( ) Rent…..….rai, fee….. THB/rai
6. You have suitable areas for planting Japonica rice
   ( ) Yes, how…….……..…….……
   ( ) No, because…….…….…….
7. You use water from irrigation
   ( ) Total areas ( ) Some areas, water from other sources…….…..……
8. Before you participate in JRCF, you receive information from.. (choose more than one choice)
   ( ) Relatives ( ) Neighbors ( ) Government
   ( ) Staff of rice mills ( ) Leader of famer group ( ) Radio and TV
   ( ) Brochure ( ) Others, (please specify)……..…...

9. Who is an important person for your decision to join in JRCF (choose more than one choice)

( ) Yourself ( ) Neighbors ( ) Government
( ) Staff of rice mill ( ) Relatives
( ) Leader of famer group ( ) Others, (please specify)…….

10. Factors affecting your decision to join in JRCF

Contents	Opinion	
	Yes	No
10.1 High and certain purchase price	( )	( )
10.2 Certain market	( )	( )
10.3 Payment on time by contract rice mill	( )	( )
10.4 No exploitation of rice mill	( )	( )
10.5 High yield of paddy	( )	( )
10.6 A good extension services provided by particular rice mill	( )	( )
10.7 Easy grow	( )	( )
10.8 Easy taking care	( )	( )
10.9 Easy harvesting	( )	( )
10.10 Few problems of disease and insect	( )	( )
10.11 Others…….…..	( )	( )

11. Your paddy is sold through collector or leader of farmer group

( ) Yes ( ) No

12. Before you join in JRCF, your leader consider you from…(choose more than one choice)

( ) Your planted areas are close an irrigation
( ) No flood in your farmlands
( ) You have an experience on Japonica rice planting and is familiar with him/her
( ) Others, (please specify)…….……..

You consider to join with particular rice mill because…(choose more than one choice)

( ) Your areas are close rice mill
( ) Renown of rice mill
( ) You want to contract with this rice mill again
( ) No have choices
( ) Others, (please specify)…….……..

13. The model of JRCF (for researchers)

14. The problems in system of JRCF

Problem……..……..……..……..……

……..……..……

Solution……..……..……..…..……

……..……..……

15. Supporting Japonica rice production by contract rice mill

Contents	Providing	
	Yes	**No**
15.1 Technical information	( )	( )
15.2 Technology for Japonica rice cultivation and harvesting Fee……THB	( )	( )
15.3 Inputs ( ) seeds ……....THB ( ) rice sprouts …..THB ( ) fertilizers …….THB ( ) insecticides…….THB	( )	( )
15.4 Finance/credit	( )	( )
15.5 Extension staffs ……..times/crop	( )	( )
15.6 Facilities such as vehicles for transporting paddy Fee…….THB	( )	( )
15.7 Others……. …….	( ) ( )	( ) ( )

16. What do you want the government plays a role in Japonica rice production (choose more than one choice)

( ) Establishment of a central agency as a consultant

( ) Supporting academic information such as knowledge of production technology

( ) Linking to coordinate between farmers and private sector

( ) Legislation to solve the problems in case of a contract violation

( ) Monitoring and Evaluation

( ) Others, (please specify)……..……..……..…

17. The details in agreement of JRCF

( ) Specify by yourself ( ) Specify by rice mill ( ) Both

Contents…….…….....

…….

18. You know the details in agreement

( ) Know ( ) Don't know

Contents…….…….....

…….

19. The problems of Japonica rice production through CF system

……

……

……

20. Costs and earnings of Japonica rice farming (Major rice season of 2014, transplanting method)

Contents			Fees
1. Costs			
	1.1 Seed	THB/rai	
	1.2 Fertilizer	THB/rai	
	1.3 Insecticide	THB/rai	
	1.4 Rent of land	THB/rai	
	1.5 Fuel (Tractor, Lawn mower, Pump)	THB/rai	
	1.6 Labor (plowing, transplanting, taking care)	THB/rai	
	1.7 Harveste machine service	THB/rai	
	1.8 Others……..		
Total production costs		**THB/rai**	
2. Income			
	2.1 Yield	Kg/rai	
	2.2 Price	THB/kg	
Total incomes		**THB/rai**	
3. Earning			
	3.1 Total incomes	THB/rai	
	3.2 Total production costs	THB/rai	
Total earnings		**THB/rai**	

21. In last year, did you prefer your earnings?
( ) Yes ( ) No, because…….……

22. Do you have other incomes beyond JRCF?
( ) Yes, I have ……..……
( ) No

<u>Part III</u>: Opinion on Japonica rice production

1. JRCF system is a good way for increasing your income.
( ) Agree ( ) Disagree because..…….……...……

2. In CF system, rice mill and farmers should make the details in an agreement together.
( ) Agree ( ) Disagree

3. Japonica rice should be produced only through CF system to control a quality of paddy
( ) Agree ( ) Disagree

4. In the future, you will continue to cultivate Japonica rice
( ) Yes ( ) No because …….

5. Suggestions

…….……

……..……

Appendix 1.3 : Structured questionnaire for Japonica rice collectors

Questionnaire

Part I: Basic information of the respondent

1. Sex ( ) Male ( ) Female

2. Age ……. years

3. Education ( ) Less than Elementary education ( ) Elementary education
( ) Secondary education ( ) Bachelor ( ) Others, please specify…..……..…

4. Marital status ( ) Single ( ) Married ( ) Widow

5. Household members…….persons (including you)

Part II: Japonica rice production

1. Experience on collecting Japonica rice ……years
Number of rice mills that contracted …….mills (include the current rice mill)

2. At present, you contract with rice mill, name……..……..
You collect Japonica rice about…….years with this rice mill

3. In your responsibility,
The total Japonica rice planted areas……..…rai (Quota)
The total your contract farmers…… persons

4. Why you decide to collect Japonica rice?
……
……..……
……..……

5. Do you prefer income from collecting Japonica rice?
( ) Yes, ( ) Commission fee…….THB ( ) Transporting fee……..…THB
( ) No, because……

6. Who is an important person for your decision to join in JRCF (choose more than one choice)

( ) Yourself ( ) Neighbors ( ) Government
( ) Staff of rice mill ( ) Relatives
( ) Leader of famer group ( ) Others, (please specify)…….

7. Before you select farmers to join in JRCF, you consider them from..(choose more than one choice)

( ) Their planted areas are close an irrigation
( ) No flood in their farmlands
( ) Their experience on Japonica rice planting
( ) Familiarity
( ) No have choices
( ) Others, (please specify)……..……..……..

8. The process of Japonica rice production through CF (from start to finish)

……

……

……

……

9. You visited contract farmers' paddy field with the extension staff of contract rice mill

( ) Yes, ……..times/crop
( ) No, only me visited them……times/crop
( ) Never visited

10. You met the owner of particular rice mill …….times/crop

11. The details in an agreement of JRCF

( ) Specify by yourself ( ) Specify by rice mill ( ) Specify by farmers ( ) All Contents…….…….…….....

……

12. You know the details in an agreement

( ) Know ( ) Don't know
Contents…….…….…….....

……

13. The problems for collecting Japonica rice, or during visited farmers' field

Problem…….…….…….……..…….……..……
…….……
Solution…….…….…….……..……..……
…….…….…….……..……

14. You also plant Japonica rice

( ) Yes ( ) No Why……..……..

15. Do you have other incomes beyond planting and collecting Japonica rice?

( ) Yes, I have ……
( ) No

16. What do you want the government plays a role in Japonica rice production (choose more than one choice)

( ) Establishment of a central agency as a consultant
( ) Supporting academic information such as knowledge of production technology
( ) Linking to coordinate between farmers and private sector
( ) Legislation to solve the problems in case of a contract violation
( ) Monitoring and Evaluation
( ) Others, (please specify)……..……..……..…

<u>Part III</u>: Opinion on Japonica rice production

1. JRCF system is a good way for increasing farmers' income.
( ) Agree ( ) Disagree because..…….……...……

2. In CF system, rice mill and farmers should make the details in an agreement together.
( ) Agree ( ) Disagree

3. Japonica rice should be produced only through CF system to control a quality of paddy
( ) Agree ( ) Disagree

4. In the future, you will continue to cultivate and collect Japonica rice
( ) Yes ( ) No because …….

5. Suggestions

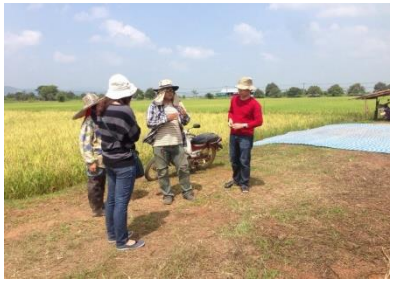
……..……

……..……

Appendix 1.4 : Pictures of the first survey

Rice Mills

Collectors



Contract farmers

Staffs of the CRI

Appendix 2: The second survey (Chiang Rai Province and Bangkok on October, 2015)

Appendix 2.1 : Structured questionnaire for rice mills

Appendix 2.2 : Structured questionnaire for Japanese restaurants

Appendix 2.3 : Structured questionnaire for companies (Distributors/Retailers)

Appendix 2.4 : Structured questionnaire for Thai consumers

Appendix 2.5 : Pictures of the second survey

Appendix 2.1 : Structured questionnaire for rice mills

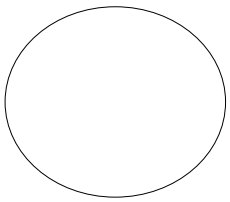
Questionnaires

Part I : Personal Information

1. Name of interviewee……..…….
2. Position in rice mill.……....
3. Experience with rice mill…….…….....years
4. Main Responsibilities…….
5. Gender ( ) Male ( ) Female
6. Age…….years
7. Education ( ) Bachelor ( ) Master ( ) Doctor ( ) Others.……...…….

Part II : Rice mill Information

1. Name of rice mill…….…….……...……
2. Address…….…...……...…..……
3. Business operations, since year……., (about……..years)
4. Number of staffs…..…….…..person
5. You produce other products beyond Japonica rice
   ( ) Yes, such as ……...……
   ( ) No, only Japonica rice



6. Main product……
7. At present, you produce other products from Japonica rice (choose more than one choice)
   ( ) Packed rice under your brand, trade name …….
   ( ) Packed rice under buyers'brand, trade name …….
   ( ) Beauty products from rice bran
   ( ) Supplement products from rice bran
   ( ) Other, (please specify)……..……..
8. Volume of Japonica rice production capacity ……..….tons/……
9. Your rice mill has a contract with buyers
   ( ) Yes, number of buyers …….. companies
   ( ) No

10. Your rice mill produces the packed milled Japonica rice under your band name
    ( ) Yes, trade name……
    Volume ( ) 5 kg/bag ( ) 10 kg/bag ( ) 15 kg/bag ( ) Others……
    ( ) No

Part III : Distribution of milled Japonica rice

1. Your rice mill sold the total number of Japonica rice to buyer ( ) Yes ( ) No
   Who is the main buyer? …….
   Your rice mill sold Japonica rice through broker/middleman, or not.
   ( ) Yes ( ) No

2. Confidence level between you and your buyers

Contents	Process/Checking	Level		
		Trust	Distrust	Not sure
Volume				
Quality				
Safety/standard				
Time				
Payment				
Delivery				
……				
……				
……				

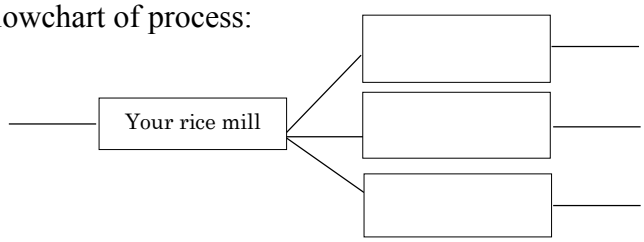
3. Problems between you and your buyers (Please rank the items from 1 to 2)
   ( ) No problem ( ) Condition of payment ( ) Price Negotiation
   ( ) Condition of purchasing volume ( ) Delivery ( ) Credit
   ( ) Quality of products ( ) Uncertain price ( ) Others……..……

4. Your rice mill has penalty for buyer if causes a problem
   ( ) Yes, how……..……
   ( ) No

5. The buyers of your rice mill and market share (Please rank the items)

Items	Market share (%) (approximately)	Problems
( ) Factory	……%	
( ) Wholesaler	……%	
( ) Retailer	……%	
( ) Restaurant	……%	
( ) Supermarket ……	……%	
( ) Exporter	……%	

Flowchart of process:



6. Throughout during of Japonica rice trading, your rice mill sold Japonica rice to buyers with fixed price
   ( ) Yes, price…… ( ) No, why……
7. How transport Japonica rice, and details?

7.1 (Main buyer)	7.2 (Second)	Extra
……..% By…… ……..% By…… Your rice mill ……..% By…… ……..% By…… Note:	……..% By…… Your rice mill ……..% By…… Note:	

8. How about stock of Japonica rice in your rice mill?
   ( ) Sufficient
   ( ) My mill has <u>many</u> Japonica rice in stock, why……
   How manage ……
   ( ) My mill has a <u>little</u> Japonica rice in stock, why……
   How manage ……

   In next year, how your rice mill has a business plan for Japonica rice production?
   ( ) Increase ( ) Equal this year, how…… ( ) Decrease
   Why……
   In the future, How about Japonica rice business? (please give your opinion)
   ( ) Market price ……
   ( ) Volume……
   ( ) Standard……
   ( ) Others……
9. Thai government should play a role in your business?
   ( ) Yes, how……
   ( ) No

10. Factors affecting your business

Contents		Level			Why/How
		1	2	3	
( )	1. Smooth production volume / sales volume				
( )	2. Uncertain product needs				
( )	3. Changeable product price				
( )	4. New competitors				
( )	5. Price of competitors				
( )	6. Many conditions on product quality in the market				
( )	7. Strictness of product standard				
( )	8. Developing product quality of competitors				
( )	9. Changing lifestyle of consumers				
( )	10. Policies of government				

Note: 1 = problem, 2 = No problem, 3 = Not sure

11. Suggestions

……
……
……

Appendix 2.2 : Structured questionnaire for Japanese restaurants

Questionnaires

Part I : Personal Information

1. Name of interviewee……..…….

2. Position in restaurant...……....

3. Main responsibilities…….…….…….

4. Experience with this restaurant…….…….....years

5. Gender ( ) Male ( ) Female

6. Age…….years

7. Education ( ) Bachelor ( ) Master ( ) Doctor ( ) Others.……...…….

Part II : Japanese restaurant information

1. Japanese restaurant name...……...……...……

2. Location…….
( ) Five star hotel ( ) Hi-end shopping mall ( ) Japanese restaurants (stand-alone)
( ) General shopping mall ( ) Within office building ( ) Others…….…….....

3. Open-close time……

4. Your restaurant has operated……..years Since…….

5. Number of staffs…..……..…..person

6. Main menu of your restaurant…….…..

7. Average price per dish……THB

8. Your customers are classified into ( ) Premium ( ) General ( ) Both

9. Type of your customers
( ) Thai…..% ( ) Japanese….% ( ) Other countries …….%

10. Which meal that most customers consume ( ) Breakfast ( ) Lunch ( ) Dinner

11. Communication channel for promoting your restaurant
( ) TV ( ) Radio ( ) Internet ( ) Magazines ( ) Posters ( ) Others..……..

Part III : Japonica rice information

1. Main source of Japonica rice in your restaurant…..……..……..
How purchase……...

2. Last five year, you never changed the supplier of Japonica rice ( ) Yes ( ) No
Why selected this supplier……..…….……

3. Milled Japonica rice price within last 5 years
( ) Increase ( ) Decrease ( ) Same ( ) Fluctuate

4. Milled Japonica rice price at the present…….THB/kg
Compared with last year ( ) Increase ( ) Decrease ( ) Same

5. Purchasing volume of milled Japonica rice …….kg/time (time is …..….)
You cooked Japonica rice …….kg/day

6. If milled Japonica rice in your restaurant is not enough for cooking in that day, how you will do?...……..

7. In the future, you will cook Japonica rice, especially THJR
( ) Increase ( ) Decrease ( ) Same Why……...

Part IV : Attitude to Japonica rice

1. Do you think that Japanese dishes, including Japonica rice, is healthy foods?
( ) Yes, why……..…….…….……
( ) No, why……...…….…….……

2. Can you distinguish between imported Japanese rice and THJR
( ) Yes, I can how…..…….…….……
( ) Cannot

3. Can you distinguish the grains of Japonica rice and Thai short grain?
( ) Yes, I can, how……...……..……..
( ) No, both same

4. Do you think that your restaurant has to use imported Japanese rice from Japan?
( ) Yes, why…….……
( ) No need, why…….…….…….…….…….

5. How about your expenses for Japonica rice?
( ) Good value for money ( ) Reasonable ( ) Worthless Why……..…

6. Japonica rice easily find to consume in the market?
( ) Yes ( ) No

7. What are factors influencing Japonica rice consumption? (Please rank the items from 1 to 2)
( ) Brand ( ) Taste ( ) Price ( ) Advertisement
( ) Introduction from other persons ( ) Value ( ) Quality
( ) Personal preference ( ) Convenience ( ) Healthy foods

8. Do you like Japonica rice more than Thai rice?
   ( ) Yes, why……..……..……..
   ( ) No, why…….……..……...
   ( ) Cannot compare, it depend on each menu, such as menu..……..……

9. Do you agree that Japonica rice can substitute Thai rice?
   ( ) Agree ( ) Disagree Why……

10. Suggestions
   ……
   ……

Appendix 2.3 : Structured questionnaire for companies (Distributors/Retailers)

Questionnaires

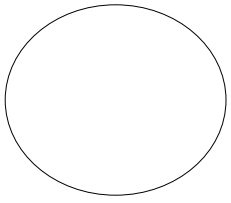
Part I : Personal Information

1. Name of interviewee……..…….
2. Position in company……....
3. Experience with company…….…….....years
4. Main Responsibilities…….
5. Gender ( ) Male ( ) Female
6. Age…….years
7. Education ( ) Bachelor ( ) Master ( ) Doctor ( ) Others.……...…….

Part II : Company Information

1. Type of company ( ) Exporter ( ) Importer ( ) Exporter & Importer
   ( ) Domestic trader ( ) Others……..
2. Name of company …….
3. Location ……..……
4. Experience of business operation……...……year, since year……..……
   Japonica rice business……year, since year….…….
5. No. of current staff, including office and factory staff……..……....persons
6. Products/business under your company
   (1)……..……, ……%
   (2)……..……, ……%
   (3)……..……, ……%
   (4)……..……, ……%
   (5)……..……, ……%

   100%



7. What is main product/business? ……..……..
8. Volume of Japonica rice production capacity ……..……..…….tons per…..

9. Structure of organization that relate with Japonica rice

	Note:

10. Your company makes a contract with trading partner like rice mill, or not.
    ( ) Yes, with……
    How…… ……
    Problem……
    Benefit……
    ( ) No, freedom ( ) Both, how…….

Part III : Japonica rice trade

1. Your company buys Japonica rice from suppliers,
   who? .....
   Who is the main supplier? …….
   Your company buys Japonica rice through broker/middleman, or not
   ( ) Yes ( ) No

2. Confidence level between your company and suppliers

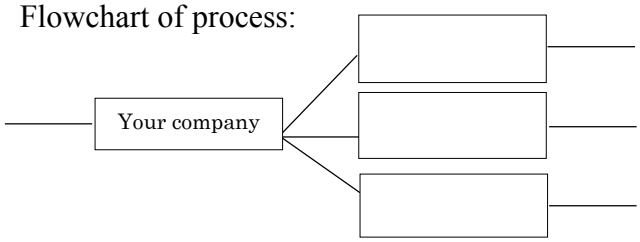
Contents	Process/Checking	Level		
		Trust	Distrust	Not sure
Volume				
Quality				
Safety/standard				
Time				
Payment				
Delivery				
……				
……				
……				

3. Problems between you and your suppliers (Please rank the items from 1 to 2)
   ( ) No problem ( ) Condition of payment ( ) Price Negotiation
   ( ) Condition of purchasing volume ( ) Delivery ( ) Credit
   ( ) Quality of products ( ) Uncertain price ( ) Others……

4. Your company has penalty for supplier that causes problems
   ( ) Yes, how……..……..( ) No
5. Your company mills or packs Japonica rice by yourself
   ( ) Yes,…….%, how ……..…….…….
   ( ) No, how ……..…….……
6. Do your company has brand name for packed Japonica rice?
   ( ) Yes, trade name……. ( ) No
   Amount of each bag Japonica rice
   ( ) 5 kg/bag ( ) 10 kg/bag ( ) 15 kg/bag ( ) Others……
7. Main purchasers of your company and market share (Please rank the items)

Items	Market share (%) (approximately)	Problems
( ) Factory	……%	
( ) Wholesaler	……%	
( ) Retailer	……%	
( ) Restaurant	……%	
( ) Supermarket ……	……%	
( ) Exporter	……%	

Flowchart of process:



8. Main problem between you and your purchasers (Please rank the items from 1 to 2)
   ( ) No problem ( ) Condition of payment ( ) Price Negotiation
   ( ) Condition of purchasing volume ( ) Delivery ( ) Credit
   ( ) Quality of products ( ) Uncertain price ( ) Others ……
9. Throughout during of Japonica rice trading, do your company purchased Japonica rice from suppliers with fixed price?
   ( ) Yes, price…… ( ) No, why……
   Price information
   ( ) Japan, how……..……
   ( ) Vietnam, how……..……

   Throughout during of Japonica rice trading, do your company sold Japonica rice to purchasers with fixed price?
   ( ) Yes, price…… ( ) No, why……

10. How transport Japonica rice, and details?

10.1 (Main supplier and purchaser)	10.2 (Second purchaser)	Extra
……..% By……. ……..% By……. Your company ……..% By…….. ……..% By…….. Note:	……..% By…….. Your company ……..% By…….. Note:	

11. How about stock of Japonica rice in your company?
    ( ) Sufficient
    ( ) My company has <u>many</u> Japonica rice in stock, why……
    How manage ……
    ( ) My company has a <u>little</u> Japonica rice in stock, why……
    How manage ……

    In next year, how your company has a business plan of Japonica rice production?
    ( ) Increase ( ) Equal this year, how…… ( ) Decrease
    Why……

    In the future, How about Japonica rice business? (please give your opinion)
    ( ) Market price ……
    ( ) Volume……
    ( ) Standard……
    ( ) Others……

12. Thai government should play a role in your business
    ( ) Yes, how……
    ( ) No

13. Factors affecting your business

Contents		Level			Why/How
		1	2	3	
( )	1. Smooth production volume / sales volume				
( )	2. Uncertain product needs				
( )	3. Changeable product price				
( )	4. New competitors				
( )	5. Price of competitors				
( )	6. Many conditions of product quality in market				
( )	7. Strictness of product standard				
( )	8. Developing product quality of competitors				
( )	9. Changing lifestyle of consumers				
( )	10. Policies of government				

Note: 1 = problem, 2 = No problem, 3 = Not sure

14. Suggestions

…….
…….
…….
…….
…….

Appendix 2.4 : Structured questionnaire for Thai consumers

Questionnaires

Part I : Personal Information

1. Gender ( ) Male ( ) Female
2. Age ..... year
3. Status ( ) Single ( ) Married ( ) Widow
4. Education ( ) Less than Bachelor ( ) Bachelor ( ) Master ( ) Others……..…….
5. Occupation ( ) Personal business ( ) Salaried Person ( ) Student
   ( ) Homemaker ( ) Retired ( ) Others…..…….
6. Monthly Income
   ( ) 10,000 THB or less ( ) 10,001-15,000 THB
   ( ) 15,001-20,000 THB ( ) 20,001-25,000 THB
   ( ) 25,001-30,000 THB ( ) 30,001-35,000 THB
   ( ) 35,001-40,000 THB ( ) 40,001-45,000 THB
   ( ) 45,001 THB or more
7. No. of household ( ) 1-2 ( ) 3-4 ( ) 5 or more

Part II: Consumer Behavior

(A) Consumption at Japanese restaurants

1. What place do you frequently go to eat Japanese dishes?
   ( ) Five star hotel ( ) Hi-end shopping mall ( ) Japanese restaurants (stand-alone)
   ( ) General shopping mall ( ) within office building ( ) Others…….....
2. You have ever been to hi-end and mass Japanese restaurants
   ( ) Yes ( ) No
   (If yes) What is the difference of hi-end Japanese restaurants, if compared with mass brands? (Please rank the items from 1 to 2)
   ( ) Taste how……..……..
   ( ) Menu how……...……
   ( ) Price how……...……..
   ( ) Atmosphere how……..
   ( ) Quality how……..
   ( ) Others……..……...……...

3. Do you have Japanese restaurants that frequently visit? ( ) Yes ( ) No

3.1 **(If yes)**

-What is name of Japanese restaurants that you frequently visit? .....

- How often 1 time: ……..

- Why? (Please rank the items from 1 to 2)

( ) Taste ( ) Location ( ) Menu ( ) Brand image ( ) Price

( ) Advertisement ( ) Atmosphere ( ) Quality

- What you frequently order menu? ……...

(If ever order rice menu) How about Japonica rice? .....

3.2 **(If no)**

- What is your favorite Japanese restaurants? (Please rank the items from 1 to 2)

( ) Fuji ( ) Ootoya ( ) Oishi ( ) Zen

( ) Hachiban Ramen ( ) Shabuchi ( ) Yayoi ( ) Sukishi

- Why you select it as the number one? (Please rank the items from 1 to 2)

( ) Taste ( ) Location ( ) Menu ( ) Brand image

( ) Price ( ) Advertisement ( ) Atmosphere

( ) Quality ( ) Others…….

- What you frequently order menu? …….

(If ever order rice menu) How about Japonica rice? .....

4. In the last 90 days, how often have you eaten at Japanese restaurants?
( ) 0 time ( ) 1-2 times ( ) 3-4 times ( ) 5 times or more

5. What meal are you most likely to eat at Japanese restaurants?
( ) Breakfast ( ) Lunch ( ) Dinner

6. Who influences your visiting at restaurants?
( ) Friends ( ) Myself ( ) Family ( ) Spouse ( ) Others…..……..

7. In which media channels do you usually recognize brand owner's advertisements? (Please rank the items from 1 to 2 according to what is most important)
( ) TV ( ) Radio ( ) Internet ( ) Magazines ( ) Posters ( ) Others..……..

8. Five years ago compared with the current year, do you eat Japanese dishes more often?
( ) Often ( ) Same ( ) Not often
Why…….……...……

(B) Buying of packed Japonica rice

1. Do you know that packed Japonica rice is sold in the country
( ) Yes, I know, I can buy from..……...……..
( ) Don't know

2. Have you ever bought packed Japonica rice?
   ( ) Ever, I bought it for ( ) Trading ( ) Cooking by myself ( ) Others..…
   ( ) Never

If bought

1. In the last 90 days, how often have you bought bag Japonica rice?
   ( ) 0 time ( ) 1-2 times ( ) 3-4 times ( ) 5 times or more
2. Amount of each purchase ( ) Less than 5 kg/time ( ) 5 kg/time
   ( ) 10 kg/time ( ) 15 kg/time ( ) Other ……..…..
3. What place did you frequently buy it?
   ( ) Shopping mall such as The Mall, Central, Robinson etc.
   ( ) Supermarket such as Lotus, BigC, Foodland, Tops etc.
   ( ) Retail shop
   ( ) Others ……...…….……
   Why? ……
4. Which brand do you frequently bought? ….....
   Why? (Please rank the items from 1 to 2)
   ( ) Brand ( ) Taste ( ) Price ( ) Advertisement
   ( ) Introduction from other persons ( ) Value ( ) Quality
   ( ) Personal preference
5. Do you check price before buying a product?
   ( ) Yes, from…… ( ) No
6. Who influences your purchase?
   ( ) Friends ( ) Myself ( ) Family ( ) Spouse ( ) Others.……
7. In which media channels do you usually recognize brand owner's advertisements? (Please rank the items from 1 to 2 according to what is most important)
   ( ) TV ( ) Radio ( ) Internet ( ) Magazines
   ( ) Posters ( ) Others…….……..
8. Five years ago compared with the current year, do you buy bag Japonica rice more often?
   ( ) Often ( ) Same ( ) Not often
   Why……...……...……..…

<u>Part III</u> : Attitude to Japonica rice

1. Do you think that Japanese dishes, including Japonica rice, is healthy foods?
   ( ) Yes, why……..…….……
   ( ) No, why……...…….…….……

2. If you eat Japanese dishes in restaurants, especially Japonica rice, do you know that Japonica rice was imported or was produced in Thailand?
   ( ) Know, how……
   ( ) Don't know

3. If you eat Japanese dishes in restaurants, especially Japonica rice, do you need imported Japanese rice from Japan?
   ( ) Yes, why……
   ( ) No need, why……

4. Do you know that Japonica rice can be produced in Thailand?
   ( ) I don't know, I think that Japonica rice in restaurants was imported only
   ( ) Yes, I know, from……..

5. If restaurants use Japonica rice that was produced in Thailand, Do you feel?
   ( ) Good ( ) Normal ( ) Not good Why……

6. How about Japonica rice in Japanese restaurants of your most visited?
   ( ) Good ( ) Normal ( ) Should improve Why? .....

7. How about your expenses for Japonica rice?
   ( ) Good value for money ( ) Reasonable ( ) Worthless Why……..…

8. Do you think that Japonica rice easily find to consume in the market?
   ( ) Yes ( ) No

9. What are factors influencing your consumption on Japonica rice? (Please rank the items from 1 to 2)
   ( ) Brand ( ) Taste ( ) Price ( ) Advertisement
   ( ) Introduction from other persons ( ) Value ( ) Quality
   ( ) Personal preference ( ) Convenience ( ) Healthy foods

10. Can you distinguish the grains of Japonica rice and Thai rice?
    ( ) Yes, I can, how……..……..……..
    ( ) No, both same

11. Do you like Japonica rice more than Thai rice?
    ( ) Yes, why……..……..……..
    ( ) No, why……..……..……...
    ( ) Cannot compare, it depend on each menu, such as menu.……..……

12. Do you agree that Japonica rice can substitute Thai rice?
    ( ) Agree ( ) Disagree Why……

13. **(Before test)** Do you think that Japonica rice that was produced in Thailand can substitute imported Japanese rice?
    ( ) Agree ( ) Disagree Why……..……

Part IV : Consumers' preference evaluation

1. Please select the best Japonica rice choice in each attribute

Attributes	Choices				Note
1. Milled Japonica rice					
(1) Shape (short and round grain)	( ) JR 1	( ) JR 2	( ) JR 3	( ) Same	
(2) Color (clear grain)	( ) JR 1	( ) JR 2	( ) JR 3	( ) Same	
2. Cooked Japonica rice					
(1) Shape (beautiful round)	( ) JR 1	( ) JR 2	( ) JR 3	( ) Same	
(2) Color (shiny white)	( ) JR 1	( ) JR 2	( ) JR 3	( ) Same	
(3) Smell	( ) JR 1	( ) JR 2	( ) JR 3	( ) Same	
(4) Taste/Flavor	( ) JR 1	( ) JR 2	( ) JR 3	( ) Same	
(5) Texture (soft sticky)	( ) JR 1	( ) JR 2	( ) JR 3	( ) Same	
3. Overall preferences	( ) JR 1	( ) JR 2	( ) JR 3	( ) Same	
4. Highest sale price (expectation)	( ) JR 1	( ) JR 2	( ) JR 3	( ) Same	
5. Highest consumer satisfactions (expectation)	( ) JR 1	( ) JR 2	( ) JR 3	( ) Same	

2. **(After test)** Do you think that THJR can substitute imported Japanese rice from Japan?
( ) Agree ( ) Disagree Why…….……..……..…

3. Suggestions

…….……

…….……

Appendix 2.5 : Pictures of the second survey

Rice mills


Distributors


Managers of
Japanese restaurants


Retailers


Thai consumers