

# Production of Japanese Rice through Contract Farming System in Wiang Pa Pao District, Chiang Rai Province, Thailand

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Received June 29, 2015; Revised July 25, 2015; Accepted August 25, 2015

**Abstract** Many companies in Thailand have encouraged farmers especially the northern regions to cultivate DOA 1 and DOA 2 Japanese rice varieties (scientific name: *Oryza sativa* var. Japonica) through contract farming system in which each company may have different model and management approaches. Therefore, this study explored the currently prevailing contract farming of Japanese rice in Thailand especially in Wiang Pa Pao district, Chiang Rai province, to identify the advantageous and disadvantageous points of Japanese rice production, and to examine the important role of each stakeholder in Japanese rice production. The data of this study were collected from two state agencies, two rice millers, six collectors and thirty contract farmers who were selected for in-depth interviews by using questionnaires and interview forms. The contract farming model and management details were different in each rice mill such as signing a contract, purchase price, commission fee, specifications of rice quality, and so on. Lack of financial liquidity and fluctuation of contract price may influence the confidence of Japanese rice growers in the future. Moreover, lack of quality seeds was another obstacle of Japanese rice production in Thailand. The contract farming of Japanese rice involved many parties as follows: rice mill, collector, contract farmer, and state agency namely Chiang Rai Rice Research Center (CRI) while each stakeholder had different significant roles for the example; CRI produced rice seed to distribute to rice mills, and has developed varieties of this rice. Moreover, it established the Japanese rice community center to produce more rice seeds, and has encouraged farmers to raise the standards of production for the competitive domestic and international markets.

**Keywords:** contract farming, Japanese rice, stakeholders, agricultural marketing, agricultural economics

**Cite This Article:** Kanokon Seemanon, Masahiro Yamao, and Kenji Hosono, "Production of Japanese Rice through Contract Farming System in Wiang Pa Pao District, Chiang Rai Province, Thailand." *American Journal of Rural Development*, vol. 3, no. 2 (2015): 41-51. doi: 10.12691/ajrd-3-2-4.

## 1. Introduction

Japanese rice in Thailand has been experimented for over 50 years by researchers of the Chiang Rai Rice Research Center (CRI) of the Rice Department. In 1964, they brought seeds of Japanese rice from Japan to experiment on different rice varieties. The scientific name of Japanese rice is *Oryza sativa* var. Japonica, which is also called other names as follows: Japonica rice or *Oryza sativa* (Japonica cultivar-group). The group of Japonica rice is a sub-species of *Oryza sativa*. It has many strains such as Akitakomachi, Koshihikari, Norin, and Sasanishiki. The CRI has continuously experimented to cultivate Japanese rice in farmlands, especially in northern provinces such as Chiang Rai, Chiang Mai and Lamphun. Moreover, it researched the peculiarity of Japanese rice and explored its appropriate production technology, which would be adapted to environments of Thai farms and fitted into local market requirements. In 1995, the Department of Agriculture (DOA) certified two Japanese rice varieties

as DOA 1 (from Sasanishiki strain) and DOA 2 (from Akitakomachi strain), and recommended them for extension and cultivation [29]. Nowadays, the CRI has collected 58 varieties of Japonica rice, which can be classified into two groups. The first group is rice for direct consumption (table rice) including DOA 1 and DOA 2, and the second group is rice for use as raw materials in the food industry (industrial rice) such as sake, noodle, dessert and Japanese rice cake powder or "Mochi powder" [2].

DOA 1 and DOA 2 varieties have a quality like Koshihikari which can be sold as first grade of consumers' market in Japan. Moreover, they are suitable to be grown in areas where the average temperature is around 18-25 degrees Celsius and their resistance to hot weather is stronger than other Japanese rice varieties. These two varieties can grow both in-season and off-season. In-season rice is cultivated from the end of July to August, and harvested in October to November. Off-season rice is cultivated in mid-January, and harvested in May. They can grow in two seasons because they are non-sensitive to photoperiod. Yields of DOA 2 and DOA 1 from the experiment of the CRI were 827 kg/rai and 742 kg/rai,

respectively (1 rai = 0.16 ha). Their productivity was much higher than other Japanese rice varieties [30].

In 1988, large export companies in northern Thailand paid attention to the production and exports of Japanese rice because they thought it had a large potential to become an export-oriented commodity under the WTO regime. Japan was required to open its rice market and increase its import of foreign rice. The companies began to produce Japanese rice in northern provinces through contract farming system. During the period from 1992 to 2001, the seventh and eighth National Economic and Social Development Plan, the government promoted the research and extension of Japanese rice varieties to support the new business of private companies [17]. In the beginning, large export companies intended to increase the production of Japanese rice particularly for export to the Japanese market. However, they had to stop or slow down such an export-oriented production because they found it hard to implement appropriate quality control of products. The requirement of quality control over imported rice in Japanese market was much stringent than the companies had expected, and too complicated than the international standard. In more concrete terms, the Japanese rice market identifies the standard of each rice species based on grade and taste, while international standard identifies only type or grade of rice. A technical barrier for imported rice was firmly set up in the Japanese market [29].

Since 2004, new small companies have appeared and encouraged farmers to cultivate Japanese rice in small volume such that they can control rice quality. They have developed a more effective contract farming system. Furthermore, the companies intended to increase the distribution of Japanese rice to consumers and entrepreneurs within the Japanese restaurant industry in Thailand. In 2004, cultivated areas amounted to approximately 30,000 rais/year (4,800 ha/year) including irrigation areas, in Chiang Rai, Chiang Mai and Lamphun provinces. The production of Japanese rice in these three provinces was approximately 20,000 tons/year, and milled rice was estimated at 8,000 tons/year [29].

In 2014, 13 private entrepreneurs in Thailand encouraged farmers to cultivate Japanese rice through the contract farming system. Ten entrepreneurs were members of the Association of Japanese Rice Producers in Thailand, and three entrepreneurs were the processors and exporters of Japanese rice. They were the large private companies that have various branches across the country with growing sales volumes. The Association of Japanese Rice Producers in Thailand was established in 2013 whose members determined strategic approaches for production and marketing of Japanese rice in Thailand. Moreover, the members also planned to develop rice quality and to reduce production cost. The total of cultivated paddy fields under the association approximated 80,000 rais (12,800 ha) which involved 6,000 contract farmers. The total yield of paddy was approximately 60,000 tons, with a 750 kg/rai of average yield. The volume of milled rice was 36,000 tons. Moreover, entrepreneurs set up a purchase price of paddy at 9-12 THB/kg. However, each rice miller of the association managed a different contract farming system. Meanwhile, the CRI produced DOA 1 and DOA 2 seeds to distribute to entrepreneurs at approximately 3-5 tons/year which is not enough to meet an increasing demand from growers [3]. Moreover, the market demand

for Japanese rice is relatively high due to the fact that Japanese restaurants have extended chains and branches through the country as a whole. In fact, restaurants 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 [10].

Thailand also has the potential to export Japanese rice to ASEAN, other Asian countries and EU. In 2014, Thailand exported 126 tons of Japanese rice worldwide, realizing 380,371 USD, which was more than in 2013 both in quantity and value. However, Thailand also imported Japanese rice from foreign countries. The volume of imported rice from Vietnam was 192 tons, with a value of 142,058 USD. Japan also exported to Thailand 36 tons, valued at 90,808 USD [9]. Japanese rice from Thailand has a great potential to penetrate new market channels in the world market, although its production has faced severe competition.

This study had three objectives. The first was to analyze the prevailing contract farming of Japanese rice production in Thailand, especially in Wiang Pa Pao district in Chiang Rai province. The second was to identify advantages and disadvantages of Japanese rice cultivation employing the contract farming system. The third was to examine the important role of each stakeholder in this system.

This study focused on the prevailing socio-economic aspects of contract farming of Japanese rice in Thailand. The few studies have been conducted to survey the current situation and details of Japanese rice contract farming. Two rice millers which belonged to the Association of Japanese Rice Producers in Thailand were interviewed in depth. The rice millers are crucial for this study because they have determined a model and how to manage the system of Japanese rice contract farming. Collectors and contract farmers of each rice miller, as well as the state agency involved in this system, were interviewed with questionnaires. All respondents were selected by using the purposive sampling method.

The results of this study are divided into four sections. The general profiles of respondents were investigated in the first section. The second section explained and discussed on the contract farming model and management of Japanese rice contract farming by the two rice millers. The third section identified the advantages and disadvantages of Japanese rice production of the two rice mills to know what issues should be adjusted in order to improve this contract farming system of rice millers. The last section analyzed significant roles of various stakeholders in Japanese rice production.

## **1.1. Contract Farming System**

In the 1950s, contract farming started in Europe which it has been regarded as a form of promotion and development of agricultural products. It created 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 [13]. Contract farming system has expanded worldwide. For example, contract farming accounted for 36% of the total value of US agricultural

production in 2001 [4]. Brazil had over 70% of poultry production and 30% of soya production consummated through contract farming system [19]. At present, contract farming has become more and more popular in developing countries. In Thailand, Charoen Pokphand Company (CP) is a huge conglomerate company that produces many agricultural commodities through contract farming. In the early 1970s, it started a contract farming business, and since 1987, it has expanded contract farming system into many agricultural commodities such as cassava, sugar cane, baby corn, palm oil, fragrant rice, barley, sorghum, cashew nuts, poultry, swine, etc. [8,22,25].

Contract farming can aid farmers to access to better inputs and more efficient production [23,24]. Some companies support technology, dissemination of information, supply agricultural inputs and credit for investment. Contract farmers can learn some important skills through contract farming system regarding data record, methods of applying chemicals and fertilizers, and the efficient use of farm resources [5]. Moreover, the details of agreement contract depend on type of products and parties. In addition, Pansin and Khamkaew [18] explained that most of those farmers who produce agricultural commodities through contract farming system need to sell their products to company and getting input factors from the company.

Therefore, contract farming means that the company/buyer contracts with farmers/sellers by written or verbal agreement, 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 [6,13,21,22,28].

### 1.2. Model of Contract Farming

Contract farming models have many characteristics which depend on the nature and type of contracting agency, technology, nature of crop or produce, objective, resource of contractor, experience of farmer and local and national contexts [23,26] such model as 1) the centralized model, 2) the nucleus estate model, 3) the multipartite model, 4) the informal model, and 5) the intermediary model. The most common practice in Thailand and Southeast Asia is the intermediary model [25]; 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. Normally, the collectors are responsible for all field activities from sowing to harvesting [5]. In other words, they are similar to the quotamen that collect products according to the quotas set by the company, and they assist contract farmers in all field activities. However, the company has extension officers to support technical information for the collectors and their farmers [19,25], as shown in Figure 1.

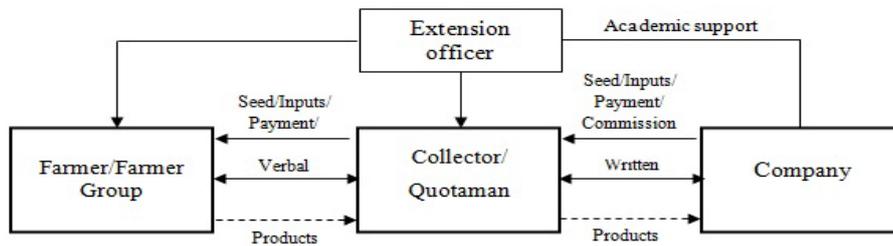


Figure 1. Intermediary model of contract farming system in Thailand (Source: Adopted from [25].)

### 1.3. Advantages/disadvantages/success of Contract Farming

Contract farming may transform traditional agriculture into a modern one which has both advantages and disadvantages. Its 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 contract farming system. Table 1 shows other advantages of the contract farming system [5,13,22,28].

Table 1. Advantageous points of contract farming system

Sectors	Advantageous points
Farmer/Seller/Producer	<ol style="list-style-type: none"> <li>1. Market certainty</li> <li>2. Price stability</li> <li>3. Income certainty</li> <li>4. Receiving input, production services, credit, new technology and skills</li> <li>5. Incremental productivity</li> </ol>
Company/Buyer	<ol style="list-style-type: none"> <li>1. Receiving quality products on time and meet their requirement</li> <li>2. Planning the production and marketing</li> <li>3. Reducing production costs from large scale production</li> </ol>
Consumer and overall economy	<ol style="list-style-type: none"> <li>1. Improvements of product quality and safety for consumers</li> <li>2. Export of products more and more</li> <li>3. Continuous manufacture of agricultural products</li> <li>4. Continuous employment in companies</li> </ol>

On the other hand, there are several disadvantages as shown in Table 2. 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 mismanagements may cause problems of farmers' livelihood, thus making them hesitant to continuously participate in this system. 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 other than their proper investment in farmland, which leads to the reduction of yields and worse quality of product. Moreover, contract farming often destroys the environment because the growers emphasize on mass production by inputting many chemicals to accelerate the production [5,7,13,15,22].

**Table 2. Disadvantageous points of contract farming system**

Sectors	Disadvantageous points
Farmer/Seller/Producer	<ol style="list-style-type: none"> <li>1. Farmers may have risks in new product</li> <li>2. Farmers have no market to sell surplus products</li> <li>3. Company exploits contract farmers with monopoly production</li> <li>4. Staff of company may corrupt in allocation of quotas</li> <li>5. Company delays payment</li> <li>6. Company does not provide compensation for natural disaster</li> </ol>
Company/Buyer	<ol style="list-style-type: none"> <li>1. Mismanagement of companies have effect on farmers' participation</li> <li>2. Farmers sell their products to outside contract</li> <li>3. Yields and quality of product reduce because farmers used loan incorrectly</li> </ol>
Environment and social	<ol style="list-style-type: none"> <li>1. Environmental destruction due to mass production</li> <li>2. Noncompliance with contract leads to poor relationship</li> </ol>

Moreover, contract farming will succeed in collaboration among all parties consisting of company, buyer, farmer, producer and seller. Naturally, they have to understand their own role and function. Farmers should also consider their contribution in developing the quality of products. The companies should have financial stability and support farmers in various fields such as technology, information, input and credit. Furthermore, companies should explain clearly the details in an agreement with farmers and always give advice to farmers.

Contract farmers, collectors and company should build a good relationship based on honesty and sincerity. In addition, the company should share in the risk of production, and the farmers can negotiate with the company for the price of commodity. For the further development of contract farming, the government has to provide special services in cases where the company cannot arrange in a proper way such as agricultural input, information and technology. However, the government should also have knowledge and understanding of the principles and methods of contract farming system before its promotion. Naturally, the government should 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 contract farming. Moreover, a bank will provide finance for contract companies if special case such as natural disasters happen [5,13,15,21,22].

## 2. Materials and Methods

Chiang Rai province (Figure 2) was selected as a study area because farmers here planted Japanese rice in irrigated areas such as Phan, Mueang Chiang Rai, Mae Chan, Mae Sai, Mae Suai, Wiang Pa Pao and Wiang Chiang Rung districts. This province was ranked at the top of Japanese rice production in Thailand. The temperature here is 18-25 degrees Celsius which is suitable for the cultivation of Japanese rice. Moreover, the CRI conducts a series of scientific research here and prepares a technology package and information for its cultivation which would be extended to rice farmers. In addition, the CRI produced Japanese rice seeds for distribution to the companies that have established a contract farming system. This province

has implemented the first pilot project to encourage farmers to grow Japanese rice [2]. Unfortunately, no indicative statistical data show the trends of paddy fields for Japanese rice and the number of Japanese rice contract farmers.

Moreover, eight companies in Chiang Rai province have a contract farming system for Japanese rice, and a rice mill dealing in the largest volume of Japanese rice in Thailand is located here [27]. This study selected two Japanese rice mills among these companies by using the purposive sampling method: X and Z rice mills (alias names). X rice mill was selected because it was a new rice mill that encouraged farmers to cultivate Japanese rice, which X miller had a contract with 150 farmers whose combined cultivated areas were approximately 500 rais (80 ha) in Wiang Pa Pao district. With regard to Z rice mill it was among the first rice mill in Chiang Rai province that has engaged in Japanese rice business and has encouraged farmers to cultivate Japanese rice for a long time. Moreover, Z rice miller established business contract with 400 farmers whose total areas of paddy fields were approximately 3,000 rais (480 ha) in Wiang Pa Pao district [31]. A study of both X and Z rice mills may show differences as regards to model, management and advantages and disadvantages of Japanese rice contract farming system. Therefore, Wiang Pa Pao district in Chiang Rai province was selected as a study area implicitly.

In this study, the authors utilized the data that were derived not only from documents of related organizations, journals, and books, but also from in-depth interviews from field survey at concerned target group in Wiang Pa Pao district. The interviewees included two managers/owners of rice mill factories, six collectors, thirty contract farmers, as well as one director of Wiang Pa Pao Agricultural Office, three staffs of Chiang Rai Rice Research Center, all of whom were selected using the purposive sampling method. The respondents were interviewed in-depth by the research team at each office/rice mill and house of collectors. The structured questionnaires were used to collect the information on the background of respondents, the model and management of contract farming in each rice mill, its advantages and disadvantages and the role of stakeholders in Japanese rice

production. The data were arranged and analyzed by using qualitative analysis and descriptive statistical tools.

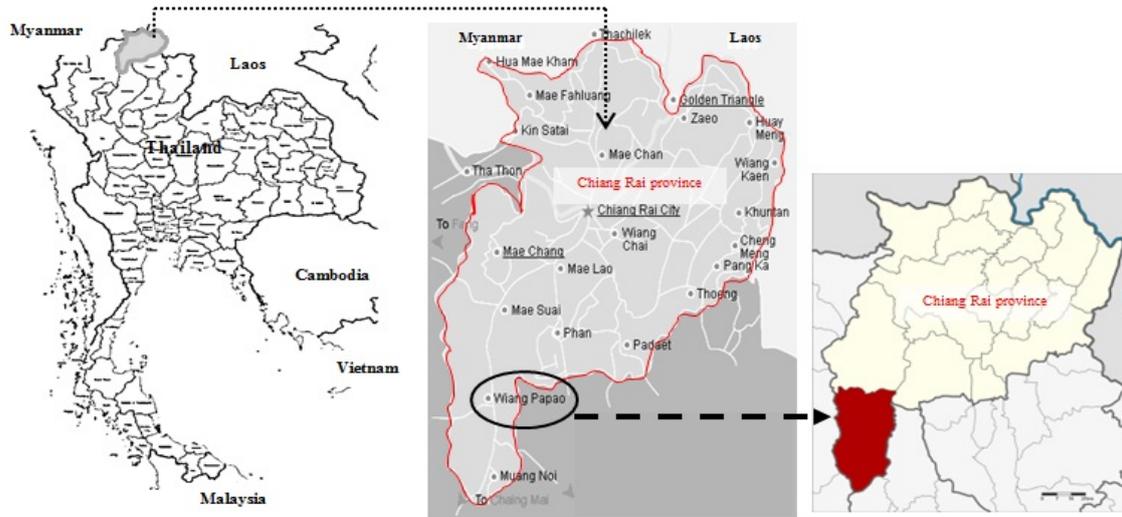


Figure 2. Map of Wiang Pa Pao district, Chiang Rai province, Thailand (Source: Google Map 20<sup>th</sup> December, 2014)

### 3. Results and Discussion

#### 1. The general profile of respondents

X and Z rice mills (Table 3) have experiences in Japanese rice production for 8 years (since 2006) and 18 years (since 1996), respectively. Moreover, X rice mill could produce Japanese rice approximately 2,000 tons/year or 5.5 tons/day, while Z rice mill could produce approximately 5,000 tons/year or 13.7 tons/day. In 2014, X rice mill had business links with 12 collectors and 500 contract farmers. The cultivated areas of Japanese rice under X rice mill’s contract amounted approximately to

2,000 rais (320 ha) which dispersed in many districts and provinces. Z rice mill dealt with 34 collectors, 1,500 contract farmers, and their cultivated areas were approximately 10,000 rais (1,600 ha), which also were dispersed in many districts and provinces. X rice miller sold all Japanese rice to buyers in Thailand, especially the export companies, and also made and sold processed products from rice bran and germ of Japanese rice for domestic consumers. Z rice miller also sold 90 % of all Japanese rice to the export companies in Thailand, and the remainder is sold to the domestic market, especially consumers in Chiang Rai province.

Table 3. Profiles of two Japanese rice millers in Chiang Rai province

Contents	Respondents	
	X rice mill	Z rice mill
Location	Mueang district	Mae Suai district
Experience with Japanese rice (year)	8	18
Capacity (ton/day)	5.5	13.7
No. of collector	12	34
No. of contract farmer	500	1,500
Cultivated area under the contract (rai)	2,000	10,000

Table 4. Profiles of six collectors in Japanese rice contract farming

Contents	Respondents					
	X rice mill			Z rice mill		
	1	2	3	1	2	3
Gender	Male	Male	Male	Female	Female	Male
Age (year)	54	63	60	62	54	58
Educational level	Pri.*	Pri.*	Pri.*	Pri.*	Pri.*	Pri.*
Experience with collector in Japanese rice (year)	8	5	4	18	8	10
Experience with rice mill (mill)	1	3	1	1	1	1
No. of quota (rai)	120	117	98	150	60	250
No. of contract farmer	12	22	13	15	5	61
Productivity** (kg)	90,000	87,750	73,500	112,500	45,000	187,500
Commission fee (THB/kg)	0.20	0.20	0.20	0.50	0.50	0.50

\* Primary school

\*\* The average of Japanese rice was 750 kg/rai, therefore, the productivity calculated from number of quota x 750 kg/rai.

Six collectors in Wiang Pa Pao district were selected for this study, composing of three collectors from X and three collectors from Z rice mill (Table 4). All collectors

in this study were composed of four males and two females. Their average age was 58.5 years. All collectors attended primary school, and they had experience as

Japanese rice collector for more than 4 years, with some having experiences of 8 to 18 years. The collectors were farmers themselves in Wiang Pa Pao district who have to collect Japanese rice from contract farmers and also have to cultivate Japanese rice in order to understand all steps of its production process and to give advice to farmers correctly.

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 with the return of the coordination between farmers and miller (commission fee). The commission fee of X and Z rice mills were 0.20 THB/kg, and 0.50 THB/kg, respectively. The production of Japanese rice was under the allocation of cultivated areas, which rice millers will specify the different quota number of cultivated areas in each collector. In 2014, each collector of X rice mill allocated Japanese rice cultivated areas according to the number of quota 98-120 rais (15.7 – 19.2 ha) with 12-22 contract

farmers, while each collector of Z rice mill allocated 60-250 rais (9.6 – 40 ha) of cultivated areas with 5-61 contract farmers.

The contract farmers in Wiang Pa Pao district selected for this study were composed of 17 farmers from X, and 13 farmers from Z rice mill (Table 5). Male farmers accounted for 66.7% of all farmers, and female were 33.3%. Their ages were more than 50 years (73.3% of all farmers), and their education level was primary school (86.7% of all farmers). In addition, 63.3% of respondents cultivated Japanese rice in the whole paddy fields. Moreover, half of all respondents had less than 10 years of experience on Japanese rice cultivation. All contract farmers under Z rice mill in this study had never established any business link with other rice mills, while the contract farmers of X rice mill (88.2 % of its respondents) had produced and sold Japanese rice to other rice mills before contract with X rice mill. This means that X rice mill might have a tactic in attraction for cultivation.

**Table 5. Profiles of thirty contract farmers in Japanese rice contract farming**

Contents		Respondents					
		X mill (n=17)		Z mill (n=13)		Total (n=30)	
		Frequency	%	Frequency	%	Frequency	%
Gender	Male	14	82.4	6	46.2	20	66.7
	Female	3	17.6	7	53.8	10	33.3
Age	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
Civil status	Single	0	0.0	0	0.0	0	0.0
	Married	17	100.0	13	100	30	100
Educational level	< primary school	0	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
Experience with Japanese rice cultivation	1-10	9	52.9	6	46.2	15	50.0
	11-20	6	35.3	7	53.8	13	43.4
	21-30	1	5.9	0	0.0	1	3.3
	31-40	1	5.9	0	0.0	1	3.3
No. of contracted rice mill	1	2	11.8	13	100	15	50.0
	2	12	70.6	0	0.0	12	40.0
	3	3	17.6	0	0.0	3	10.0
Japanese rice cultivated area	1-5	6	35.3	1	7.7	7	23.3
	6-10	9	52.9	4	30.8	13	43.4
	11-15	2	11.8	8	61.5	10	33.3
	1-5	4	23.5	1	7.7	5	16.7
Total areas of agricultural cultivation	6-10	10	58.8	3	23.1	13	43.4
	11-15	1	5.9	7	53.8	8	26.6
	16-20	1	5.9	2	15.4	3	10.0
	21-25	1	5.9	0	0.0	1	3.3

## 2. Japanese rice contract farming management model

The system of Japanese rice contract farming in Wiang Pa Pao district was mainly an intermediary model; collectors have key roles standing between rice mill and farmers. It is noteworthy that X and Z rice mills modified this basic model to become more-workable for their business operation. Under such modified intermediary model, a buyer formally has a contract with a collector who has his own informal arrangements with farmers [5]. X rice mill's business operation was based on a written contract with collectors and farmers in each group in Wiang Pa Pao district (Figure 3) because it had less

experience with Japanese rice production than Z rice mill. Therefore, X rice miller had to develop a written contract in the system of contract farming to build a confidence with the collectors and farmers in its area. However, the rice miller did not force them to sign a contract. FAO [6] mentioned that company and farmers should understand the details of agreement together. In addition, companies should inform and explain the details in an agreement to farmers because they do not have enough knowledge and education. If they do not receive any notice from the companies, it may become a cause of non-compliance with contract requirements [14]. According to findings of

other scholars, both company and farmer signed a contract in advance in order to establish the term and condition together. Of course, the company cannot force farmers to sign a contract [20].

Since X rice mill is located about 90 km from Wiang Pa Pao district, it gave an additional 0.50 THB/kg transportation fee for the collectors. Collectors charged 0.20 THB/kg as commission fee. The rice miller paid to contract farmers according to the quality of Japanese rice paddy. In fact, price of paddy varied according to season and humidity, such as 10 THB/kg for off-season rice and 9 THB/kg for in-season rice with no more than 25% humidity, or 11.5 THB/kg for off-season rice and 10.5 THB/kg for in-season rice with less than 25% humidity

and paddy yielded more than 900 kg/rai. The rice miller should set up a good tactic in pricing, in order to attract farmers to participate in Japanese rice cultivation. In addition, the rice miller focused on Japanese rice with high quality. Therefore, he set up higher contract prices in order to purchase Japanese rice with good quality and meet the specifications of export companies (buyers) when processing Japanese rice. However, buyers decided the specifications of milled Japanese rice when the rice miller did not have own standards. Kaur and Minot [11] [16] mentioned that checking the quality or grading of product is very essential, leading to product pricing and income of the growers.

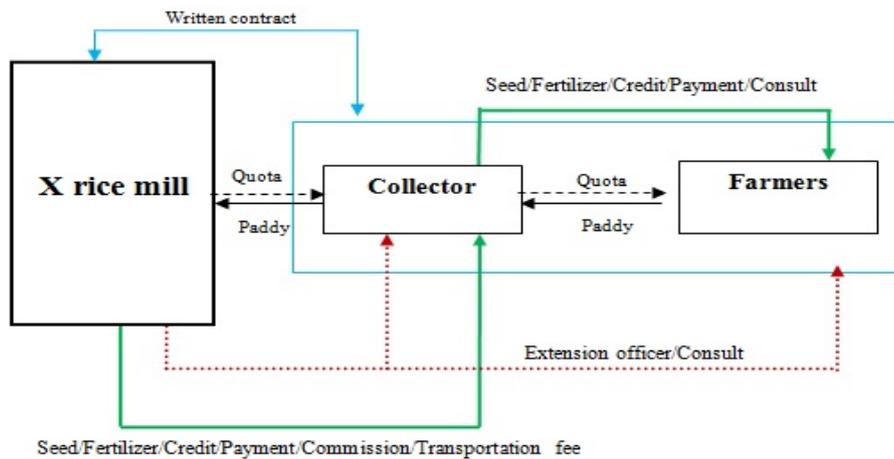


Figure 3. Model of Japanese rice contract farming of X rice mill

Z rice mill opened a purchasing station under this system (Figure 4) which was located in Wiang Pa Pao district, because there were a number of contract farmers and Japanese rice was cultivated in large areas there. The contract farming of Z rice mill was based on a verbal contract. However, a written contract was disadvantageous for illiterate farmers [14]. The rice mill has relied on its close relationship with collectors and contract farmers in their vicinity. With the rice miller’s experience on Japanese rice production, it gained the confidence of farmers and collectors. The rice miller, collectors and contract farmers had a good relationship together; Limnirankul et al. [12] explained that the good relationship between farmers and company, and between company and community, influenced contract negotiation.

However, many countries still used verbal agreements in contract farming system which the parties relied on with mutual respect [1].

With a purchasing station near the farms, Z rice miller only charged 0.10 THB/kg of transportation fee for collectors. This rice mill gave 0.50 THB/kg of commission fee to the collectors, by which they got as additional income except from cultivation of Japanese rice. This commission fee was an incentive for those who wanted to be a contract collector. With regard to purchasing price in contract, Z rice mill decided a fixed contract price, being 10 THB/kg for off-season rice and 9 THB/kg for in-season rice. Without any consideration of humidity, the rice miller, the collectors and the farmers made consensus on the market price.

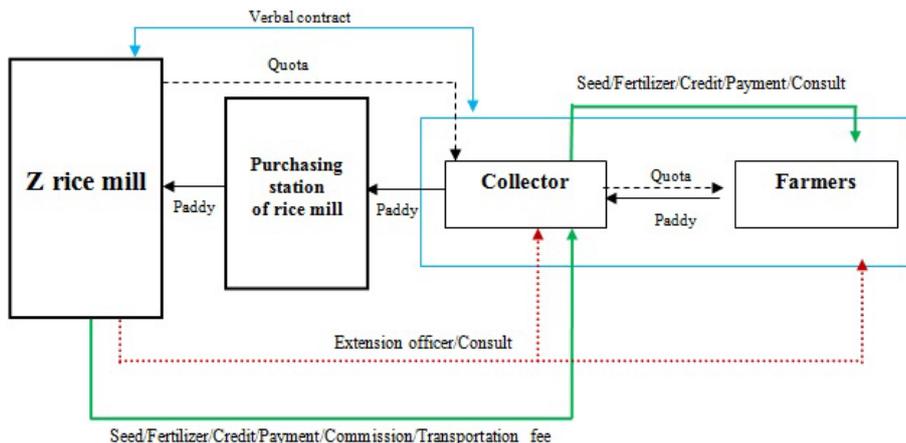


Figure 4. Model of Japanese rice contract farming of Z rice mill

### 3. Advantages and disadvantages of Japanese rice production

This study found both advantages and disadvantages of Japanese rice production in Wiang Pa Pao district from viewpoints of contract farmers and collectors. The advantages and disadvantages can be divided into four sides as follows; contract, cultivation, maintenance and harvesting sides (Table 6). All respondents pointed out that high contract price and assured market of Japanese rice were the first of all advantages. Secured contract price of Japanese rice ranged between 9 and 12 THB/kg, while other ordinary rice varieties in the area, especially San Pa Tong and RD 6 glutinous rice price was approximately 7-8 THB/kg. Therefore, Japanese rice was a good alternative

crop for rice farmers in the area. Moreover, the rice millers bought all Japanese rice that contract farmers produced, even if their products exceeded quotas. The farmers can sell surplus products to miller. In a review of the experience of contract farming in India, Minot [16] explained that vegetable contract farmers received higher prices than non-contract farmers, and the contract farmers can raise income from participation in this contract farming system. Moreover, Kunthongjan [14] studied contract farming of cabbages, and explained that buyer purchased the cabbages from farmers according to a contract. Although the farmers produced cabbages in more quantities than the specified contract, the buyer would still purchase all products.

**Table 6. The advantages and disadvantages of Japanese rice production in Wiang Pa Pao district**

Contents	Frequency (percent)				Total (n= 36)		Classification*
	X rice mill (n=20)		Z rice mill (n=16)		Ad.	Dis.	
	Ad.	Dis.	Ad.	Dis.			
<b>1. Contract side</b>							<b>Advantage</b>
1.1 Higher contract price than other crops	20 (100.0%)	0 (0.0%)	16 (100.0%)	0 (0.0%)	<b>36</b> (100.0%)	<b>0</b> (0.0%)	Advantage
1.2 A certain market	20 (100.0%)	0 (0.0%)	16 (100.0%)	0 (0.0%)	<b>36</b> (100.0%)	<b>0</b> (0.0%)	Advantage
1.3 A certain pricing	20 (100.0%)	0 (0.0%)	6 (37.5%)	10 (62.5%)	<b>26</b> (72.2%)	<b>10</b> (27.8%)	Advantage
1.4 Determining the exact date of payment	20 (100.0%)	0 (0.0%)	3 (18.7%)	13 (81.3%)	<b>23</b> (63.9%)	<b>13</b> (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%)	<b>31</b> (86.1%)	<b>5</b> (13.9%)	Advantage
<b>2. Cultivation side</b>							<b>Advantage</b>
2.1 Farmers are satisfied with yields	18 (90.0%)	2 (10.0%)	14 (87.5%)	2 (12.5%)	<b>32</b> (88.8%)	<b>4</b> (11.2%)	Advantage
2.2 Extension staff of rice mill and/or collector assisted and consulted them throughout the cultivation	20 (100.0%)	0 (0.0%)	11 (68.7%)	5 (31.3%)	<b>31</b> (86.1%)	<b>5</b> (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%)	<b>29</b> (80.5%)	<b>7</b> (19.5%)	Advantage
<b>3. Maintenance side</b>							<b>Not sure</b>
3.1 It is easy to maintain	12 (60.0%)	8 (40.0%)	10 (62.5%)	6 (37.5%)	<b>22</b> (61.1%)	<b>14</b> (38.9%)	Not sure
3.2 Less disease and insects	13 (65.0%)	7 (35.0%)	9 (56.3%)	7 (43.7%)	<b>22</b> (61.1%)	<b>14</b> (38.9%)	Not sure
<b>4. Harvesting side</b>							<b>Advantage</b>
4.1 It is easy to harvest	19 (95.0%)	1 (5.0%)	13 (81.3%)	3 (18.7%)	<b>32</b> (88.8%)	<b>4</b> (11.2%)	Advantage
4.2 Extension staff of rice mill and/or collector checked the quality of rice before harvest	20 (100.0%)	0 (0.0%)	11 (68.7%)	5 (31.3%)	<b>31</b> (86.1%)	<b>5</b> (13.9%)	Advantage

\* The classification of advantages in Japanese rice contract farming were justified according to the percentage of the total farmers' attitude toward contract farming. It was justified into three categorized (0.0-33.3%: disadvantage, 33.4-66.6%: Not sure, and 66.7-100.0%: advantage).

In addition, 88.8 % of all respondents were satisfied with yield of Japanese rice. This rice has 750 kg/rai of average yield which the growers can produce rice between 600-1,000 kg/rai especially during off-season when more yield was realized than in-season [30]. Apart from the environment in area, the most important factor for production was good quality seeds [11]. Moreover, the respondents (86.1%) mentioned that the extension staff of rice mills and/or collector assisted them and offered consultation them throughout cultivation. Another study by Kaur and Kirsten & Sartorius [11,12] explained that good communication and close monitoring of company resulted to a good relationship and a sense of trust between the company and contract farmers which led to a reduction in breach of contract.

Moreover, 61.1% of all respondents identified that maintenance of Japanese rice was easy. However, some farmers found problems in Japanese rice maintenance such as blast disease even if contract farmers operated according to the instructions of rice mills' extension staff and/or collectors. Also 88.8% of respondents identified

that harvesting Japanese rice is easy because harvester machine services were available for a fee of 700-800 THB/rai if rice farmers face lack of harvest laborers. Moreover, the extension staff of rice mill and/or collector checked the quality of rice 15 days before harvesting, such as checking contaminated rice, immature rice seed. If there are any quality problems, the farmers have to eliminate these problems immediately such as contaminated rice, and then they can harvest and send paddy to the collector. Simmons et al. [24] found that extension staff visited contract farmers many times and checked the quality of Bali rice seed one week before harvesting in Indonesia. The contracted production (15%) is rejected before farmers harvest because extension staff found impure rice in farmland of contract farmers.

The disadvantages of Japanese rice production can be found in three main aspects. Firstly, 81.3% of respondents, especially for Z rice mill mentioned that the rice miller delayed payment due to the lack of liquidity even if a rice miller informs the exact date of payment to farmers. Therefore, the collectors cannot get money to pay to

contract farmers. Some collectors had to bring their own money to pay contract farmers first. Following the Japanese rice trading under contract farming system, contract farmers of both X and Z rice mills have to sell paddy through only their collectors. The collectors will pay the farmers within 15 days after they sell paddy to rice miller, then he will transfer money to each account of collectors.

Secondly, respondents (62.5%) mentioned that Z rice mill lowered purchase price from 13 THB/kg to 10 THB/kg, because it reduced costs of business operation to compete in the market. When the rice miller adjusted the prices, it gave an opportunity its contract farmers to sell their products outside the contract. This is in much contrast with a case study by Kaur [11] who studied potatoes contract farming; the companies interviewed did not allow their contract farmers to sell their products in the open market. In fact, contract farmers of Z rice mill could hardly sell Japanese rice to other market channels because other rice millers such as X rice miller did not intend to purchase Japanese rice from non-contract farmers. If X rice miller found that collector or contract farmer brought Japanese rice from outside the contract, the rice miller declared such person as a defaulter and a blacklisted person. Putsyainunt et al. [20] mentioned that the companies had an advantage over the contract farmers due

to the fact that they controlled the production system and markets. However, the companies did not force them to sign a contract with companies, if they feel dissatisfied with the details of conditions.

Finally, although cultivation of Japanese rice was easy, some respondents (38.9%) identified that maintenance is rather complicated than Indica rice, especially fertilization; this rice respond to nitrogen fertilizer at a higher rate (12-30 kg/rai). It required a thorough maintenance more and punctual planting, and it does not resist pests and blast disease. Farmers need to work more for protecting, checking rice field and disposing of these problems properly.

**4. Important roles of stakeholders in Japanese rice production**

Japanese rice in Thailand has been produced through the system of contract farming resulting to expanded cultivated areas due to increasing attentions of rice farmers. Stakeholders in the production of Japanese rice had to understand their own role and other stakeholder roles to develop the production more and more. This study examined the important roles of stakeholders in Wiang Pa Pao district. The stakeholders and their functions can be categorized into at least four groups as follows; rice mill, collectors, contract farmers and state agencies, as shown in Figure 5.

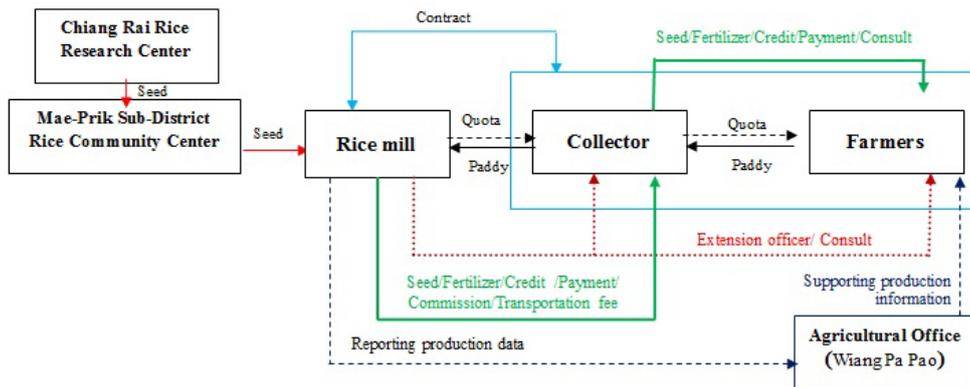


Figure 5. Stakeholders in Japanese rice production in Wiang Pa Pao district

Firstly, rice mill had 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, and their field staffs extended to disseminate knowledge and be consulted by the farmers regarding the production and maintenance of Japanese rice, techniques for cropping of plant and methods of marketing management [11,12,20]. Package of productive material and credit was regarded as the most effective tool to manage a contract farming system. However, contract farmers can buy more inputs from the outside which contract rice millers did not prohibit. Moreover, purchase price can be set by the rice millers which depended on the quality of rice.

Secondly, the collectors acted as a local coordinator and/or a consultant. They are important person for rice millers because they stand in between the rice miller and contract farmers in a certain defined local area. Furthermore, they gave advices on Japanese rice production and maintenance to contract farmers, thereby reducing troubles of rice millers' management. Thirdly,

contract farmers produced Japanese rice and used particular kinds of productive materials provided by a rice miller. Finally, the CRI had a substantial role in seed production and the extension and implementation of Good Agricultural Practice (GAP) which just started in 2014. Food and health became important issues for people's living in many countries. Consumers focused on the quality of products [12]. Producers have to develop their products to compete in the markets. Naturally, the Thai government has encouraged farmers to cultivate Japanese rice through GAP system to raise the standards of production for competition in the global market. The government will support private companies to produce and expand exports to foreign countries.

However, at the present, the supply of Japanese 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 seed production. This center is responsible for producing rice seed and distributing to rice mills and groups of seed

producers in the community, as well as developing the potential of rice farmers and farmer organizations. Moreover, Wiang Pa Pao Agricultural Office in Wiang Pa Pao district needs to participate in this production. They required many data from rice millers such as the number of contract farmers and cultivated areas in order to collect as agricultural statistics.

#### 4. Conclusion

Rice millers who were a target group in this study modified the models and management of Japanese rice contract farming from the intermediate model. Their models and managements needed to process through intermediaries or collectors. The collectors played a significant role in a contract farming system organized by rice millers, through which they will reduce the management trouble of rice millers. Each rice mill adopted different model and management policy on signing a contract, purchase price, commission fee, and specifications of rice quality, and so on. If contract farmers were not satisfied with these conditions such as purchase price, they did not need to contract with rice mills. However, rice millers should adjust their management if problems occurred in the system.

The production of Japanese rice had advantages such as high contract price (9-12 THB/kg), an assured outlet, high yield (600-1,000 kg/rai), monitoring and guidance by extension officers/collectors. High contract price had an effect on the income of growers. However, each rice miller established a strategy of pricing which could attract farmers to participate in this production system. Moreover, extension staffs of rice mills and collectors monitored approximately 2-3 times/season in farmland of farmers, which they could make a good relationship together. In contrast, this production especially the one followed by Z rice mill had disadvantages, namely lack of financial liquidity that led to delay of payment and reduced purchase price, which may affect the confidence of Japanese rice growers in the future. Furthermore, shortages of seeds with both good quality and quantity are still an obstacle for the Japanese rice production in Thailand. However, the CRI is developing quality of seeds and established a Japanese rice community center to produce more rice seeds. CRI will start a breeding project of Japanese rice to suit the environment in Northern Thailand better, which will be a project starting in the fiscal year 2015.

At this moment, the CRI has encouraged farmers to cultivate Japanese rice through GAP system 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. Therefore, Japanese rice is a good alternative crop for growers in Wiang Pa Pao district.

#### Acknowledgements

We appreciate the valuable help of Dr. Liao Lawrence Manzano, visiting professor of the Graduate School of

Biosphere Science, Hiroshima University for his academic suggestion.

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