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Geographical Indication Rice Supply Chain Risk Management for a Community Enterprise

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Abstract

Geographical indication (GI) rice is unique product from a specific region. Our objective is to study the risk management in the GI rice supply chain of a community enterprise called "Ban Khao Klang", which produces Sang Yod Muang Phatthalung. From the literature review and in-depth interview of the president of the group, the risk identification, risk measurement, assessment and evaluation for farmers and the enterprise are performed. Then, the priority list of risk management is descending sorted according to the index of severity, probability and cost. The result indicates that the first priority risk for farmer is flood, being in debt, high input cost and inadequate knowledge for organic farming and high production cost for an enterprise. In addition, the group needs support from government in term of subsidy in water pond. Finally, we suggest the improvement of productivity by using proper techniques. Furthermore, the enhancement of community enterprise could be implemented in human skill, teamwork and network.

Keywords: *Community enterprise; geographical indication rice; risk management*

1. INTRODUCTION

Geographical indication (GI) rice is unique quality of product produced from a specific region which involves history, tradition, knowledge and landscape in the region. One of famous GI rice in Thailand is Sang Yod Muang Pattalung, the first officially registered GI rice in Thailand. It is traditionally being produced in Pattalung province, the South of Thailand. Its characteristic is slim shape with red seed. Moreover, it contains a lot of valuable nutritional elements such as thiamine (vitamin B1), niacin (vitamin B3) and phosphorus (Rice Department, 2014).

In a GI rice supply chain, there are many stakeholders i.e. the suppliers of raw materials such as seed and fertilizer, farmers, the community enterprise which buys paddies from members and mill them and sell to customers who are department stores, supermarkets, restaurants, OTOP stores, souvenir shops, etc. GI rice farming faces risks from external uncertainty such as rainfall, flood, weed, pests, diseases, etc. The internal factors risks are mainly from the farmers and millers such as their cultivation methods, storage, milling process, grading and packing. Moreover, the sources of risk come from variability of paddy price and demand, high inputs cost, uncertain and low yield, lack of labor and changes in agricultural policies. These cause the difficulty to optimally manage the rice supply chain.

According to Harwood et al. (1999), they defined five primary categories of risk in agriculture which are production, marketing, finance, legal and human risk. Whereas Aimin (2010) defined four sources of uncertainty and risk in agriculture i.e. nature, market, family and policy. Furthermore, Chatterjee (2010) divided agricultural risk in six types i.e. production, price and market, regulatory, technology, finance and human risk. Office of Agricultural Economics of Thailand (2010) studied the need of risk management for rice farmers in nine provinces of Thailand (Nakhonsawan, Uthaithani, Phetchabun, Sisaket, Buriram, Nakhonratchasima, Lopburi, Kanchanaburi and Prachuapkhirikhan). They found that pest and drought were the most common risks in decade (1998-2007) as 89.92% and 81.70%, respectively. In addition, 64.72% of interviewees faced these disasters every year. Besides, about half of farmer lands were damaged and they lost 1,699 Baht per *rai* (1 *rai* equals to 1,600 square meter).

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Therefore, our objective is to study the risk management in the GI rice supply chain of a community enterprise called "Ban Khao Klang" which produces Sang Yod Muang Pattalung. The enterprise was established in 2005. At present, there are 85 members with total organic farming 700 *rais* and 350 tons of paddies per year.

2. METHODOLOGY

2.1 Data Collection

First, we review the related literature for the potential risk of organic rice farmers and millers. Then, we construct a questionnaire to identify risk, measure the severity and evaluate its chance using four scale levels. Next, we perform an in-depth interview the president of a community enterprise called "Ban Khao Klang" which locates in Phatthalung province in the South of Thailand. Our assumption is to discover the vision of risk management point of view from the leader of the group only because we have limitation to interview every member. Then, we follow the risk management process according to Tummala and Schoenherr (2011) and Ongkunaruk (2013), but adjust the magnitude to suitable for farmers and the enterprise. Finally, we suggest the risk mitigation based on our experiences, supply chain management principle, literature review and government policies. This study focused on farmer and rice mill of community enterprise.

2.2 Supply Chain Risk Management Process

There are four stages: risk identification, risk measurement, risk assessment, risk evaluation and risk management. First, risk identification determines potential risks for farmer and rice mill. Second, risk measurement defines the consequences of potential risks in term of the magnitudes of impact. Third, risk assessment estimates the chance of the risk could occur. Each of them has four levels as described in Table 1. Fourth, risk evaluation has two steps: risk ranking and risk response action plan. Risk ranking is based on the determination of risk exposure value for each identified risk, and is defined as

Risk exposure value
= Risk Consequence Severity Index
** Risk Probability Index* (1)

Therefore, risk exposure value ranged between 1 and 16. Next, we categorize the risk response in three categories where each represents similar range of exposure. Risk exposure value between 1 and 5 is in an acceptable category; hence, it implies that there is no need to perform any risk management. Next, risk exposure value between 6 and 9 is in a tolerable category, which implies that the decision maker should aware of these risks. Then, risk exposure value between 10 and 16 is in an unacceptable category and need to be managed. After that the implementation cost for risk response action must be appraised according to the cost needed to be paid for risk management and

Table 1 The description of index for severity and probability

Index	Severity Level	Description	Probability Level	Description	
				Farmer	Rice Mill
4	Catastrophic	In debt	Often	Once per year	Once per week
3	Critical	Lost profit	Infrequent	Every other year	Once per month
2	Marginal	Profit slightly lower	Rare	Once per 3-5 years	Once per year
1	Negligible	No impact	Extremely rare	Once per decade	Once per decade

Table 2 Implementation cost categories for risk response action-plan

Cost Index	Cost Categories	Implementation Costs (THB)	
		Farmers	Rice Mill
1	Substantial	> 100,000	> 1 M
2	High	10,001-100,000	500,001-1 M
3	Low	1,000-10,000	10,000-500,000
4	Trivial	< 1,000	< 10,000

there are four levels as described in Table 2. Finally, the summary of three indices i.e. severity, probability and cost will be calculated and rank in a descending order. Risk with a higher total index has priority to be managed.

3. RESULT

3.1 Risk Management for Farmers

The result indicates that there are several risks in terms of farmers opinion; however, we focus on the first priority risk which are flood and being in debt with the highest risk exposure value of 12 and total index of 8 as shown in Table 3. It implies that the risk management must be applied to solve these problems. Phatthalung province is geographically located in heavy rainfall region. Thus, it is flooded annually. Flood damages rice plants and results low yield and low quality. Therefore, farmers should monitor the weather forecast and decide when they should schedule rice planting to avoid the flood and self-protection by having water pond. In addition, the government should establish the sustain flood prevention. The government has conducted several projects in order to solve the flood such as the construction of dike with steel structure; however, there are more area needed this subsidy (The Government Public Relations Department, 2015). Alternatively, crop insurance is the one tool to transfer this risk to the insurance company. It is not only protecting against huge loss but also offers the opportunity for more consistent gain (Kann, 2011). In addition, being in debt is a major concern for farmers due to higher expenditure than revenue and their expense rate is increasing more than their income rate (Thonglim, 2010). Most farmers never charge their labor cost, maintenance cost, inventory cost, and transportation cost as the production cost. While the income is low due to the low paddy price which is the mechanism of market price. In order to manage this risk, farmers should make the household account which includes the balance sheet of incomes and expenses and actual cash flows to financially control. It shows that the performance of the business and farmers can provide the plan for future accomplishment (Kann, 2011). Moreover, Thonglim (2010) suggested that the integrated farming is the one of principle which provides several sources of income such as planting fruits and vegetables for daily and weekly income since rice is annual crop and they earn once a year. Next, farmers should increase rice yield by using high quality inputs and right amount and types of fertilizer. Finally, the community enterprise can help the members by providing the low interest rate loan.

Table 3 Summary of risk ranking for farmers

Risks	Severity (1)	Prob-ability (2)	Implemen tation cost (3)	Total Index (1+2+3)
Flood	3	4	1	8
Being in debt	3	4	1	8
High raw material cost	3	2	2	8
Inadequate knowledge in organic system	2	2	4	8
Low rice yield	3	3	1	7
Dead stock	2	2	3	7
Labor shortage	1	3	3	7
Lack of government support	3	2	1	6
High interest rate	2	3	1	6
Drought	3	1	2	6
Pest	2	1	3	6
Weed	2	1	3	6
Disease	2	1	3	6
High transportation cost	2	1	3	6
Risk from rice stolen	2	1	3	6
Paddy quality is under specification	1	4	1	6
Unfair paddy price	2	1	1	4
No local collection center	2	1	1	4
Affected by the rice subsidy scheme	1	1	1	3

3.2 Risk Management for the Community Enterprise

The community enterprise acts similar to a miller who buys paddies from members and sell rice product to customers. The first priority risk is high production cost as shown in Table 4. The major concern is packaging

cost due to low purchasing power resulting from low volume procurement. The community enterprise is a small-sized enterprise and has low capacity. Thus, the group cannot have economy of scale in the production. Moreover, there is no sufficient fund for investing in a high-tech packing machine. In addition, due to skill-less staff, the packages are damaged after packing resulting in high cost and low productivity. Then, the consolidation of the demand for packaging among neighbor communities, establish the standard packaging i.e. plastic film and training the staff could mitigate this risk. In summary, the implementation of supply chain management principle could mitigate the other risks such as planning, optimal sourcing of inputs and productivity improvement as shown in Table 5.

Table 4 Summary of risk ranking for the community enterprise

Risks	Severity (1)	Prob-ability (2)	Implemen tation cost (3)	Total Index (1+2+3)
High production cost	2	4	3	9
Machine breakdown	2	3	3	8
Wrong forecasting and planning	2	2	4	8
Low quality of paddy	2	2	4	8
High transportation cost	1	3	4	8
High paddy cost	3	2	2	7
High specification from customer	2	3	2	7
Improper storage	2	2	3	7
Labor shortage	1	3	3	7
Found other varieties of rice	2	2	2	6
Demand uncertainty	1	3	2	6
Low yield	2	1	3	6
Insufficient funding	2	2	1	5
Supply shortage	2	1	2	5
Low selling price	1	2	2	5
Affected by the rice subsidy scheme	1	1	1	3

Note that this study is a pre-risk management guideline since our limitation on qualitative result. The other opinion may be varied. Further research can be explored by brainstorming this result with other members to adjust and conduct the uniform risk management for the enterprise and farmers.

4. CONCLUSION

GI rice supply chain faces many risks and uncertainty including natural disaster, uncertainty of yield and price, risk of labor shortage, etc. Therefore, the stakeholders in the supply chain needs to identify and evaluate potential risks in order to consider the priority risks that need to be handled first for reducing potential risk and severity of consequence. After risk identification, risk measurement, risk assessment and risk evaluation which integrated the aspects of severity, probability and cost involving risk mitigation, the descending ranking shows the priority risk management based on these aspects.

Table 5. Summary of risk management for high priority risks

Stake-holders	Risks	Risk Management
Farmer	Flood	- Self-prevention - Planting schedule - Government support
	Being in debt	- Farm record and financial planning - Enterprise low rate loan - Generate revenue from other career
	High raw material cost	- Self-production - Procurement consolidation
	Inadequate knowledge in organic system	- Training - Knowledge management
The communi-ty enterprise	High production cost	- Consolidation procurement - Standard packaging
	Machine breakdown	- Total Productive Maintenance
	Wrong demand forecast	- Planning with customers
	Low quality of paddy	- Supplier evaluation - KM
	High transportation cost	- Consolidation

For farmer, flood and being in debt are the major risks that must be alleviated. In addition, the group needs support from government in term of subsidy in water pond. While, the enterprise priority risk is high production cost. The risk mitigation can be performed by implementation of proper techniques for production and supply chain management, high quality of inputs, and consolidation among members and nearby communities. Furthermore, the enhancement of community enterprise could be implemented in human skill, teamwork and network.

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