
The operation performance of Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd., Chachoengsao province, Thailand

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Abstract The operation performance of the Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd., Chachoengsao Province, Thailand was studied. The results revealed that Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd. is royal patronage which is supported by various agencies such as the Cooperative Promotion Department, and Land Development Department. This cooperative collected paddy from 10 farmer members, with average amount of paddy at 14 tons per year, and the paddy were delivered to the cooperative rice mill for processing. The full mill capacity is 1.2 ton of paddy per day. The service charge rate is one Thai baht per kilogram. The cooperative has produced rice in both packaging and non-packaging for sale to consumers by themselves. Regarding the SWOT analysis results, concerning the strengths, the cooperative rice mill was royal patronage that can provide inexpensive milling service charge for farmers. Additionally, operation staff had experience in rice milling for a long time. Whilst the weaknesses were the rice mill without checked the quality of paddy before milling-process and did not have the specialized technicians to repair a milling machine as well as budget deficit. In terms of the opportunities, the rice mill had a wide range of support from organizations of budgeting, staff, and administration. Moreover, farmers was preferred consuming rice grown by their own. Finally, the threats were the rice mill which located in a non-rice-farming area, and it operated less than the full milling capacity. The collaboration with supply chain partners should be encouraged to increase the quantity of paddy for the milling process.

Keywords: Rice Mill, Agricultural Cooperative, SWOT, Supply Chain, Operation, Rice Mill Performance

Introduction

In Thailand, rice is an important economic crop and the main food of the Thai people for a long time (Insomphun, 2002). Rice mill are considered as a very important part of the agricultural sector in Thailand in processing rice to easily consume for the people. In addition, the rice mill are an important intermediary in the rice market of Thailand. More than 80-90% of total paddy rice were sold to the rice mill (Isvilanonda, 2010). Majority of farmers sell rice directly to the rice mill making no competition in buying

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rice (Srisompan, 2014). As a result, the price of paddy rice sold by farmers depends on rice mill. If the rice price is lowered from being undercut, farmers may sell their rice at a lower price resulting in a loss. In addition, some farmers may sell all rice to rice mill, and finally, they have to buy rice back from the rice mill for consuming. Currently, there are private rice mill, government rice mill, and people-own rice mill. The people-own rice mill are established by a group of farmers and most of them are supported by the government such as budget, location, and machinery. The people-own rice mill are established in form of community enterprises, farmers groups, or agricultural cooperatives.

Agricultural cooperatives are important institutions in agricultural development (Boadu, 2016) playing a crucial role in the development of the rural sector and in promoting food security (Ruete, 2014). Major agricultural cooperatives compose of production and marketing cooperatives, poultry and livestock cooperatives, fishing and fish marketing cooperatives, and food processing and marketing cooperatives (Boadu, 2016). Hence, rice mill agricultural cooperative is one tool for enhancing farmers capability by helping farmers to avoid buying rice for consuming, reducing the cost of living, and solving the problem of poverty (Nakpheng, 2005). Rice mill cooperative, as food processing cooperatives, can assist farmers to process rice and consume their own rice by processing their rice at the agricultural group rice mill. The rice processes by their own rice mill has good quality and is safe from chemicals (Ngaemngam, 2015). From this importance, it can be seen that the agricultural group rice mill can contribute to farmer's self-dependence (National Science and Technology Development Agency, 2015).

However, from literature studies regarding agricultural group rice mill were successful only in some areas, while some areas were not. Therefore, the operation of rice mill is not acceptable (Maikaensarn and Chantharat, 2016) due to the shortage of budget and modern equipment in operation, most of which require budget support from public and private organizations. Moreover, there was a lack of knowledgeable people to work continuously (Domklang *et al.*, 2015). This research is interested in the study of the agricultural group rice mill operation in the form of agricultural cooperatives by selected Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd., as a case study.

Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd., is a food processing, and rice mill cooperative located in Chachoengsao Province, the Eastern Region of Thailand. Established in 1984, this cooperative is royal patronage and is supported by three agencies including: the Royal Development Projects Board (RDPB) supporting budget and staff in the rice mill, the Cooperative Promotion Department supporting staff from the department to help the rice mill management, and the Land Development Department taking care of the operation of the rice mill. The mill has to pay

all income from its operation to the Land Development Department as a caretaker. Whenever the rice mill needs to spend money, the mill has to propose to withdraw income to the Land Development Department; the mill cannot use money immediately. This rice mill can produce an average of 1.2 tons of rice per day (Chanchaengngam, 2018). Even though this cooperative is supported by government agencies; however, the mill still faces many challenges. To name a few, the mill operates under ideal capacity/year with a lack of full empirical evidence of its benefits. In order to improve its performance at the operational level, the supply chain should be developed and the SWOT analysis should be conducted to evaluate cooperative performance. The finding of this study is beneficial for operation development of Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd., and other agricultural cooperative rice mill in future. The objective was to evaluate the operation performance of the Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd., Chachoengsao Province, Thailand.

Materials and Methods

This qualitative study was carried out by using in-depth interviews with cooperatives manager, Mr. Wirot Chanchaengngam, the manager of Khao Hin Sorn Agricultural Cooperative (KHSAC) Rice Mill Ltd., Chachoengsao Province, Thailand in August 2018. In addition, an observation was applied to gain insights on rice mill operation.

Rice mill operation described by all activities in the operation, and operational performance as described by the SWOT analysis under the supply chain framework. SWOT is an analysis of the organization's internal strengths and weakness, coupled with the opportunities and threats that the organization faces externally (Lynch, 2006). The SWOT analysis result is able to suggest a firm's position in its journey towards meeting its strategic objective (Nwakoby *et al.*, 2017).

Results

An operation of Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd

Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd., is a rice mill given from the King Bhumibol Adulyadej (King Rama IX of Thailand). The rice mill officer who was interviewed is Mr. Wirot Chanchaengngam. He is 38 years old, and has been appointed to be in charge of the mill caretaker for 15 years. His domicile is in Prachinburi province, Thailand.

The KHSAC Rice Mill was established in 1984 at Khao Hin Sorn Royal Development Study Center covering around 6 rai, aiming to provide a source of study for the public and provide rice services to farmers. The service charge for all kinds of paddy is at the rate of 1 baht per

kilogram. The mill can product either brown rice or white rice as desired by the farmers. Also, the mill does not have any extra charges and return all rice to farmers, as well as by-products of rice, including rice husk, rice bran, and bran to be used in their farms. In 2017, the rice mill provided services totaling 101 tons of paddy accounting for 87 tons from farmers, and 14 tons from Khao Hin Sorn Agricultural Cooperative Ltd. The rice mill is supported by three agencies: 1) the Royal Development Projects Board (RDPB) supporting the budget and staff for the rice mill operation. This agency assisted in all staff hiring. The rice mill consisted of one officer and four workers working in the rice mill. 2) The Cooperative Promotion Department providing officers from the Department of Cooperative Promotion to help in the rice mill manage, and 3) The Land Development Department taking care of the operation of the rice mill. The mill has to pay all income from its operation to the Land Development Department as a caretaker. Whenever the rice mill needs to spend money, the mill has to propose to withdraw income to the Land Development Department; the mill cannot use money immediately.

Table 1. The operation of Khao Hin Sorn agricultural cooperative rice mill Ltd

Table	Detail
Year of establishment	- Established in 1984
Supporting agencies	- The Royal Development Projects Board (RDPB) - The Cooperative Promotion Department - The Land Development Department
Quantity of employees	- Two officer - Four staffs
Service charge	- 1 baht/kg.
Quantity of machines	- There are two machines, but currently only one is used.
Production capacity of rice mill	- 1.2 ton paddy per day
Quantity of production in 2017	- Total of 101 tons of paddy
Machine operating time	- 7 hours per day
Rice paddy variety Processing Service	- All rice paddy variety

In regard to machines used in the rice mill, the first machine was SATAKE Model 1070, produced in Japan, with a capacity of 24 tons per day. This machine has a complicated system and difficult to learn for workers at that time. In 2011, the Royal Development Projects Board (RDPB) allocated 3,600,000 baht to build a rice mill and gave the second machine named “Chiyo” to the rice mill. Chiyo was SMS 12 TSC Model with 15 horsepower and the capacity of 12 tons per day. The production capacity of the second was less than the first one because it was a rice mill used in a community level, and this model was made in Thailand which was not complicated and more easy to use than the first one. Both machines used

electricity in production. At present, the first machine temporarily stopped using due to its old condition and the malfunction of the machine. Only the second machines can still be used with the full mill capacity of 1.2 ton of paddy per day. But in case of Rice Berry or Jasmine Rice Rad, it takes longer time to process the same amount of rice. The average production volume is 0.8 tons per day. The working time of the rice mill machine is 7 hours per day of government work hours (Table 1).

Supply chain analysis of Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd

Supply chain analysis is a process starting from purchasing raw materials, manufacturing or processing goods, until - delivery consumers (Araki, 1999). Supply chain is mainly divided into three parts: 1) Upstream is the source of raw materials that feed into the business. 2) Middle stream is the process of processing material to produces, and 3) Downstream is the delivery of products or service to consumers. This supply chain is driven by the need to solve redundant problems and respond to changes by coordinating all activities throughout the chain (Theppitak, 2009). Supply chain management assumed a significant role in firm's performance (Jain *et al.*, 2010).

In this study, upstream was a gathering of paddy to the rice mill for processing. Middle stream was rice processing, and downstream was the delivery of rice to customers. From figure 1, the KHSAC Rice Mill provided rice milling to farmers in Chachoengsao and neighbor provinces. Paddy, was gathered from two channels. The first channel was from 10 members of KHSAC Rice Mill. The cooperative was the buyer of paddy and stocked it in a warehouse. The paddy then was sent to the rice mill to process as customers' requirement. In 2017, the KHSAC Rice Mill purchased totaling 14,189 kilograms of rice from farmers, or approximately 14 tons. When the paddy was milled to processing rice, the rice mill returned rice and by-products such as rice bran, broken rice, and rice husk back to the cooperative. The cooperative produced rice in both packaging and non-packaging for sale to consumers by themselves. The second channel was from farmers, especially those in the area. In 2017, the ordinary and non-member farmers brought their paddy to process at the rice mill covering 87,372 kilograms or about 87 tons. When the paddy was processing as rice, the rice mill returned rice and by-products such as rice bran, broken rice, and rice husk to those famers. Most farmers brought rice form the rice mill for their consumption to reduce their cost of living. On average, paddy rice sent into the rice mill was 101 tons per year which was less than the rice mill capacity of 1.2 tons per day. This finding revealed that the rice mill may not perform with its full efficiency. The details of supply

chain of Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd. is demonstrated in figure 1.

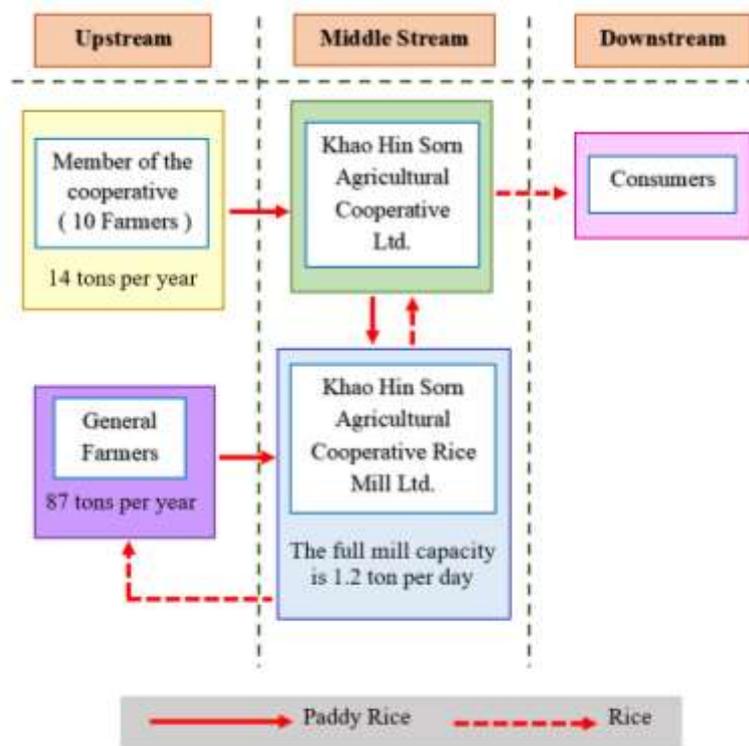


Figure 1. Supply chain of Khao Hin Sorn Agricultural Cooperative Rice Mill Ltd.

SWOT analysis of the operation performance of Khao Hin Sorn agricultural cooperative rice mill Ltd

A SWOT analysis evaluates the internal strengths and weaknesses, and the external opportunities and threats in an organization's environment (Sammut-Bonnici and Galea, 2015). SWOT analysis is a method or tool helping in strategy planning that are known and widely used in business and a number of works (Hutanuwatr, 2002). The word SWOT derived from an acronym of 4 words (Naveekan, 1995):

- “S”, from the word "strengths", is the ability and the positive situation within an organization or a good practice operation.
- “W” from the word "Weaknesses", is a negative situation within the organization, or inferior or bad performance of an organization.
- "O" from the word "Opportunities", is an external factor and environment that yields positive results to the operation of the organization, or external environment that is beneficial to the operation of the organization.

- "T" from the word "Threats", is an external factor and situation that hinders the functioning of the organization, or external environment that is a problem to the operation of the organization.

The results of SWOT analysis can reveal the potential and capabilities of the organization leading to strategic planning and enhancement of organization capacity (Bartol and Martin, 1994). In addition, SWOT analysis can determine factors that assist a firm to accomplish its objectives, and walk through obstacles that the firm has to overcome or minimized them to achieve the preferred results (Singh, 2010). The results from SWOT analysis of the operation performance of Khao Hin Sorn agricultural cooperative rice mill Ltd. under the framework of the supply chain can be analyzed as presented in Table 2.

Strengths of the KHSAC Rice Mill

The rice mill was built on the initiative of His Majesty King Rama IX to help farmers to help themselves which makes this rice mill is more reliable and well-known to people dwelling within and outside the area. The officer in charge of the operation of the mill has gained experience in the rice mill operation for 15 years. A longer insight of experience in milling is advantageous for millers to gather information about producers and markets (Furuya and Sakurai, 2005). This rice mill offers rice processing service fees to farmers at an inexpensive rate (only 1 baht/ kilogram of paddy). Farmers are able to obtain both rice and by-products from the processing, namely rice husks and broken rice. Farmers can take advantage of these by-products such as raising animals, or making fertilizer for their plants.

Weaknesses of the KHSAC Rice Mill

The KHSAC Rice Mill does not verify the quality of the paddy collect from farmers before processing leading to the uncertainty of rice, depending on the quality of paddy rice that farmers bring to the rice mill. Farmers have to check the quality of paddy rice by themselves in order to get the high quality rice that they needed. Rice Knowledge Bank indicated that the starting quality of paddy should be good with right moisture at 14% and have a high purity. Secondly, the rice mill processes all kinds of rice in the same milling machine according to farmer's queue immediately. The mill does not gather and separate rice types before processing. When the mill processes different types of rice, especially rice with different colors, such as Rice Berry Rice, or Red Jasmine Rice. The rice mill must run clear the small rice fragments, which wastes time for operation. Then, the rice mill lacked of specialized staff to repair and maintain the rice mill machinery. When the machine is out of order, the rice mill must hire a mechanic from somewhere else which is time-consuming. The rice mill

staff should resolve problems by themselves. In addition, this rice mill is run by the government, so the difference between this rice mill and conventional ones is that this mill must send all income to the government. When the rice mill needs to use a budget for operations, such as repairing a machine, the mill cannot use money immediately. Instead, the money must be requested to the center for budget allocation. This process consumes considerably long time leading to the shortage of budget when emergency. Finally, this rice mill has more capacity than the amount of paddy sending to the rice mill. The rice mill does not operate with full capacity, causing the waste of resources in the operation of the rice mill.

Opportunities of the KHSAC Rice Mill

The rice mill can reducing the cost of living in the economic downturn and this may be due to the sufficiency economy. The results revealed that the key opportunity for the KHSAC Rice Mill was that the farmers increased trend to consume their crops, processing by themselves. In addition, the government has supported the establishment of other rice mill in the country, in terms of budget, knowledge, machines, etc. Indeed, the rice mill cooperative still requires government support, since the mills not possible to produce good quality milled rice with a poor milling equipment even, if the paddy quality is optimal and the operator is skilled (Rice Knowledge Bank, n.d).

Threats of the KHSAC Rice Mill

The rice mill are located in agricultural areas with little rice farming. Most of them are cassava farming. This area is less paddy than other areas. As a result, the quantity of paddy processed at the rice mill was less than that of the rice mill in most rice farming areas. This may affect the revenue of the rice mill. Nowadays, there are many technologies in machine development to be smaller and affordable which make a rice mill at a community level. Farmers have the option of bringing the rice to nearby processing instead of bringing the paddy to KHSAC Rice Mill for convenience and cost reduction, and in line with the government's support for farmers to set up rice mill in their own areas so that farmers can rely on themselves. As a result, the amount of paddy that farmers brought to a rice mill would be decreased, and income from rice processing services would be reduced. Appropriated location of rice mill should be located in a wider area of paddy field, with a high level of rice production, and in harvested area (Paman *et al.*, 2016).

Table 2. SWOT analysis of the operation performance of Khao Hin Sorn agricultural cooperative Rice Mill Ltd

SWOT	Description
Strengths	❖ This rice mill was built on the initiative of His Majesty King Bhumibol Adulyadej of Thailand making this mill is more reliable and well-known.
	❖ Rice mill officers have long experience in operation of the rice mill.
	❖ This rice mill offers inexpensive rice processing service fee (only 1 baht/ kilogram of paddy). Farmers can receive both rice and by-products from the processing.
Weaknesses	❖ The rice mill does not check and control the quality of the paddy before processing.
	❖ The rice mill processes all kinds of rice in the same machine immediately which wastes operation time.
	❖ The rice mill lacks of specialized staff to repair and maintain the rice mill machines.
	❖ The rice mill has budget shortage problem because the mill must request budget allocation from the center. This process consumes considerably long time.
	❖ The rice mill has more capacity than the amount of paddy that farmers bring to the mill.
Opportunities	❖ The rice mill receives supports from various agencies in budget, personnel, and administration.
	❖ The increasing trend of farmers consuming their crops and processing by themselves.
	❖ The government supports the establishment of more rice mill.
Threats	❖ The rice mill is located in agricultural areas with little rice farming making lower amount of paddy.
	❖ Development of small and affordable rice mill in community level results in farmers are able to choose to bring their paddy to neighboring mills.
	❖ The government supports the establishment of community rice mill for farmers, resulting in more competitors.

Discussion

Rice mill cooperatives are an important role in the development of the rice farming sector and in promoting food security for farmers. This research investigated the operation performance of the Khao Hin Sorn Agricultural Cooperative (KHSAC) Rice Mill Ltd., Chachoengsao Province, Thailand, as a case study. SWOT analysis was applied to determine the operation performance by using supply chain framework. The result revealed that the strong points of the cooperative rice mill are royal patronage that can provide inexpensive milling service charge for farmers. Additionally, operation staff had experience in rice milling for a long time. This strong point was consistency with the Good Manufacturing Practices (GMP) for Rice Mill (2010) as specified in the control of operation that skill and experience used to accurately and efficiently control the operations in order to obtain the good quality of rice products. This points was also in line

with the Japan International Cooperation Agency (JICA, 2015) stated that experienced operators are needed for operators' technical capabilities. Thus, this point can be interpreted that experienced of operational staff is the chief strong point for rice mill cooperatives.

Whilst the weaknesses were that the rice mill did not check the quality of paddy before milling-process. The way to solve this weakness was that the mill should check and record paddy receiving from farmers to control operation and quality of finished rice/polished rice (GMP for Rice Mill, 2010). Another weakness was KHSAC did not have specialized technicians to repair a milling machine as well as the budget deficit. This result was similarly to the study of JICA (2015) that the challenge of rice milling service in Papua New Guinea was there were not enough technicians capable of maintaining machines.

In terms of the opportunities, the rice mill had a wide range of support from organizations in terms of budget, staff, and administration. This result can indicated that the funding support was an implementation of rice mill cooperative (Udin *et al.*, 2014). This factor helped to enhance the KHSAC to run rice milling. Moreover, farmers preferred consuming rice grown by their own. Finally, the threats were that the rice mill was located in a non-rice-farming area, and it operated less than the full milling capacity.

This study suggests that in rice mill operation, skilled people for machine maintenance, and repairing machines are required. Additionally, the provision of budget for operating continuously and efficiently is also necessary. KHSAC have more available funds and support, but it needs to collect more paddy to increase their operation rate which is consistent with Furuya and Sakurai (2005). The establishment of rice mill should study the amount of rice grown in the established area to know the amount of paddy in the area in order to meet the needs of rice mill. Moreover, the collaboration with supply chain partners should be encouraged to increase the quantity of paddy for milling process.

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