

# THE STUDY OF PARBOILED RICE'S SUPPLY CHAIN IN THAILAND

by

**Sakgasem Ramingwong**

Department of Industrial Engineering,  
Chiang Mai University, Chiangmai, Thailand  
Tel: (66) 53-944126, Fax: (66) 53-944185  
Email: sakgasem@gmail.com

**Wassanai Wattanutchariya**

Department of Industrial Engineering,  
Chiang Mai University, Chiangmai, Thailand  
Tel: (66) 53-944126, Fax: (66) 53-944185

and

**Wimalin Laosiritaworn**

Department of Industrial Engineering,  
Chiang Mai University, Chiangmai, Thailand  
Tel: (66) 53-944126, Fax: (66) 53-944185

## ABSTRACT

Thailand has export more than 3.5 million tons of parboiled rice yearly, supporting more than half of world's parboiled rice consumption. However, there have yet to be a study of Thai parboiled rice supply chain. Therefore the paper is aiming at identifying the supply chain of the parboiled rice and analyzing the supply chain using Value Stream Mapping, Value Stream Analysis and SCOR model. The scope of the study covered from farmer, middle man, parboiling and milling factory and exporter. The data used is taken from both primary data, i.e., factory visit and interview, and secondary data. Result of the study indicates improvement suggestion as well as identifies the best practice. Also suggestion to the policy maker is given.

## KEYWORDS

Parboiled Rice Supply Chain, Value Stream Mapping and Value Stream Analysis, SCOR Model

## INTRODUCTION

As the "kitchen of the world", Thailand exported more than 9 million tons of rice to global market in 2010, accounting more than 5.2 trillion USD. (Department of Export Promotion, 2010) Where there are several kind of rice exported from Thailand including Jasmine white rice, Glutinous rice, Brown rice, etc., among those, Parboiled rice is one of the most demanding one, sharing nearly 40% of those exported volume, i.e., 3.5 million tons. Major market of the parboiled rice includes countries in Africa, East Asia and Europe, eg, Cameroon, Nigeria, Saudi Arabia, Kuwait, Israel, Lebanon, Italy, German, France, etc.

With such big market opportunity, Thai parboiled rice firms have expanded in number and their capacity since 2002. Today, there are more than 100 parboilers with a gross capacity of more than 42,300 ton per day.

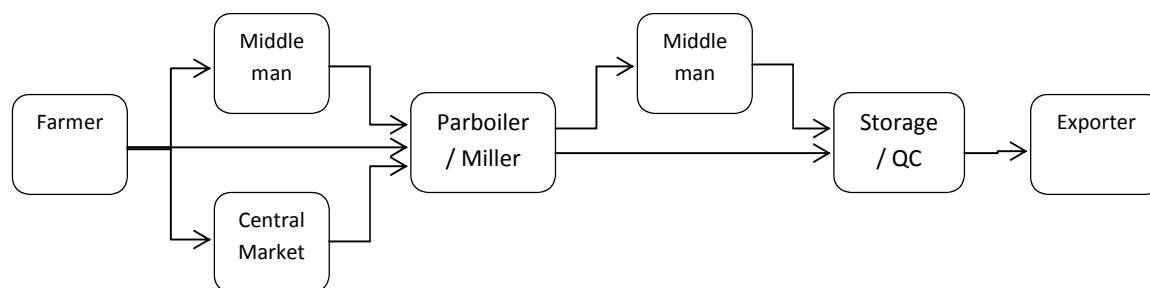
### *Production of Parboiled Rice*

Parboiled rice has been popular for some countries. Because of its physical texture and its cost, it has been demanded and became familiar with these consumers. Parboiled rice used normal rice or sometimes low-graded rice as a raw material. It was then cleaned, soaked, steamed, dried and milled at specific conditions and becoming parboiled rice. The original objectives of parboiling process are that it can reduce losses while milling and it can reduce nutrition losses. Parboiled rice is normally light brown in color, having light scent, and full seed. It has a long shelf life with high nutrition (Vitamin B and E) and it can expanded firmly when cooked.

### ***Parboiled Rice Supply Chain***

The supply chain of parboiled rice starts from farmers that grow rice. Where they can sell their product directly to the parboiling and milling factory, they can also sell at central market. Where most of the time, they will be contacted by middle man per factory or exporter order. The parboiler/miller received rice as raw material and produce parboiled rice using parboiling process described. Then the factory either sell the product to a middle man or sell directly to the storage, packaging, quality control company before it can be sold by the exporter. The parboiled rice exporters mostly have made purchasing agreement with firms in the destination countries.

**FIGURE 1  
PHYSICAL FLOW WITHIN PARBOILED RICE SUPPLY CHAIN**



### ***Production Problem in Supply Chain Member***

From interviewing with parboiled rice supply chain members, several problems arise. For example, farmers, as the initial source of the chain, have to take risk in rice growing. The risks involve weather, pest, changes in production cost (eg, fertilizer). Long inventory may result in moisture content, and therefore result in rice's quality. However, farmers are hardly influenced in buying/selling price. Negotiation power was limited to only buyer. Middle man also face problem with government policy of price intervention and quality drop. Parboiler/Miller are also playing significant roles in the supply chain as possessing main value added activities. They also face the same problem with the middle man. Where quality drops, they take risks in rejection of the product. Another big problem of parboiler/miller is that they are Make-to-Order of the rice exporter which again dependent to buyer overseas. Therefore, parboiler/miller will not be able to plan their production. This results in high cost of production and maintenance.

## **LITERATURE REVIEW**

Basic supply chain tools being used in this study are Value Stream Mapping/ Value Stream Analysis and SCOR Model. The tools are not new however the context of parboiled rice is yet to be seen. Therefore, the following section will only brief these commonly-known techniques.

### ***Value Stream Mapping/Value Stream Analysis***

Value stream mapping and Value Stream Analysis is one of the most popular supply chain analysis techniques focusing on the flow of materials and information required to deliver a product to a consumer. With a indicators of time, each activities would be categorized in terms of Value-Added Activities (VA), Non-Value Added Activities (NVA) and Necessary-Non-Value Added Activities (NNVA). Therefore, improvement in the supply chain can preliminarily identified.

There are yet to be a study on parboiled rice value stream. However, Santiwatanathum, N., Sirisoponsilp had studied about Jasmine rice and indicates non-value-added activities of 57% of total time. (Santiwatanathum and Sirisoponsilp, 2002) Apart from that there are several studies on other agricultural products using value stream mapping and analysis techniques. (Surapeepong, 2007, Francis, 2004, Simons et.al, 2005, Pratanadee et.al., 2010, Titicharoenpong and Sopadang, 2007)

### **SCOR Model**

Supply Chain Operations Reference Model (SCOR Model) is a process reference model developed to address, improve, and communicate supply chain management practices within enterprises.

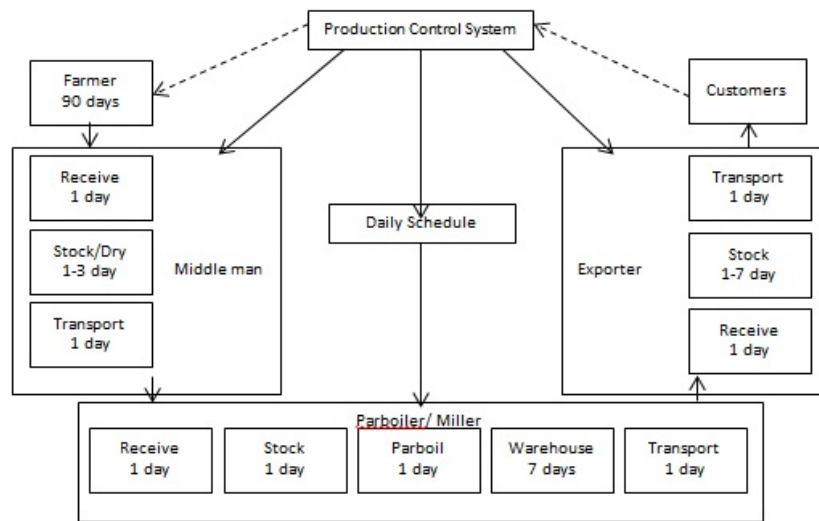
SCOR is based on 5 processes: Plan, Source, Make, Deliver, and Return, providing three-levels of process as Level 1 to defining scope, Level 2 to configuring the supply chain and Level 3 to as the process element details.

SCOR is widely used in the supply chain study where it can identify the strength and weakness, hence suggest the improvement potential. Given an example of the study related to the agriculture products, the supply chain study for Thai cassava using SCOR model by Pratanadee et.al. (Pratanadee et.al., 2009) reflected the weakness of the supply chain as the lack of suitable processing technology, low quality of raw material, ability to meet customer requirement in terms of capacity and quality of the finished products. The suggestions are such as introduction of Good Agricultural Practice (GAP) and Contract Farming to improve the standard of the supply chain.

## **RESULT PRESENTATION**

### ***Parboiled Rice's Value Stream***

**FIGURE 2  
VALUE STREAM MAP OF PARBOILED RICE**



From literature, interviewing, site visiting and questionnaires, supply chain of parboiled rice can be grouped into 12 activities as shown in VSM in Figure 2 accounting in 114 days from farmers to overseas buyers.

After analyzing the data, it can be found that 91 days from 114 days are of "Value-Added". These activities are 90-day rice growing and 1-day parboiling process. Apart from that, there are 17-day non-value-added accounting from inventory at middle man, parboiler/miller, exporter. These inventory is logistics-wise non-value added however important for those of marketing and selling price. The 6-day non-value-but –necessary activities are receiving and transportation from member to member in the supply chain.

**TABLE 1**  
**VALUE STREAM ANALYSIS OF PARBOILED RICE SUPPLY CHAIN**

Value of Activity	Activities		Time	
	No. of Activities	%	day	%
Value-Added Activities (VA)	2	16.66	91	79.82
Non-Value-Added Activities (NVA)	4	33.34	17	14.91
Necessary-Non-Value Activities (NNVA)	6	50	6	5.27
<b>Total</b>	<b>12</b>	<b>100</b>	<b>114</b>	<b>100</b>

From the table, it can be seen that more than 80% of the activities are value-added. However, a majority of it is taken from rice growing activities (90 days) which is accompanying with serious risks. In addition, this value-added activity is playing a non-dominance role in the supply chain, especially pricing, bargaining and negotiation power. The reverse relationship between value and pricing may result in misleading of the supply chain management in such case.

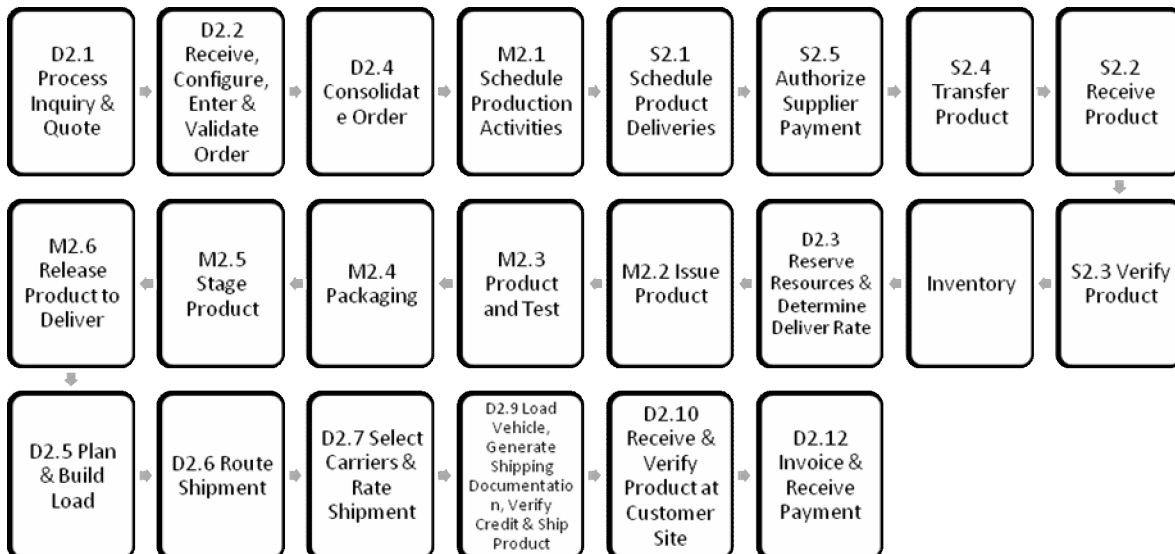
***Parboiled Rice’s SCOR Model***

On the top level or process type, the study focuses on Source, Make and Deliver processes. Whilst, at present, there is no production planning and very few returning, Plan and Return processes were excluded from the interest of the study.

On the configuration level, the processes are categorized into S2 - Source Make-to-Order Product, M2 - Make-to-Order and D2 – Deliver Make-to-Order Product.

On the process element level, the processes are decomposed into 23 activities. However, activities D2.8 Pick Staged Product and D2.11 Test & Install Product are not consistent with parboiled rice supply chain, they were excluded from the consideration. In addition, the inventory activity was included as suitable.

**FIGURE 3**  
**SUPPLY CHAIN ACTIVITIES FOLLOWING SCOR FRAMEWORK**



Upon this research, 5 supply chains involves in the data collection. (Company name was enclosed per companies’ request.) However, the basic information was given such as the production capability. These 5 case study parboilers have a capacity of 500, 450, 200, 0.5 and 240 tons per day.

Data collection was conducted based on SCOR framework. For example, the following table demonstrates the data on M2.3 Product and Test

**TABLE 2**  
**EXAMPLE OF DATA COLLECTION – M2.3 PRODUCT AND TEST**

Topic	Indicator	M2.3 Product and Test				
		A	B	C	D	E
Reliability	Production Loss Percentage	10	20	10	10	40
Responsiveness	Production Time (hr)	20.80	18.75	8.33	0.08	3.33
Flexibility	Production Change Percentage	90	90	90	100	70
Cost	Ratio of Production Cost and Material Cost	12.5	12.5	25	5	25

Whilst collecting all information needed for the assessment following SCOR framework, it can be found that all 5 case study chains shows low performance. They consistently possess low logistics efficiency. Their operations are mostly unplanned and very dependent to global market price. This issue results in sometimes excessive and sometimes out-of-stock inventories. The production is also low in quality as the input material are not well prepared and well planned. Where the best practice among 5 case study chain can be identified, the figure found cannot meet the researcher own satisfaction. There are several improvement can be done to increase the supply chain efficiency.

### SUMMARY

The study focusing on parboiled rice's supply chain using Value Stream Mapping/ Value Stream Analysis and SCOR Model reveals several topics for improvement. Where the non-value added activities which mostly are the inventory at receiving station from each supply chain members are improvable, planning process are among the top issue to improve the supply chain efficiency. Marketing mechanism can be a good improvement scheme where the chain can be more negotiative to the market.

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