

# **OPTIMIZATION IN THE SUGAR TRANSPORT PROCESS CASE STUDY: ABC SUGAR TERMINAL PUBLIC COMPANY LIMITED.**

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## **ABSTRACT**

This research aimed to study causes of the problems in the process of sugar transport from the warehouse to dock of ABC Sugar Terminal Public Company Limited in order to find solutions to the sugar transport process from the warehouses to the port of ABC Sugar Terminal Public Company Limited. The sample of this research was people who work in the dock of ABC Sugar Terminal Public Company Limited and are involved in the transport process from the warehouse to the dock. The research tools that were used in collecting data were in-depth interviews.

From the research, it was found that the sugar transport process from the warehouse to the dock can be improved to increase efficiency in which costs can be reduced. As the lead time per cycle of the transport process from the warehouse to the dock is quite long and there is a high labor cost, there are two steps in the transport process which can be improved. The solution is using plastic carriers to help reduce transport time and costs.

**Keywords :** Optimization; Sugar Terminal; Sugar; transport

## **INTRODUCTION**

ABC Sugar Terminal Public Company Limited was established in 1976 by a group of sugar industrialists who owned nine sugar factories. Originally, the company was registered under the name of The ABC Sugar Terminal Company Limited. with the aim of using warehouses and docks on an area of approximately 93 rai (148,800 m<sup>2</sup>). It later bought additional land and expanded the area to 154 rai 3 ngan 50 wah (247,800 m<sup>2</sup>) to be used as a storage area for sugar to be loaded or unloaded into the cargo ships. It also planned for the warehouses to be next to the Chao Phraya

River to serve as the center of the sugar factories of its members. There are 32 warehouses and 3 docks. Later, The ABC Sugar Terminal Co., Ltd. was listed on the Stock Exchange of Thailand on 13 July 1990 and became a public limited company in 1994, using the new name of ABC Sugar Terminal Public Company Limited. The company provides the services of cargo loading and unloading from cargo ships, dock renting, warehouse renting and goods packing for transportation to foreign countries or transportation for domestic sales. In the sugar storage process of ABC Sugar Terminal Public Company Limited, there will be trucks from the factories which deliver sugar to be stored in the warehouse. On the day of export, the warehouse will be open and the sugar will be transported to the dock by trucks. Cranes are then used to load the sugar onto the cargo ships [1]In 2014, the sugar market in Thailand had a total of 19.23 million tons of sugar produced from sugarcane processing. The consumption and use of sugar in Thailand was 14.34 million tons. At present, Thailand has approximately 9.3 million rai (14,880 km<sup>2</sup>) of sugarcane cultivation area in which 103 million tons of sugarcane are produced. 11.29 million tons of various types of sugar are produced.

22.14% of sugar produced in Thailand is consumed locally and 77.86 % is exported. However, the commencement of the ASEAN community at the end of December 2015 has resulted in the sugar market of ASEAN becoming more open. In the Philippines and Indonesia, sugar is classified as a highly sensitive commodity. Therefore, it is subject to 38 % tax in the Philippines and 30-40 % tax in Indonesia. [6] The fact that ASEAN produces more sugar than its consumption causes ASEAN to have the excess sugar supply of almost 5 million tons that must be exported to markets outside ASEAN. Moreover, Thailand is considered as a major source of sugar production in ASEAN in which about 58.71 % of sugar production in ASEAN is from Thailand. In addition, Thailand is a major exporter of sugar in ASEAN. The total sugar output of ASEAN is 10.23 million tons in which 85.92% of the sugar output is of Thai sugar export [4] As mentioned above about the operation process of ABC Sugar Public Company Limited, the process of transporting sugar from the warehouse to the dock should be improved at each step to reduce time and costs in order to increase efficiency. In addition, having good operation process and supply chain management help increase value of products competitiveness in the market. [7]. Therefore, the researcher would like conduct research on this issue in order to improve the transport process quality which will be beneficial for ABC Sugar Public Company Limited.

## **OBJECTIVES**

- 1) To study causes of the problems in the sugar transport process from the warehouse to the dock of ABC Sugar Terminal Public Company Limited
- 2). To find solutions to the problems in the sugar transport process from the warehouse to the dock of ABC Sugar Terminal Public Company Limited

## **LITERATURE REVIEW**

### Concepts and Theories

- 1) Fishbone or Cause and Effect Diagram shows the relationship between problems and all possible causes.
- 2) Concepts and theories of warehouse define a warehouse as a place for storing, and distributing inventory. Warehouses can have different names such as distribution centers, sales centers and stockrooms.
- 3) Concepts and theories about warehouse management define warehouse management as a process of receiving and storing goods which leads to the delivery of goods to recipients.
- 4) Concepts and theories about transportation efficiency define that transportation development is aimed at improving the quality of transportation with the highest standards and efficiency [5].
- 5) Milk-run theory refers to one of the techniques used to support the just-in-time production system (JIT) to help reduce the total cost of transportation and inventory [2].

## METHODOLOGY

### Population and Sample

The population used in the study was those who work in the dock of ABC Sugar Terminal Public Company Limited in the process of storing sugar in the warehouse. They were the foreman, the dock master, the seaman and the crane driver.

The sample used in the research was those who work in the dock of ABC Sugar Terminal Public Company Limited. Accidental sampling was used to collect data from the sample while they were working in the dock of ABC Sugar Terminal Public Company Limited.

### Fishbone or Cause and Effect Diagram

It was used to analyze the problems of the delivery of sugar to customers which are the following:

#### 1 Man

- Lack of personnel in the transport process and logistics
- Foreign labor problems which is caused by the lack of responsibility

#### 2 Machines

- There are insufficient cranes to load the cargo at the time of the shipment.
- Outsourcing of additional trucks because there are insufficient trucks in the dock to transport sugar.

#### 3 Method

- Work process in the department is too slow. For example, the workers on the ship have to load the sugar onto the ship the ship one sack at a time, causing the process to be slow.

#### 4 Environment factors

- Unpredictable weather in the country such as rain on the delivery date of sugar
- Unsuitable loading area; therefore, sugar has to be moved to a suitable area for loading [3].

## Research Tools

In this research, the researcher used in-depth interviews in data collection. The in-depth interview form was created in accordance with the guidelines and objectives of the research and relevant documents. Herein, five participants were interviewed, including four warehouse employees and one manager.

According to the Fishbone diagram analysis, one effective way to increase the transportation efficiency is to improve the method by using plastic carrier to decrease loading time. Accordingly, the inventory, carrying cost and waste will be decreased.

## ANALYSIS

### Time Used in Sugar Transport from the Warehouse to the Dock (Old Process)

Sugar Transport Process from the Warehouse to the Dock (Old) Time

1. Workers carrying sacks of sugar from the warehouse to trucks 20 min
  2. Trucks going to the scale 10 min
  3. Cranes transferring sugar from trucks to ships 20 min
  4. Workers arranging sacks of sugar on ships 30 min
- Total sugar transport time from the warehouse to the dock 1 hr 20 min

From the table, time used in each step in the process is the following:

- Step 1. Workers carrying sacks of sugar from the warehouse to trucks takes 20 minutes;
- Step 2. Trucks going to the scale takes 10 minutes;
- Step 3. Cranes transferring sugar from trucks to ships takes 20 minutes;
- Step 4. Workers arranging sacks of sugar on ships takes 30 minutes.

The total sugar transport time from the warehouse to the dock is 1 hour 20 minutes.

### **Time Used in Sugar Transport from the Warehouse to the Dock (New Process)**

Process)

Sugar Transport Process from the Warehouse to the Dock (New) Time

- 1. Trucks bringing sugar in plastic carriers from the warehouse 10 min
- 2. Trucks going to the scale 10 min
- 3. Cranes transferring sugar from trucks to ships 20 min
- 4. Workers unhooking sugar from cranes 15 min

Total sugar transport time from the warehouse to the dock 55 min

### **From the table, time used in each step in the process is the following:**

- Step 1. Trucks bringing sugar in plastic carriers from warehouses takes 10 minutes;
- Step 2. Trucks going to the scale takes 10 minutes;
- Step 3. Cranes transferring sugar from trucks to ships takes 20 minutes;
- Step 4. Workers unhooking sugar from cranestakes 15 minutes.

Total sugar transport time from the warehouse to the dock is 55 minutes.

### **Costs of Sugar Transport from the Warehouse to the Dock (Old Process)**

Sugar Transport Process from the Warehouse to the Dock (Old) Costs

- 1. Workers carrying sacks of sugar from the warehouse to trucks (wage for 10 workers) ¥3,000 /day
- 2. Trucks going to the scale -
- 3. Cranes transferring sugar from trucks to ships ¥12,000/day
- 4. Workers arranging sacks of sugars on ships (wage for 10 dock workers) ¥4,500/day

Total sugar transport costs from the warehouse to the dock ¥19,500/day

From the table, cost for each step in the process is the following:

- Step 1. Workers carrying sacks of sugar from the warehouse to trucks costs ¥3,000 /day;
- Step 2. No cost for trucks going to the scale;
- Step 3. Cranes transferring sugar from trucks to ships costs ¥12,000/day;
- Step 4. Workers arranging sacks of sugars costs ¥4,500/day.

The total costs of sugar transport from the warehouse to the dock is ¥19,500/day.

### **Costs of Sugar Transport from the Warehouse to the Dock (New Process)**

Sugar Transport Process from the Warehouse to the Dock (New) Costs

- 1. Trucks bringing sugar in plastic carriers from the warehouse (wage for 8 workers and cost of plastic carriers) ¥2,400 /day

- 2. Trucks going to the scale -
  - 3. Cranes transferring sugar from trucks to ships ₪12,000/day
  - 4. Workers unhooking sugar from cranes (wage for 5 dock workers) ₪ 1,500/day
- Total sugar transport costs from the warehouse to the dock ₪15,900/day

## **SUMMARY OF ANALYSIS**

### 1. Analysis of Sugar Transport Process from the Warehouse to the Dock

It can be seen that there are two changes in the process which are in Step 1 and Step 4. In Step 1, the workers neatly arrange sacks of sugar in the plastic carriers. In Step 4, the workers unhook sugar from the crane when it has been transferred to the ship.

### 2. Analysis of Time Used in Sugar Transport from the Warehouse to the Dock

The table shows the time used in sugar transport from the warehouse to the dock. It is found that the old transport process takes 1 hour 20 minutes / cycle and the new process takes 55 minutes / cycle. Time used in sugar transport can be reduced by 25 minutes / cycle.

### 3. Analysis of Cost of Sugar Transport from the Warehouse to the dock

The table shows the costs of sugar transport from the warehouse to the dock. It is found that the total costs of the old process are ₪19,500/day and the total costs of the new process are ₪ 15,900/day. The costs can be reduced by ₪3,600 / day.

## **RESULT**

The researcher studied the causes of problems in the sugar transport process from the warehouse to the dock and discovered that there are areas which can be improved to increase the efficiency of the sugar transport process from the warehouse to the dock in order to reduce costs and time. There are 2 steps in the process to be improved which occur in the warehouse and the dock. Time used in the old sugar transport process per transport/cycle is long and the costs of the transport process are high. Therefore, the researcher suggested the use of plastic carriers be incorporated in the process to reduce the time and costs

## **CONCLUSION**

From studying the sugar transport process, it can be seen that the old process is time-consuming and costly. In the warehouse, a sack of sugar must be loaded onto the trucks one at a time which is time-consuming. When comparing with the new process, the concept of bringing plastic carriers into use is that the workers can put the sugar in the plastic carriers beforehand, thus saving time on loading the sugar onto the trucks. Moreover, in the old process, when the trucks arrive at the dock, workers have to load the sacks of sugar onto the ship one by one, causing the labor cost to be high and time to be wasted. In the new process, the cranes can load the sacks of sugar in plastic carriers directly onto the ship. The number of workers used is reduced from 15 to 5. This helps save a lot of time and costs.

## RECOMEMMDATIONS

1. Further research can be conducted on other areas in sugar transport process to increase efficiency and reduce more costs sand time.

2. Export process from the source to the destination can be further researched.

However, the limitation of this research should be addressed here, including;

1. This research is specifically for sugar transport process.

2. The transportation employed in this work was break-bulk vessels.

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