

# IDENTIFICATION OF SUGARCANE SUPPLY CHAIN CONDITIONS IN MOJO SUGAR FACTORY IN SRAGEN

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## ABSTRACT

The agricultural sector has an important role in the economy in Indonesia, one of the agriculture sector is plantation subsector. Sugarcane is one of the plants in the plantation subsector that has a high economic value and processed into sugar. Sugar is one of nine basic needs of community, so that the sugar industry is an important element in moving the national economy. Mojo Sugar Factory is one unit of PTPN IX of Surakarta that produce sugar. The decreasing in sugar production gives impact on the decreasing of the sugar industry contribution in Indonesia to achieve the self-sufficiency of sugar. Improving and enhancing the sustainable supply chain management in the sugar industry is expected to increase the production result so as to maximize the value added. This study aimed to determine the conditions of the sugarcane supply chain in Mojo Sugar Factory, in Sragen. The method used in this study was descriptive analysis. The study was conducted in Mojo Sugar Factory in Sragen. Descriptive analysis result showed that the structure of the sugarcane supply chain in Mojo Sugar Factory has a performance that is not optimal.

**Keywords:** supply chain, sugarcane, performance

## BACKGROUND

Sugar is one of nine basic needs in Indonesia, so that the sugarcane industry regarded to be an important element in moving the national economy. Performance of the increased production of the sugar industry to be one of the main points of the government to achieve the self-sufficiency of sugar in Indonesia in 2014 but has yet to be realized. Self-sufficiency of sugar declared a success if it can meet the needs of national sugar consumption in the absence of sugar imports.

Mojo Sugar Factory, in Sragen is one unit of PT. Perkebunan Nusantara, generally known as PTPN IX, the Division of Annuals Plants that process the sugarcane into crystal sugar/granular sugar. In 2015, Mojo Sugar Factory has a production capacity of 2500 TCD (Ton Cane per Day). Planning of

additional production capacity of Mojo Sugar Factory in 2016 will increase from 2500 TCD to 4000 TCD in supporting the achievement of government programs that is the self-sufficiency of sugar by 2019 that will come.

Milling season planning of Mojo Sugar Factory in 2015 is in April to October. In fact, the milling season in 2015 was ended sooner than the milling planning that is considered to be completed in September. Milling season of Mojo Sugar Factory was completed in mid-September 2015 because there were problems in the supply chain of sugarcane as raw material for sugar production.

The main raw material of Mojo Sugar Factory is sugarcane from farmer partnership located in Sragen and surroundings. Sugarcane is the raw material that should be

available when the milling season arrives, when the supply of sugarcane has been over, so the factory production cannot run. The end of the milling season that is faster than the initial planning of the milling season of 2015, give on impact of the decreasing of the production result of White Crystal Sugar in Mojo Sugar Factory.

The result of decreasing sugar production and if it is constantly to decrease, so the government programs in achieving the self-sufficiency of sugar by 2019 is also not easy to succeed as the self-sufficiency of sugar announced in 2014 ago. The increasing productivity of providing excellent service to the supplier that is farmers as sugarcane suppliers and consumers are becoming one of the efforts in achieving the self-sufficiency of sugar. This needs to be balanced with the development of the sugar industry (sugar factory) which is integrated from plantations to distribution.

One to overcome the problems in the management of Mojo Sugar Factory described above either by improving and developing the supply chain management. Supply chain management will give impact on each of the sugar industry to produce the product on the right time and place. Improving and enhancing the supply chain management of sustainable Mojo Sugar Factory will be balanced to the results of increased sugar production so as to maximize the value added in the supply chain. According to Puryantoro, P., Hani, E. S., & Subekti, S. (2018), supply chain system that is too long and equitable distribution of income in the supply chain that is still low are the issues that must be addressed.

The value added at each agent of the balanced supply chain will result in the increasing of Mojo Sugar Factory production. Thus, it is necessary to define first, on how the conditions of the sugarcane

supply chain in Mojo Sugar Factory in Sragen Regency.

## METHODOLOGY

This study was conducted in Mojo Sugar Factory in Sragen Regency in analyzing the value added and design of performance measurement metrics of the sugarcane supply chain. The selection of location chosen deliberately or purposive, which is based on the purpose of the study (Singarimbun and Effendi, 2006).

Respondents were selected based on purposive sampling method or selected samples. Irianto and Mardikanto (2010) stated that in the sample selection technique (purposive sampling) must go through choices based on the suitability of characteristics, which is owned by the prospective samples/respondents with certain criteria intended by the researcher accordance with the purpose of the study. This method was conducted because the researcher would like to collect data in the form of information from informants who are experts in their fields. Respondents consisted of Head of Plant, Head of Administration, Finance and General, and Head of Processing in Mojo Sugar Factory. Consideration of experts selection involved in the study to determine the experts are position and experience of experts in the field that they do as agent involved along the supply chain of the sugarcane in Mojo Sugar Factory.

Sugarcane supply chain model is discussed descriptively using method of supply chain development, which refers to the framework of the development of the Asian Productivity Organization (APO) following the process framework that has been modified by Vorst (2006).

Supply chain management analysis method used in this study was the structure of the supply chain that is one of the six

aspects of structured study (Marimin and Maghfiroh, 2010). The structure of the supply chain is composed of members of the supply chain, the flow pattern and supply chain entities.

## RESULTS

### 1) Supply Chain Members

In general, the sugarcane supply chain model in Mojo Sugar Factory which is served as the object of this study is shown in Figure 1.

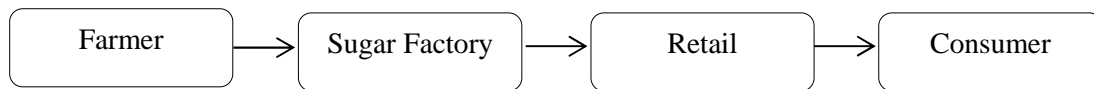


Figure 1. Model of Sugarcane Supply Chain in Mojo Sugar Factory

According to Vorst (2007), on the schematic diagram of the supply chain in the total network of supply chain includes supplier, factory, distributor, retail and consumer. The structure of the supply chain of agricultural products according to Marimin and Maghfiroh (2011) is unique because it does not always follow the order of the supply chain in the total network of supply chain. Figure 1 shows that the members of the sugarcane supply chain in Mojo Sugar Factory in Sragen include farmers, Mojo Sugar Factory, Retail and Consumer. This is due to the study focus on the condition of the sugarcane supply chain in Mojo Sugar Factory especially in Sragen Regency. In addition, there is no sugar distributor in Sragen Regency who participate in the auction of sugar in the Board of Directors of PTPN IX of Surakarta.

Farmer is the first agent in the sugarcane supply chain in Mojo Sugar Factory. Farmer has full responsibility on tasks of sugarcane cultivation/farming starting from planting to harvesting. Farmer as the first link in the sugarcane supply chain in Mojo Sugar Factory served as a supplier of raw materials, namely sugarcane. The process of sugar production in Mojo Sugar Factory will run smoothly when the supply of sugarcane that is milled always available.

The number of farmer partnerships in the Mojo Sugar Factory in 2013-2015

experienced the fluctuation. In 2013 the number of farmer partnerships of Mojo Sugar Factory as many as 334 farmers, in 2014 it decreased by 32 farmers and in 2015 had increased so that the number of farmers partnerships become 311 farmers. Mojo Sugar Factory farmer partnerships have a role in the supply of sugarcane. There is the implementation of the sugarcane nursery by farmers who conducting their own nursery and those who buy the sugarcane seedling. Planning of sugarcane planting conducted by the Mojo Sugar Factory farmers by taking into account the information related to the market condition. This is due to the farmers considered as farmer partnerships and key suppliers of raw materials for Mojo Sugar Factory that is sugarcane. Sugarcane has a good quality depending on the pattern and the technology applied by the farmers. In 2015, the farmer partnerships of Mojo Sugar Factory divided into 7 Plant Staffs.

Sugarcane supply chain in Mojo Sugar Factory implementing the contractual systems with farmer and retail partnerships. Farmer partnerships that need sugarcane planting capital may be assisted by Mojo Sugar Factory to provide recommendations on the capital loan from Micro Credit Program through the bank. However, there are farmer partnerships who are not borrowed the capital of Mojo Sugar Factory, so that the farmer partnerships are not bound by a contract that must be

fulfilled by farmer related to the quantity of sugarcane in incorporating the sugarcane to the factory. Therefore, the sugarcane farmers can mille the sugarcane to wherever sugar factory so that Mojo Sugar Factory production is very dependent on the supply of sugarcane from farmers.

Mojo Sugar Factory enforces the contract towards the retail through the Board of Directors of PTPN IX of Surakarta as a legal entity from Mojo Sugar Factory. The contract is in the form of payments agreement based on results of the auction of sugar to the Mojo sugar factory through the Board of Directors of PTPN IX of Surakarta. For the retail and distributors who agree with the auction price of sugar after completing the further payment

to get the DO (Delivery Order) used to take sugar in the Sugar Mojo.

**2) The Flow Pattern in the Supply Chain**

In the supply chain, there are generally three kinds of flows that must be managed. The first is the flow of products that flows from the upstream to downstream. Second is the flow of financial that flows from downstream to upstream. Third is the flow of information that can flow from upstream to downstream or vice versa (Pujawan, 2005). The structure of the sugarcane supply chain consists of farmer, company, retail and final consumers. Figure 2 shows the pattern of flow in the sugarcane supply chain in Mojo Sugar Factory.

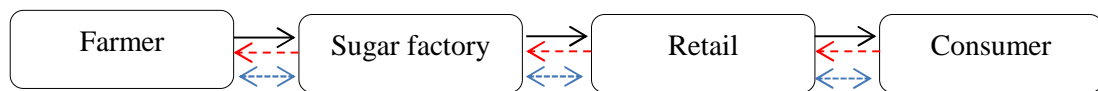


Figure 2. Flow Patterns in the Sugarcane Supply Chain in Mojo Sugar Factory

- Information
- Flow of Products
- ← - - - Flow of Financial
- ← - - -> Flow of Information

The flow of products in the sugarcane supply chain in Mojo Sugar Factory can be seen in Figure 2. The flow of the sugarcane supply chain starting from the farmers as producers and providers of raw materials, namely sugarcane. The harvested sugarcane will be sent by the farmers to Mojo Sugar Factory using trucks that had been rented by farmers. Before being sent, the sugarcane is selected based on the analysis of the sugarcane maturity level, then the stem of sugarcane is purged from all of dirt and the leaves and roots of sugarcane are removed. After sugarcane arrive in Mojo Sugar Factory, then the sugarcane will be given the treatment in the form of sugarcane processing into sugar.

Sugar produced is sugar that can be accepted by consumers. Sugar that appropriate with the standards will be auctioned by the Board of Directors of PTPN IX of Surakarta. The auction process of sugar followed by several agents including farmers, PTPN IX and the registered distributor or retail. Sugar then auctioned by reference to Farmer Purchase Price established by the Government so that the auction price in the range of Farmer Purchase Price. After the auction of sugar, it will be announced the winner of the auction and do the publishing of Delivery Order (DO) as proof of the agreement and the amount of sugar prices. Retail that wins the auction brings the DO to Mojo Sugar Factory and then the sugar in

retail can come down to the final consumer.

The flow of financial in sugarcane supply chain occurred from the consumer, retail, Mojo Sugar Factory and farmer. Transaction system between farmers and Mojo Sugar Factory that is revenue sharing system. Mojo Sugar Factory get a share of the sugar production produced from sugarcane of farmer partnerships, it is the repayment for Mojo Sugar Factory who has made the processing of sugarcane and do the counseling/guidance to the farmer partnerships. Percentage of sugar revenue sharing is 66% for farmers and 34% for Mojo Sugar Factory. The percentage is the revenue sharing that has been agreed by the farmers and Mojo Sugar Factory that is considered mutually beneficial for both parties. The higher sugarcane yield of farmer partnerships, the greater the revenue earned by farmers. Farmers in getting the revenue sharing are not entirely in cash, the revenue sharing of farmers is divided into two parts: 90% in cash and 10% in the form of sugar. The cash earned by farmers based on the auction results of the Board of Directors of PTPN IX of Surakarta, which is a legal entity from Mojo Sugar Factory. In the sugar trade system, auction price is ideally above the Farmer Purchase Price set by the government. It aims to guarantee the benefit of sugarcane farmers and sugar producers. Determination of Farmer Purchase Price by the government is assumed to have been considered the benefit of farmers and producers (the Ministry of Commerce, 2015). The determination of Farmer Purchase Price that caused the price of sugar is more stable because the objectives achieved in the auction process will revolve around the Farmer Purchase Price and the prices established is the best price in a transparent manner (Ministry of Commerce, 2015). At Mojo Sugar Factory, retail will do the

payment in accordance with the auction price that has been agreed through the Board of Directors of PTPN IX of Surakarta.

The information flow within the supply chain occurs over the telephone. The flow of information occurs on farmers to Mojo Sugar Factory and then to retail and to the final consumer or otherwise. Information between farmers and Mojo Sugar Factory is in the form of auction prices of sugar and counseling to farmer partnerships about the cultivation of sugarcane so that the productivity and quality of sugarcane increased. Information between Mojo Sugar Factory and retail is in the form of sugar auction prices transparency and quality of auctioned sugar. Information between retail and consumer is in the form of products quality offered by the sellers.

### **3) Sugarcane Supply Chain Entities**

#### **a) Product**

Traded products in the supply chain are White Crystal Sugar that known as granular sugar. Sugar is the main production result of Mojo Sugar Factory produced in accordance with the quality requirements of SHS (Superior High Sugar) sugar. Production result of Mojo Sugar Factory must come into range of White Crystal sugar at class I or II in accordance with the sugar quality requirements specified in the Indonesian National Standard (INS), the table details of INS 3140.3: 2010

#### **b) Market**

Demand for sugar from year to year has increased because sugar is one of the food basic needs of community. Sugar in the supply chain is devoted to the various segments starting from retail to consumers around Java, especially in Central Java.

#### **c) Stakeholders**

The parties involved in the sugarcane supply chain in Mojo Sugar Factory called as

stakeholders either directly or indirectly. Each agent in the supply chain of their business process wishing for gain.

## CONCLUSIONS

Condition of sugarcane supply chain in Mojo Sugar Factory has a supply chain performance that is not optimal, this is due to several obstacles that become problems in the supply chain of sugarcane, such as sugarcane supply shortage and their farmer partnerships who are not bound by a contract. The optimal performance of the supply chain has not been achieved but Mojo Sugar Factory has the key to success that could encourage the activity of the supply chain to be optimal, such as create trust with farmer partnership and retail, convenience of accessing the capital to farmer partnerships, has a number of farmer partnerships who are always increasing and maintaining the good quality of sugar.

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